Title
Proposal for a Graduate Program in Rehabilitation Science Leading to the Degree of Doctor of Philosophy in Rehabilitation Science at the University of California, San Francisco.

Date of Preparation
December 20, 2013

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SECTION 1: INTRODUCTION

1.1. Aims and Objectives

The UCSF Department of Physical Therapy and Rehabilitation Science, in collaboration with faculty from the Department of Physical Therapy at San Francisco State University (SFSU), seeks to offer a unique opportunity to study rehabilitation science. While the historical perspective for PhD programs within this field has been to address the clinical sciences, we envision a non-traditional approach that addresses the broader perspective of both basic and clinical sciences in the areas of musculoskeletal and neurorehabilitation. Such an approach offers substantial opportunity for cross-fertilization between the basic and clinical sciences and is in line with the definition of rehabilitation science, as put forth by the Institute of Medicine (IOM).

As defined by the IOM, rehabilitation science encompasses “basic and applied aspects of health services, social sciences, and engineering as they relate (1) to the restoration of functional capacity in a person and (2) the interaction of that person with the surrounding environment”1.

This proposal aims to establish the first PhD in Rehabilitation Science program at a publicly funded higher education institution in the State of California. The PhD Program in Rehabilitation Science is a logical and much needed step in the development of the Graduate Program in Physical Therapy at UCSF and fills an important gap for the UCSF Graduate Division. The existing joint UCSF/SFSU Doctor of Physical Therapy Science (DPTSc) program will be phased out as the new PhD Program in Rehabilitation Science is implemented.

The PhD in Rehabilitation Science program leverages the current collaboration with San Francisco State University, by including a wide variety of faculty with diverse knowledge and expertise in the field of rehabilitation science. The new PhD program will contribute to the discipline of rehabilitation science while also furthering the health sciences, advancing healthcare goals of the university, and increasing consumer access to evidence based health care. The proposed PhD program is unique in the State of California, as well as the University of California system. Within UCSF, the PhD program maximizes the integration of the depth and breadth of offerings and opportunities for training in a number of interdisciplinary areas related to rehabilitation science.

The proposed size of the program will begin with two students admitted every other year. This model was established given the number of current faculty in the Department of Physical Therapy and Rehabilitation Science and the funding available to support PhD students. We anticipate a moderate growth with a maximum size of 2 students admitted every year (8-10 students in the program at any given time). This size will allow us to provide adequate funding and mentorship support to students. With more funded faculty and a T-32 training grant, there may be potential for the program to admit more students. The proposed size of the program is in line with the size of institutions with similar degree programs (see Table 1 on page 6).

The specific aims and objectives of the PhD program are as follows:

1. Create a preeminent center of learning and discovery in rehabilitation science at the doctoral level.
2. Leverage the expertise of faculty within the academic program at both UCSF and SFSU to strengthen and expand the training in rehabilitation sciences available to students and develop academic areas of focus that draw on the strengths of our faculty and the campus.
3. Take advantage of the highly interdisciplinary nature of UCSF and the diversity at SFSU to expand the learning opportunities and enrich the collaborative science research experience for our graduate students.
4. Enhance interactions with the broader academic community in rehabilitation science centers of excellence at the national level.

A central goal of the program is to capitalize on the highly interdisciplinary nature of UCSF and create an academic program that integrates multiple disciplines. PhD students will have the opportunity to participate in specialized training in areas that will ensure distinction of the PhD program at UCSF. These specialized areas include:

**Musculoskeletal Biomechanics**

Musculoskeletal Biomechanics is one of the foundational sciences of physical therapy and rehabilitation science. Motion analysis and applied biomechanics have roots from over a century ago; however, with recent advances in technology, new and innovative ways to assess and record human movement are being developed. Furthermore, reduction in costs for some biomechanics research methods is resulting in larger numbers of laboratories performing these investigations. The result has been an explosion in high-quality biomechanics research performed across the country and beyond. These discoveries are being translated immediately to the clinic for improved patient care.

The proposed program will train new investigators on the latest advancements in musculoskeletal biomechanics and prepare them for careers in research in academia and industry. General areas of study in the Musculoskeletal Biomechanics track include: 1) assessment of normal and pathological human movement using motion analysis and kinematic imaging techniques, and 2) quantitative imaging of the musculoskeletal system, including advanced quantitative magnetic resonance imaging (MRI), spiral computed tomography (CT), high-resolution peripheral quantitative computed tomography (HRpqCT), and Positron Emission Tomography (PET). The UCSF Human Performance Center is a state-of-the-art motion analysis laboratory with a 10-camera VICON optical motion capture system and three AMTI force platforms for measurement of ground reaction forces. This laboratory, which is dedicated to research, is the only active motion capture system at UCSF. The UCSF Musculoskeletal Quantitative Imaging Research (MQIR) group is a large group of interdisciplinary researchers dedicated to advancing quantitative imaging for clinical implementation and development of post-processing and training procedures for research and clinical use. This group has access to two 3T research-dedicated MR scanners, one whole-body 7T MRI scanner, HRpqCT, CT, PET, PET-MR, and micro-CT scanners. This infrastructure and network of expertise, in combination with the patient population at UCSF, creates an ideal environment for training research scientists in the area of musculoskeletal biomechanics and rehabilitation science.

**Clinically Informed Neuroscience**

The field of neurorehabilitation has made significant advances over the past two decades in developing metrics to assess functionality and applying these metrics to treatment paradigms. Despite this progress, we have yet to fully appreciate the guiding principles underlying activity-based neuroplasticity and restoration of function. The ability to transform how rehabilitation is implemented in the clinic is dependent upon defining these basic principles in the context models of neurotrauma, neuroinflammation, and neurodegenerative disease, with an emphasis on the translation of these laboratory findings to the clinical arena.

The Clinically Informed Neuroscience track will offer two pathways of investigation. The first pathway is invested in a clinically-based platform, which will focus on neural injury and neurodegenerative disease, with the objectives of assessing disability, applying new technologies to improve functionality, and testing the underlying basis of activity-based restoration of function and outcomes research. To achieve these objectives, students will have access to state-of-the-art motion analysis; robotics, including lower extremity exoskeletons with biofeedback to support locomotion; specialized equipment such as the G-trainer by Alter G, an anti-gravity treadmill to support learning-based training; and the motion analysis equipment in the PT Movement Research Laboratory at San Francisco State University. Students will have the opportunity to interrogate the functionality of the brain and neuroplasticity through state-of-the-art MRI-based technologies and transmagnetic stimulation in the Departments of Radiology and Biomedical Imaging and Neurology, which oversees a rich patient database for stroke and multiple sclerosis for outcomes research. In addition, the Department of Physical Therapy at SFSU provides students with opportunities to participate in research on balance-based torso weighting interventions for patients with multiple sclerosis and a recently developed program to study movement accuracy. Access to the UCSF patient population, through the collaborative departmental efforts of Physical Therapy and Rehabilitation Science, Neurology and Neurological Surgery, will position the students’ science at the forefront of clinical care.
The second pathway within the Clinically Informed Neuroscience track is devoted to laboratory-based translational research that will focus on experimental models of neurodegeneration and chronic neuroinflammation and the interplay between defined activity and key molecular events driving motor, sensory and cognitive decline or recovery. This pathway is supported by laboratories that are uniquely positioned to study structure and function and the molecular basis for damage and reparative processes. These laboratories combine high-level imaging microscopes with molecular biology platforms to study structure and function. Essential to this research is the Neurobehavioral Core for Rehabilitation Research, a facility operated by the Department of Physical Therapy and Rehabilitation Science that provides state-of-the-art instrumentation to fully profile motor, sensory and cognitive function and assess voluntary or forced activity in the context of disease-based animal models. The Core not only provides ample opportunity for students to measure neurological function, but also to address activity as a determinant of outcome. Additional support for this pathway will come from UCSF-sponsored Core services, including: 1) the Biological Imaging Developmental Center that provides instrumentation for novel imaging, including spinning disk confocal microscopy and confocal microscopy with capability for multi-color and spectral imaging, 2) the Parnassus Flow Cytometry Core, and 3) the Mouse Genetics Core, operated by the Diabetes Center. This pathway will interface with the graduate programs in Neuroscience, Biomedical Sciences and Stem Cell Biology. Students will have the opportunity to attend classes and seminars within these programs including mini-courses that are uniquely tailored to specific research topics.

Falling between the Musculoskeletal Biomechanics track and the Clinically Informed Neuroscience track is the cross-cutting field of chronic pain. UCSF has a strong basic science group in the neural underpinnings of pain physiology, housed primarily in the Neuroscience and Biomedical Science graduate programs. There are also strong pre-clinical and clinical programs in the treatment of acute and chronic pain, housed primarily in the Departments of Anatomy, Physiology, Anesthesia, Neurology, Physiological Nursing, and Psychiatry. What is less robust, however, is the linkage between the basic science of pain physiology and the clinical care of patients in musculoskeletal and neurological rehabilitation. The Department of Physical Therapy and Rehabilitation Science is a participant in the Center of Excellence in Pain Education, and contributes to the case study components of the educational program. Experienced faculty in pain science have expressed their support of the PhD program in Rehabilitation Science, and this collaboration will help forge research linkages between the basic science laboratories and the clinical care of patients with acute or chronic pain.

1.2. Historical Background

Historical Development of the Field

With the increased number of aging individuals in society and the survival of patients with previously fatal illnesses, organ transplants, trauma, and cancer, patients need education and rehabilitation to resume independence and maximize the quality of life. In addition to reform in health care delivery and managed care, the expanding population with health care needs requires that scientific knowledge and technology continue to advance and be transitioned rapidly into clinical care.

The field of rehabilitation science is interdisciplinary and seeks to understand the relationships among physiological, environmental, occupational, and psychosocial causes, course, and consequences of functional disability and how to improve quality of life by enabling human function and performance. Basic and applied research from the health sciences, social sciences and other related fields are directed towards enhancing physical and psychosocial functioning and quality of life of people with disabilities.

As a result of the efforts to help soldiers recovering from injuries after World War II, the field of rehabilitation science was officially recognized as a subspecialty in 1946. The field expanded quickly beyond the use of orthotics

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and assistive devices to include the use of therapies and medications to increase mobility and function. At the national level, the National Institute of Child and Health Development (NICHD) was established in 1962 to meet a number of pressing priorities, including responding to the need for understanding mental and intellectual disabilities. Development of the field of disability research soon led to studies that not only sought to understand disability, but to identify or develop ways to improve the health and quality of life for individuals suffering from disabilities.

After the implementation of the Americans with Disabilities Act in 1990, Congress passed responsibility for rehabilitation science research to the National Institutes of Health. In 1991, the National Center for Medical Rehabilitation Research (NCMRR) was founded as a Center within the NICHD. The NCMRR is committed to funding research in rehabilitation science, offering numerous mechanisms for funding, including postdoc awards (F-32), career development awards (K-awards), training grants (T-32) and various research awards (R01, R03, R21, etc.). Over the past 22 years, the NCMRR has been the major galvanizing force for rehabilitation research, and has made substantial contributions to the field of medical rehabilitation research using their original interdisciplinary research priorities as guidelines that are still used today. These research priorities include:

- Improving functional mobility
- Promoting behavioral adaptation to functional losses
- Assessing the efficacy and outcomes to medical rehabilitation therapies and practices
- Developing improved assistive technology
- Understanding whole body system responses to physical impairments and functional changes
- Developing more precise methods of measuring impairments, disabilities, and societal and functional limitations
- Training research scientists in the field of rehabilitation

Given the position of the Department of Physical Therapy and Rehabilitation Science at UCSF and the scholarly interests and NIH-level funding of its faculty, the Department is poised to offer a PhD program that will address these research priorities in rehabilitation science.

Historical Development of Doctoral Programs in the Department of Physical Therapy and Rehabilitation Science

Currently, the Department of Physical Therapy and Rehabilitation Science offers both a joint UCSF/SFSU Entry-level Doctor of Physical Therapy (DPT) degree and a joint UCSF/SFSU Doctor of Physical Therapy Science (DPTSc) degree. The Entry-level Doctor of Physical Therapy degree is a 3-year joint program between UCSF and San Francisco State University. In 2013, the program received re-accreditation through 2021 from the Commission on Accreditation in Physical Therapy Education (CAPTE). The program runs for 36 continuous months and includes 32 weeks of full-time clinical affiliations. This program accepts 50 students per year and is designed to prepare scholarly clinicians. The curriculum is built on a strong theoretical foundation in basic, medical and applied sciences. Critical thinking and clinical reasoning skills are developed within an integrated program that prepares students to work collaboratively with patients across the lifespan to improve health and wellness, address disability challenges, and optimize function. Graduates excel in the National Licensing Examination and are considered top applicants for positions in physical therapy practice.

The Doctor of Physical Therapy Science (DPTSc) degree was originally created in 1999, and was designed for experienced clinicians to return to the University to expand their academic studies and develop their skills as clinical researchers, educators, and clinical specialists. At the time of the original proposal, the DPTSc was the only research-based doctoral program in physical therapy for the University of California or the California State University. The DPTSc program was the proposed degree, rather than a PhD program, after careful consideration...
of the resources allocated for teaching and research, which were more in line with an advanced professional
doctoral degree. However, as the health care sciences have evolved, new faculty members have been recruited to
support a stronger research effort. This success has resulted in the highest level of extramural funding achieved in
the history of the Department of Physical Therapy and Rehabilitation Science. With the expansion of our faculty
and research, we are now optimally positioned to provide a PhD program that would support an academic
doctorate-level curriculum in rehabilitation science.

Of note, there is an increasing trend in the field of Physical Therapy and Rehabilitation Science to move away from
advanced clinical doctoral degrees such as the DPTSc, and toward research degrees. Currently, the advanced
clinical doctoral degree available in the United States is the Doctor of Physical Therapy Science (DPTSc) / Doctor of
Science in Physical Therapy (DScPT). In 2010, the American Physical Therapy Association’s (APTA) website listed
eleven advanced clinical doctorate programs and in 2013, this number had reduced to seven programs. UCSF/SFSU
is the only institution in the country offering a DPTSc degree, while seven universities offer other advanced clinical
doctorate programs:

1. Andrews University, Berrien Springs, MI (DScPT in manual physical therapy)
2. Boston University, Boston, MA (ScD in rehabilitation sciences)
3. Loma Linda University, Loma Linda, CA (DScpt in physical therapy)
4. Oakland University, Rochester, MI (DScpt in physical therapy)
5. Texas Tech University Health Sciences Center, Lubbock, TX (ScD in physical therapy)
6. University of Oklahoma Health Sciences Center, Oklahoma City, OK (DSc in rehabilitation sciences)
7. University of Tennessee Health Sciences Center, Memphis, TN (ScD in physical therapy)

Two post-professional graduate educational and research degrees are available in physical therapy: the Doctor of
Philosophy (PhD) or Doctor of Science (DSc/ScD). In 2013, the APTA’s website listed 43 research doctoral programs
(8 with concentrations in physical therapy and 22 in rehabilitation science)\(^5\). Currently, no other public institution
in California offers a PhD in Rehabilitation Science. The institutions that offer a research doctoral degree in
California are all private institutions, including:

1. The Ola Grimsby Institute, San Diego, CA (PhD in Orthopedic Manual Therapy)
2. University of Southern California, Los Angeles, CA (PhD in Biokinesiology)
3. Loma Linda University, Loma Linda, CA (PhD in Rehabilitation Science)

Across the country, the institutions that offer a PhD in Rehabilitation Science are primarily housed in the large,
state flagship Universities located in the Midwest and along the East Coast. Included in the table below is the
current list of PhD in Rehabilitation Science programs, along with PhD programs that have similarities to the
proposed PhD program at UCSF. The proposed program at UCSF is highlighted in green for comparison purposes.

<table>
<thead>
<tr>
<th>Institution</th>
<th>State</th>
<th>Type</th>
<th>Degree</th>
<th>Average Enrollment</th>
<th>Training Grants Awarded to the University</th>
<th>Training Grants in Rehabilitation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Drexel University</td>
<td>PA</td>
<td>Private</td>
<td>PhD in Rehabilitation Sciences</td>
<td>3-4 per year</td>
<td>2012: $0 (n=0) 2013: $0 (n=0)</td>
<td>2012: $0 2013: $0</td>
</tr>
<tr>
<td>Duquesne University</td>
<td>PA</td>
<td>Private</td>
<td>PhD in Rehabilitation Science</td>
<td>0-2 per year</td>
<td>2012: $0 (n=0) 2013: $0 (n=0)</td>
<td>2012: $0 2013: $0</td>
</tr>
<tr>
<td>Loma Linda University</td>
<td>CA</td>
<td>Private</td>
<td>PhD in Rehabilitation Science</td>
<td>1-2 per year</td>
<td>2012: $0 (n=0) 2013: $0 (n=0)</td>
<td>2012: $0 2013: $0</td>
</tr>
<tr>
<td>Medical University of South Carolina</td>
<td>SC</td>
<td>Public</td>
<td>PhD in Health &amp; Rehabilitation Science</td>
<td>3-6 per year</td>
<td>2012: $3,523,823 (n=14) 2013: $3,603,611 (n=13)</td>
<td>2012: $0 2013: $0</td>
</tr>
</tbody>
</table>

\(^5\) Directory of postprofessional doctoral and graduate programs
<table>
<thead>
<tr>
<th>Institution</th>
<th>State</th>
<th>Type</th>
<th>Degree</th>
<th>Average Enrollment</th>
<th>Training Grants Awarded to the University (2012-2013)</th>
</tr>
</thead>
<tbody>
<tr>
<td>MGH Institute of Health Professions</td>
<td>MA</td>
<td>Private</td>
<td>PhD in Rehabilitation Sciences</td>
<td>6 per year</td>
<td>2012: $5,764,405 (n=21) 2013: $6,589,139 (n=19)</td>
</tr>
<tr>
<td>Northwestern University</td>
<td>IL</td>
<td>Private</td>
<td>PhD in Movement &amp; Rehabilitation Science</td>
<td>up to 6 per year</td>
<td>2012: $8,054,128 (n=32) 2013: $7,325,680 (n=30)</td>
</tr>
<tr>
<td>Ohio State University</td>
<td>OH</td>
<td>Public</td>
<td>PhD in Health &amp; Rehabilitation Sciences</td>
<td>3 per year</td>
<td>2012: $2,973,598 (n=13) 2013: $3,268,764 (n=16)</td>
</tr>
<tr>
<td>The University of North Carolina at Chapel Hill</td>
<td>NC</td>
<td>Public</td>
<td>PhD in Human Movement Science</td>
<td>4-8 per year</td>
<td>2012: $15,722,227 (n=57) 2013: $14,818,902 (n=50)</td>
</tr>
<tr>
<td>Texas Tech University Health Sciences Center</td>
<td>TX</td>
<td>Public</td>
<td>PhD in Rehabilitation Sciences</td>
<td>2-5 per year</td>
<td>2012: $0 (n=0) 2013: $0 (n=0)</td>
</tr>
<tr>
<td>University of Alabama at Birmingham</td>
<td>AL</td>
<td>Public</td>
<td>PhD in Rehabilitation Science</td>
<td>4 per year</td>
<td>2012: $4,560,500 (n=22) 2013: $5,275,467 (n=21)</td>
</tr>
<tr>
<td>University at Buffalo, The State University of New York</td>
<td>NY</td>
<td>Public</td>
<td>PhD in Rehabilitation Science</td>
<td>1-2 per year</td>
<td>2012: $607,953 (n=4) 2013: $805,318 (n=5)</td>
</tr>
<tr>
<td>University of California, San Francisco</td>
<td>CA</td>
<td>Public</td>
<td>PhD in Rehabilitation Science</td>
<td>2 every other year</td>
<td>2012: $18,004,693 (n=57) 2013: $18,350,321 (n=55)</td>
</tr>
<tr>
<td>University of Colorado Denver</td>
<td>CO</td>
<td>Public</td>
<td>PhD in Rehabilitation Science</td>
<td>3 per year</td>
<td>2012: $6,919,474 (n=26) 2013: $7,560,108 (n=31)</td>
</tr>
<tr>
<td>University of Delaware</td>
<td>DE</td>
<td>Public</td>
<td>PhD in Biomechanics &amp; Movement Science</td>
<td>2-4 per year</td>
<td>2012: $346,526 (n=2) 2013: $394,142 (n=2)</td>
</tr>
<tr>
<td>University of Florida</td>
<td>FL</td>
<td>Public</td>
<td>PhD in Rehabilitation Science</td>
<td>3-4 per year</td>
<td>2012: $2,464,065 (n=13) 2013: $1,948,748 (n=11)</td>
</tr>
<tr>
<td>University of Iowa</td>
<td>IA</td>
<td>Public</td>
<td>PhD in Rehabilitation Science</td>
<td>1-2 per year</td>
<td>2012: $7,195,268 (n=25) 2013: $7,263,834 (n=26)</td>
</tr>
<tr>
<td>University of Kansas Medical Center</td>
<td>KS</td>
<td>Public</td>
<td>PhD in Rehabilitation Science</td>
<td>3-8 per year</td>
<td>2012: $1,604,541 (n=4) 2013: $1,530,652 (n=8)</td>
</tr>
<tr>
<td>University of Kentucky</td>
<td>KY</td>
<td>Public</td>
<td>PhD in Rehabilitation Science</td>
<td>4-7 per year</td>
<td>2012: $2,185,694 (n=11) 2013: $1,744,988 (n=10)</td>
</tr>
<tr>
<td>University of Maryland</td>
<td>MD</td>
<td>Public</td>
<td>PhD in Physical Rehabilitation Science</td>
<td>12 per year</td>
<td>2012: $3,841,749 (n=18) 2013: $3,562,960 (n=17)</td>
</tr>
<tr>
<td>University of Medical Sciences Arizona</td>
<td>AZ</td>
<td>Private</td>
<td>PhD in Rehabilitation Science</td>
<td>under 10 per year</td>
<td>2012: $1,927,366 (n=13) 2013: $1,822,950 (n=8)</td>
</tr>
<tr>
<td>University of Minnesota</td>
<td>MN</td>
<td>Public</td>
<td>PhD in Rehabilitation Science</td>
<td>2-3 per year</td>
<td>2012: $9,868,557 (n=34) 2013: $9,903,968 (n=31)</td>
</tr>
<tr>
<td>University of Pittsburgh</td>
<td>PA</td>
<td>Private</td>
<td>PhD in Rehabilitation Science</td>
<td>6 per year</td>
<td>2012: $3,058,674 (n=10) 2013: $2,104,168 (n=8)</td>
</tr>
<tr>
<td>University of Southern California</td>
<td>CA</td>
<td>Private</td>
<td>PhD in Biokinesiology</td>
<td>2-5 per year</td>
<td>2012: $1,943,937 (n=9) 2013: $2,082,273 (n=9)</td>
</tr>
<tr>
<td>University of Texas Medical Branch</td>
<td>TX</td>
<td>Public</td>
<td>PhD in Rehabilitation Sciences</td>
<td>1-2 per year</td>
<td>2012: $21,983,127 (n=61) 2013: $20,272,808 (n=56)</td>
</tr>
<tr>
<td>University of Washington</td>
<td>WA</td>
<td>Public</td>
<td>PhD in Rehabilitation Science</td>
<td>2 per year</td>
<td>2012: $1,801,414 (n=6) 2013: $1,384,248 (n=6)</td>
</tr>
<tr>
<td>Virginia Commonwealth University</td>
<td>VA</td>
<td>Public</td>
<td>PhD in Rehabilitation &amp; Movement Science</td>
<td>1-2 per year</td>
<td>2012: $16,949,967 (n=50) 2013: $153,637 (n=50)</td>
</tr>
<tr>
<td>Washington University at St. Louis</td>
<td>MO</td>
<td>Private</td>
<td>PhD in Movement Science</td>
<td>3-3 per year</td>
<td>2012: $16,764,449 (n=50) 2013: $143,012</td>
</tr>
</tbody>
</table>

The only PhD in Rehabilitation Science programs offered in the west include:

1. Loma Linda University
2. Texas Tech University Health Sciences Center
3. University of Colorado at Denver
4. University of Medical Sciences Arizona
Of these, only the Universities of Washington, Colorado, and Texas are public institutions.

The DPTSc degree was designed to educate scholarly clinicians, and to graduate individuals who would be prepared to become academic faculty in Physical Therapy programs or who could return as leaders in the clinical setting. The program has been successful in graduating individuals who were able to achieve these two goals; however, we have struggled to develop graduates who are competitive for research positions in comprehensive doctorate universities, based on the Carnegie Classification system. Examples of the career placement of DPTSc graduates is outlined in the table below. It’s worth noting that the DPTSc graduates who have been successful in receiving NIH extramural funding have been those who were recruited into the Department of Physical Therapy and Rehabilitation Science at UCSF. These faculty have been provided the mentorship and guidance needed to successfully secure NIH extramural funding to develop independent research agendas.

Table 2: Alumni of the UCSF/SFSU DPTSc Program

<table>
<thead>
<tr>
<th>Alumnus</th>
<th>Current Position</th>
<th>Publishing Activity</th>
<th>NIH Funding</th>
</tr>
</thead>
<tbody>
<tr>
<td>Boyd, Benjamin</td>
<td>Assistant Professor, Samuel Merritt University, Physical Therapy Program</td>
<td>Yes</td>
<td>• None</td>
</tr>
<tr>
<td>Dolberg, Rebecca</td>
<td>Program Director, Physical Therapy Assistant Program, Carrington College</td>
<td>Yes</td>
<td>• None</td>
</tr>
<tr>
<td>Fitzsimmons, Amber</td>
<td>Assistant Professor, UCSF Departments of Physical Therapy &amp; Rehabilitation Science and Anatomy</td>
<td>Yes</td>
<td>• Graduated August 2013; plans to pursue funding in the next year</td>
</tr>
<tr>
<td>Gilleran, Tim</td>
<td>Assistant Adjunct Professor, Samuel Merritt University, Physical Therapy Program</td>
<td>No</td>
<td>• None</td>
</tr>
<tr>
<td>Gorman, Sharon</td>
<td>Associate Professor, Samuel Merritt University, Physical Therapy Program</td>
<td>Yes</td>
<td>• None</td>
</tr>
<tr>
<td>Katzman, Wendy</td>
<td>Associate Clinical Professor, UCSF Department of Physical Therapy &amp; Rehabilitation Science</td>
<td>Yes</td>
<td>• BIRCWH K-12 Award • CTSI KL2 Award • R01 grant from the National Institute on Aging</td>
</tr>
<tr>
<td>Kinder, Jennifer</td>
<td>Therapist, Apex Physical Therapy</td>
<td>Yes</td>
<td>• None</td>
</tr>
<tr>
<td>Rivera, Monica</td>
<td>Assistant Adjunct Professor, Samuel Merritt University, Physical Therapy Program; Lecturer, UCSF &amp; SFSU</td>
<td>No</td>
<td>• None</td>
</tr>
<tr>
<td>Smoot, Betty</td>
<td>Assistant Professor, UCSF Departments of Physical Therapy &amp; Rehabilitation Science and Anatomy</td>
<td>Yes</td>
<td>• CTSI KL2 Award</td>
</tr>
<tr>
<td>Wampler, Meredith</td>
<td>Lead Therapist, Harrison Medical Center; Adjunct Faculty, University of Puget Sound</td>
<td>Yes</td>
<td>• None</td>
</tr>
</tbody>
</table>

The PhD in Rehabilitation Science degree is needed at UCSF to meet the growing demand for faculty who are able to perform independent, original research to further the field of rehabilitation science. The DPTSc degree was targeted for clinician-scientists, whose research success was dependent on working with a pre-established research team. The PhD Program, however, would allow the Department to train scientists who will complete postdoctoral training and take their research to another comprehensive doctorate university, and be a leader in his/her respective field. Graduates will be secure in starting their own research programs at other institutions with the tools necessary to collaborate with other scientists in pursuing extramural funding.

We believe the PhD program, compared to the DPTSc program, is more closely aligned with the broader mission of UCSF - advancing health worldwide. The aim of this PhD program is to move the field of rehabilitation science
research forward, and this type of work is well suited for an institution such as UCSF.

The primary difference between the proposed PhD degree and the current DPTsc degree is the level of rigor expected of students. This rigor is reflected in the increased required number of research units, the lengthened time for completion of the program, and the expectation that students will be performing independent, original research, rather than joining a current research project at UCSF. We believe this model is more in line with other PhD programs at UCSF. Additionally, the PhD program would allow us to recruit students who are interested in a PhD degree, but may possess a degree outside the field of physical therapy.

**Departmental Strength in the Field**

When the outpatient physical therapy facility at the UCSF Medical Center closed in 2003, the Department of Physical Therapy and Rehabilitation Science was established within the School of Medicine with an objective of opening a clinical practice. The Department underwent a number of moves thereafter - from 374 Parnassus to 7th Avenue to 9th Avenue and then Mt. Zion, where space was allocated to 1701 Divisaderos and Hellman. Under the new chair, Dr. Kimberly Topp, the Department consolidated its efforts at 1701 Divisadero, and thereafter relocated to new space, dedicated to both an outpatient clinic and health and wellness center, at the Mission Bay campus.

The Department underwent major changes over the last decade. While the Department historically placed great emphasis on teaching, clinical work and research, the five core faculty in the Department had substantial teaching loads and extramural funding for research was very limited. However, it is noteworthy that Nancy Byl, PT, MPH, PhD, although lacking independent NIH funding, established an internationally recognized expertise in focal dystonia.

With the initiation of joint appointments with other departments at UCSF, the face of the Department of Physical Therapy and Rehabilitation Science began to change with the recruitments of Linda Noble, Susanna Rosi and Richard Souza into the Academic Senate series. These faculty members have successfully secured and maintained extramural funding, including NIH support, and have subsequently served as the backbone for building research programs within the Department that are focused on musculoskeletal and neurological rehabilitation. Additionally, the Department hired three graduates from the DPTsc program into faculty positions - Wendy Katzman as a Clinical Professor, and Betty Smoot and Amber Fitzsimmons as Adjunct Professors. Dr. Katzman and Dr. Smoot have subsequently received funding for their research, including a KL2 award and a R01 grant from the National Institute on Aging to study the effects of exercise on functional capabilities in persons with hyperkyphosis.

The Department of Physical Therapy and Rehabilitation Science currently has 12 faculty members with primary appointments in the Department, 3 with a primary focus in teaching, 5 with a primary focus in research, and 4 with a primary focus in clinical practice. Of these, 4 are members of the Academic Senate, and 1 is an Emeritus Professor. The Department currently has 2 state-funded faculty FTE’s. Research faculty maintain laboratory space at the China Basin (Richard Souza), SFGH (Susanna Rosi), Mission Bay (Wendy Katzman) and Parnassus (Linda Noble) campuses. Department faculty members were awarded $19 million in grants and contracts in 2011/12, placing the Department five times higher than the national average of $3.5 million. Of note, faculty hold joint appointments and submit grant applications through the Departments of Neurological Surgery, Orthopaedic Surgery or Radiology, as well as through the Department of Physical Therapy and Rehabilitation Science. The table below lists only the awards submitted through the Department of Physical Therapy and Rehabilitation Science.
Table 3: UCSF Faculty Funding, Physical Therapy and Rehabilitation Science Department

<table>
<thead>
<tr>
<th>Year</th>
<th>Direct Cost</th>
<th>Indirect Cost</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>FY09</td>
<td>$191,561</td>
<td>$40,215</td>
<td>$231,776</td>
</tr>
<tr>
<td>FY10</td>
<td>$250,000</td>
<td>$119,900</td>
<td>$369,900</td>
</tr>
<tr>
<td>FY11</td>
<td>$249,828</td>
<td>$113,088</td>
<td>$362,916</td>
</tr>
<tr>
<td>FY12</td>
<td>$259,900</td>
<td>$116,643</td>
<td>$376,543</td>
</tr>
<tr>
<td>FY13</td>
<td>$1,046,879</td>
<td>$479,158</td>
<td>$1,526,037</td>
</tr>
<tr>
<td>FY14</td>
<td>$1,164,012</td>
<td>$559,925</td>
<td>$1,723,937</td>
</tr>
<tr>
<td>FY15</td>
<td>$1,014,281</td>
<td>$575,444</td>
<td>$1,589,725</td>
</tr>
<tr>
<td>FY16</td>
<td>$717,863</td>
<td>$417,154</td>
<td>$1,135,017</td>
</tr>
<tr>
<td>FY17</td>
<td>$632,156</td>
<td>$367,014</td>
<td>$999,170</td>
</tr>
<tr>
<td>Total</td>
<td>$5,526,480</td>
<td>$2,788,540</td>
<td>$8,315,020</td>
</tr>
</tbody>
</table>

Note: FY14 - FY17 are estimates

The Department of Physical Therapy at San Francisco State University has five faculty members, and the FTEs for SFSU faculty are state-supported. All five faculty are members of the SFSU Academic Senate. Two of the five faculty have a primary focus on research, while the remaining three focus on teaching and administration. In 2011/12, SFSU faculty were awarded $828,726 in grants and contracts. Two faculty (Sandy Radtka and Diane Allen) conduct research in the PT Movement Research Lab at SFSU, which is equipped with a motion analysis system, forceplates, electromyography and GaitRite system. Diane Allen, Associate Professor, received an NIH AREA grant to study the effects of torso weighting on patients with multiple sclerosis and a Patient Centered Outcomes Research Initiative (PCORI) grant to study the effects of perceived movement ability.

1.3. Timetable for Development of the Program

The goal is to matriculate the first students and begin classes in the fall of 2015. Prior to that time, the program must seek review and approval of the Deans at UCSF, the Graduate Council, Academic Senate, and the Chancellor. Then, a system-wide review by the Coordinating Committee on Graduate Affairs (CCGA) and the University of California Office of the President (UCOP) will begin. An extensive curriculum is currently in place in physical therapy and rehabilitation science at the doctoral level. Many faculty members teach in the existing physical therapy degree programs and additional faculty recruitments will be strategically chosen according to training needs in the PhD program.

Proposed Approval Process Timeline:

- **Campus Review**
  - Relevant Deans: Graduate Division/SOM – November 2013 (1 month)
  - Graduate Council: February 2014 (1 month)
  - Divisional Academic Senate: February-March 2014 (2 months)
  - Chancellor: March 2014 (1 month)

- **System-wide Review**
  - Coordinating Committee on Graduate Affairs: April-June 2014 (3 months)
  - UCOP Provost/Sr. VP, President Approve: September 2014 (1 month)

- **Program Launch**
  - New Program Announced and Applications Received: Late Fall 2014
  - Program Admissions: Winter/Spring Quarter 2015
  - Program Begins: Fall Quarter 2015

On August 1, 2013, Chris Cullander, Director in the Office of Institutional Research, confirmed with the Western Association of Schools and Colleges (WASC) that the PhD in Rehabilitation Science Program does not require a substantive change review. The PhD Program is currently accounted for in the UCSF Campus Enrollment Plan, with projected students enrolled in the 2015-16 academic year and each year thereafter.
The establishment of the PhD in Rehabilitation Science will coincide with the dis-establishment of the Doctor of Physical Therapy Science degree program. We do not plan to enroll new DPTSc students while the PhD program is under review. The existing student in the DPTSc program will continue in the program until graduation, which is anticipated for 2016.

1.4. Relation of Proposed Program to Similar Programs on Campus

The proposed PhD program will be most closely related to four current doctoral programs at UCSF. It is expected that the programs will be complementary rather than competitive.

1) PhD in Neuroscience

Students interested in the PhD in the Neuroscience program may also be interested in the proposed PhD in Rehabilitation Science program, which will have an option for a neuroscience emphasis. While there is likely to be synergism between the two programs in that both utilize clinically-relevant animal models of CNS injury/disease, the proposed program is distinguished by its emphasis on the intersection between cell injury, inflammation, neuroplasticity, stem cell biology, and activity-based restoration of function. The latter is a key distinguishing feature of this proposed program where there will be opportunity to study topics such as patterned activity to maximize plasticity and behavioral recovery, and synergism or incompatibility between combinatorial approaches that merge pharmacologic-induced plasticity with defined patterns of rehabilitation. Examples include voluntary or forced locomotion or reaching tasks, and fundamental consequences of rehabilitation on neuroinflammatory pathways, delayed cell loss, stem cell-directed axonal plasticity, and wound healing events that govern recovery processes.

Courses offered within Neuroscience that we anticipate would be of interest to our PhD students:

- NS 219 Topics in Basic or Translational Neuroscience
- NS 225 Neurobiology of Disease
- NS 245 Behavioral Neuroscience

Courses offered within the PhD in Rehabilitation Science that may be of interest to students in Neuroscience:

- RS 100 Introduction to Rehabilitation Science
- RS 340 Activity and Its Effects on CNS Disease/Injury Across the Lifespan

2) PhD in Biomedical Sciences

Neurobiology in the Biomedical Sciences program is one of eight thematic areas. The Biomedical Sciences program may attract similar applicants as those interested in the proposed PhD in Rehabilitation Science program. A key distinction of the proposed PhD program in Rehabilitation Science is an emphasis on activity-based restoration of function in the context of clinically-relevant animal models of acute neural injury and reparative processes, neurodegenerative diseases, and neuroinflammation in the adult and/or developing central nervous system.

Courses offered within Biomedical Sciences that we anticipate would be of interest to our PhD students:

- BMS 225A Human Disease: Technologies and Biomedical Applications
- BMS 225B Tissue and Organ Biology
- BMS 255 Basic Genetics and Genomics
- BMS 260 Cell Biology

Courses within the PhD in Rehabilitation Science that may be of interest to students in Biomedical Sciences:

- RS 100 Introduction to Rehabilitation Science
- RS 130 Basics in Musculoskeletal Imaging
- RS 150 Gross and Regional Anatomy
- RS 340 Activity and Its Effects on CNS Disease/Injury Across the Lifespan
- RS 400 Topics in Clinically Informed Neuroscience (e.g. Challenges in Translation of Science to the Clinic)
3) **PhD in Epidemiology and Translational Science**

Applicants interested in handling large data sets from existing studies may be interested in the PhD program in Epidemiology and Translational Science, as well as the proposed PhD in Rehabilitation Science program. The Program in Epidemiology and Translational Science educates students in methods for studying disease etiology and prevention, evaluating treatment efficacy, and implementing evidence-based clinical care and population health. The Department of Physical Therapy and Rehabilitation Science has faculty who work with large datasets in bone health, orthopaedics, and oncology, and there may be some fortuitous overlap in methodology in evaluating treatment efficacy and prevention studies. We anticipate that students in Rehabilitation Science will enroll in courses in biostatistics and research design, offered by the Department of Epidemiology. Furthermore, students in Epidemiology and Translational Science will be welcomed into courses within the PhD program in Rehabilitation Science.

Courses offered within Epidemiology that we anticipate would be of interest to our PhD students:
- EPI 150.03/202 Designing Clinical Research
- TICR Summer Clinical Research Workshop
  - EPI 150.03 Designing Clinical Research
  - EPI 218 Database Management Systems for Clinical Research
  - EPI 227 Building a Career in Clinical Research

Courses within the PhD in Rehabilitation Science that may be of interest to students in Epidemiology:
- RS 100 Introduction to Rehabilitation Science
- RS 130 Basics in Musculoskeletal Imaging
- RS 150 Gross and Regional Anatomy
- ANA 207 Neuroscience
- RS 340 Activity and Its Effects on CNS Disease/Injury Across the Lifespan
- RS 400 Topics in Clinically Informed Neuroscience (e.g. Challenges in Translation of Science to the Clinic)

4) **PhD in Bioengineering**

Students interested in the proposed PhD in Rehabilitation Science may also be interested in the joint UCSF/UC Berkeley PhD in Bioengineering. While the current areas of study within the PhD in Bioengineering include similarities, the two programs differ in the emphasis placed on engineering versus rehabilitation. For example, one of the emphases for the PhD in Bioengineering is in Biomechanics. Specific projects within the Biomechanics emphasis are rooted in tissue and/or fluid mechanics and involve cellular or tissue level investigations. In contrast, students enrolled in the PhD in Rehabilitation Science program would likely focus on applied or clinical biomechanics, using whole body technology, such as motion analysis, functional testing (balance tests), or joint imaging. We anticipate cross-pollination with the PhD in Bioengineering, as well as with related programs, including the Masters of Science in Biomedical Imaging (MSBI) and the Masters in Translational Medicine (MTM). Additionally, the formation of the PhD in Rehabilitation Science would lead to several new courses in applied biomechanics and clinical imaging biomechanics that would be available to students in the PhD in Bioengineering program.

Courses offered within Bioengineering, Biomedical Imaging, or Translational Medicine that we anticipate would be of interest to our PhD students:
- Bioengineering:
  - BioE 221 Tissue Mechanobiology
  - BioE 25 Careers in Biotechnology
- Translational Medicine
  - Epi 150.03 Designing Clinical Research
- Biomedical Imaging:
  - BI 201 Principles of MR Imaging
  - BI 202 Physical Principles of CT, PET, and SPECT Imaging
  - BI 240 Musculoskeletal Imaging
Courses within the PhD in Rehabilitation Science that may be of interest to students in Bioengineering, Biomedical Imaging, or Translational Medicine:

- RS 100 Introduction to Rehabilitation Science
- RS 330 Biomechanics of Human Motion

### 1.5. Interrelationship of the Program with other University of California Institutions

The current academic programs in the Department work collaboratively with many other departments at UCSF to offer the existing Doctor of Physical Therapy (DPT) and Doctor of Physical Therapy Science (DPTSc) degree programs. The programs are advised by an interdisciplinary, interschool faculty. In addition, students enroll in core coursework offered by a variety of departments, such as pathology, physiology, pharmacy, and biostatistics. Furthermore, given that UCSF does not currently have a strong cadre of faculty and researchers in the areas of exercise physiology and muscle biology, we have connected with UC Irvine for academic expertise from Vince Caiozzo, PhD, who delivers this content for our students.

Currently, UCSF is the only University of California campus with a Department of Physical Therapy and Rehabilitation Science offering an academic program. UC Davis and UC Irvine both have residency programs in Physical Medicine and Rehabilitation for medical trainees. These programs aim to provide trainees with exposure to patients with a wide range of physical impairments and disabilities who may benefit from physiatric medical care. However, these programs are only available to physicians, and not to others interested in the rehabilitation sciences. These two medical residency programs are focused on clinical medicine, whereas the PhD would be a research-based program, informed by laboratory-based translational research and investigative and applied clinical practice.

The Center of Research Translation grant on Osteoarthritis, is a collaboration between UCSF and UC Davis. Richard Souza, PT, PhD is a co-investigator on this large program grant and has regular meetings with faculty from UC Davis, including Nancy Lane and Barton Wise, two rheumatologists and leaders in clinical research in osteoarthritis. These relationships would be leveraged to expose students within the proposed PhD program to research ideas and methodology across the UC campuses. An additional informal collaboration exists with Samuel Ward, PT, PhD from the Department of Radiology at UC San Diego.

Additionally, educational opportunities are available through the annual UCLA Neurotrauma Meeting. This meeting brings together faculty and young investigators, including graduate students, across all UC campuses in a forum that focuses on traumatic brain injury. This meeting provides a unique opportunity for students to present their data as part of the Young Investigator’s Sessions and to network with other researchers. We anticipate that students in the Clinically Informed Neuroscience track may attend this meeting.

Programs at other University of California institutions that may be related to the PhD in Rehabilitation Science include:
Table 4: Programs at Other UC Campuses

<table>
<thead>
<tr>
<th>Institution</th>
<th>Programs</th>
</tr>
</thead>
</table>
| UC Berkeley   | PhD in Bioengineering  
                 PhD in Epidemiology  
                 PhD in Neuroscience  |
| UC Davis      | PhD in Biomedical Engineering  
                 PhD in Epidemiology  
                 PhD in Neuroscience  
                 PhD in Human Development  |
| UC Irvine     | PhD in Biomedical Engineering  
                 PhD in Epidemiology  |
| UC Los Angeles| PhD in Bioengineering  
                 PhD in Biomedical Engineering  
                 PhD in Biomedical Physics  
                 PhD in Epidemiology  
                 PhD in Neuroscience  
                 PhD in Human Genetics  
                 PhD in Bioinformatics  |
| UC Riverside  | PhD in Bioengineering  
                 PhD in Biomedical Sciences  
                 PhD in Neuroscience  
                 PhD in Genetics, Genomics, and Bioinformatics  |
| UC San Diego  | PhD in Bioengineering  
                 PhD in Biomedical Sciences  
                 PhD in Neurosciences  
                 PhD in Public Health  
                 PhD in Bioinformatics and Systems Biology  |
| UC Santa Barbara | PhD in Dynamical Neuroscience  |
| UC Santa Cruz | PhD in Biomolecular Engineering & Informatics  |

Of note, the Neuroscience Programs within the University of California are focused primarily in cellular, molecular and behavioral studies. The UC Davis areas of emphasis are cellular, molecular, developmental, systems, and cognitive neuroscience. UC Los Angeles emphasizes addiction; learning and memory; neural development, degeneration and repair; neurogenetics; neuroimaging/cognitive; and synapses, cells and circuits. UC Riverside’s areas of research are cellular and molecular; development and plasticity; systems neuroscience and behavior; computational neuroscience; cognitive neuroscience; and medical neuroscience. UC Riverside’s program includes a seminar class in neural regeneration and repair, which may have some content overlap with the PhD in Rehabilitation Science. UC San Diego includes three areas of basic neuroscience before specialization: cellular, molecular, developmental; systems; and cognitive, clinical, behavioral. UC Santa Barbara describes research areas in cognitive psychology, neuroimaging, biology, physics, computer science and engineering.

Additionally, San Francisco State University offers a MS degree in Kinesiology, which will offer potential for collaboration with the funded faculty in the department. Kate Hamel, PhD and David Anderson, PhD each have laboratories at SFSU in biomechanics.

1.6. Department or Group that will Administer the Program

The PhD in Rehabilitation Science Program will be housed and administered in the Department of Physical Therapy and Rehabilitation Science. The PhD Program Steering Committee will govern the proposed PhD program. The Steering Committee will be comprised of the following members:
• Department Chairs at UCSF and SFSU
• PhD Program Director
• Faculty Leads for each of the two tracks
• One member of the Academic Faculty from within the UCSF Department or a faculty member who holds a primary appointment at SFSU with a WOS appointment at UCSF
• One UCSF faculty member outside the Department

Duties and responsibilities of this Committee include serving as the Admissions and Curriculum Committees; setting academic standards and establishing requirements for enrollment in the program; making recommendations to the Graduate Dean concerning dismissal of students who fail to fulfill requirements of the program; arranging for the scheduled periodic evaluation of the program; and conducting biennial reviews of program membership.

The Program Director will be a UCSF faculty member and will serve a 3-year renewable term, elected by the Steering Committee, with the following duties and responsibilities: vote as a member of the Steering Committee; act as a liaison between the PhD Program and the Graduate Division, UCSF administration, outside organizations, programs, and students; and oversee funding and resources of the program in consultation with the Department Management Services Officer.

The Faculty Leads for the Musculoskeletal Biomechanics and Clinically Informed Neuroscience tracks will be UCSF faculty members and will be responsible for overseeing the student’s program of study within each track, planning coursework, and communicating staffing needs to the PhD Program Director.

1.7. Plan for Evaluation of the Program

Both formative and summative assessments will be utilized to thoroughly monitor and evaluate the effectiveness of the PhD in Rehabilitation Science program. Students will be required to submit electronic evaluations at the end of each course and upon completion of the program. These evaluations will enable students to identify perceived strengths and weaknesses of the curriculum and reflect on how well the courses meet the overall learning goals of the program. The information gathered from these evaluations will be compiled and analyzed by the Steering Committee and used to improve curriculum and instructional methods and develop additional courses if necessary.

Longitudinal data will also be gathered from alumni to track the professional development of graduates. At two and five years post-graduation, each graduate will be required to submit a CV and to complete a graduate survey, which will assess the impact of the program on their current skills and expertise, as well as how the program affected their ability to find desired employment. This system of tracking student outcomes will contribute to the long-term evaluation of the PhD in Rehabilitation Science program.

In addition to the internal evaluation activities described above, the evaluation of the PhD program will be included as part of the periodic review and evaluation of the Department of Physical Therapy and Rehabilitation Science under the Chair’s Stewardship Review. Additionally, the UCSF Graduate Division and Graduate Council conducts reviews of all UCSF graduate programs without a T-32 grant approximately every eight years. These reviews ensure continued program quality and provide impartial feedback on the program. The review process itself is composed of a self-study, student surveys, an external review, and a post-review follow-up.
SECTION 2: PROGRAM

2.1. Admissions Requirements and Undergraduate Preparation

Minimum criteria for admission to the PhD program are set by the UCSF Graduate Division and include a bachelor’s degree and prior grade point average greater than 3.0 or its equivalent. A bachelor’s, master’s or a doctoral degree in physical therapy, neuroscience, exercise physiology, biomedical engineering, or a related rehabilitation science or professional field will be required for admission into the PhD program.

Applicants must have taken the Graduate Record Examination (GRE) within five years of applying, and scores will be considered in the evaluation for admission. While no minimum GRE scores are set by the Graduate Division, applicants will be required to obtain a minimum 50th percentile score on both the Verbal and Quantitative Reasoning sections of the GRE and a 4.5 on the Analytical Writing section.

Admission requirements for students from foreign countries are the same as for domestic students. In addition, international applicants from non-English speaking countries must demonstrate proficiency in English by completing one year of study with a minimum 3.0 GPA at an accredited college or university in the United States, or by obtaining the following minimum scores on the Test of English as a Foreign Language (TOEFL): 550 on paper-based test; 213 on computer-based test; 80 on internet-based test; or 7 on the International English Language Testing System.

Applicants must also submit their CV and a Statement of Purpose (3 to 5 pages) discussing their background, interests, research goals, purpose in applying for graduate study and plans for the future. Applicants must indicate what they hope to gain from being a doctoral student in Rehabilitation Science, how their interests fit with those of the program’s faculty, and any other pertinent information supportive of their application and qualifications.

Finally, applicants must submit three letters of recommendation. Final approval for admission into the PhD program is granted by the Admissions Committee.

The admissions requirements and procedures of the PhD in Rehabilitation Science program are in line with comparable programs at other institutions. Included below is a table of each institution offering a PhD in Rehabilitation Science (or related field) and the admissions requirements.

Table 5: Admissions Requirements at Institutions with PhD in Rehabilitation Science Programs

<table>
<thead>
<tr>
<th>Institution</th>
<th>Required Degree</th>
<th>Major</th>
<th>GRE Required</th>
<th>Statement of Goals</th>
<th>Letters of Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Drexel University</td>
<td>Bachelors</td>
<td>health or rehab- related field; Masters or DPT preferred</td>
<td>Yes</td>
<td>Yes + CV + 2 years clinical experience</td>
<td>3 LORs</td>
</tr>
<tr>
<td>Duquesne University</td>
<td>DPT or Masters (must be eligible for licensure)</td>
<td>Physical therapy, athletic training, occupational therapy or related field</td>
<td>Yes</td>
<td>Yes + 2 years professional experience</td>
<td>3 LORs</td>
</tr>
<tr>
<td>Loma Linda University</td>
<td>Bachelors or Masters (must hold licensure/ certification)</td>
<td>allied health profession area or rehab related field</td>
<td>Yes</td>
<td>Faculty letter of support</td>
<td>None</td>
</tr>
<tr>
<td>Medical University of South Carolina</td>
<td>Bachelors or graduate degree</td>
<td>any major that will allow applicants to focus on functional limitations, pathology and impairment, and health services</td>
<td>Yes</td>
<td>Yes</td>
<td>3 LORs</td>
</tr>
<tr>
<td>Institution</td>
<td>Required Degree</td>
<td>Major</td>
<td>GRE Required</td>
<td>Statement of Goals</td>
<td>Letters of Reference</td>
</tr>
<tr>
<td>-----------------------------------------------------------------</td>
<td>-----------------</td>
<td>----------------------------------------------------------------------</td>
<td>--------------</td>
<td>-------------------------------------------------------</td>
<td>----------------------</td>
</tr>
<tr>
<td>MGH Institute of Health Professions</td>
<td>Bachelors of Masters (must hold licensure/certification)</td>
<td>physical or occupational therapy, speech-language pathology, rehabilitation nursing, psychiatry</td>
<td>Yes</td>
<td>Yes</td>
<td>3 LORs</td>
</tr>
<tr>
<td>Northwestern University</td>
<td>Bachelors</td>
<td>physical therapy, occupational therapy, other health professions, exercise science, biomechanics, engineering, basic sciences</td>
<td>Yes</td>
<td>Yes + 1 lab research experience</td>
<td>3 LORs</td>
</tr>
<tr>
<td>University at Buffalo, The State University of New York</td>
<td>Bachelors</td>
<td>field related to rehab science</td>
<td>Yes</td>
<td>Yes</td>
<td>2 LORs</td>
</tr>
<tr>
<td>The Ohio State University</td>
<td>Masters</td>
<td>Must have a MS in Health &amp; Rehab Science; Masters in Occupational Therapy/ Physical Therapy; Doctor of Physical Therapy; or MS in Dietetics</td>
<td>Yes</td>
<td>Yes + CV</td>
<td>3 LORs</td>
</tr>
<tr>
<td>The University of North Carolina at Chapel Hill</td>
<td>Masters preferred</td>
<td>field related to human movement (e.g. physical therapy, exercise science, athletic training, biomedical engineering, anatomy, etc.)</td>
<td>Yes</td>
<td>Yes + CV</td>
<td>3 LORs</td>
</tr>
<tr>
<td>Texas Tech University Health Sciences Center</td>
<td>Bachelors</td>
<td>physical therapy, occupational therapy, athletic training, kinesiology, biology, medicine, biomedical engineering, etc.</td>
<td>Yes</td>
<td>Yes + CV</td>
<td>3 LORs</td>
</tr>
<tr>
<td>University of Alabama at Birmingham</td>
<td>Bachelors or Masters</td>
<td>occupational therapy, physical therapy, engineering, exercise science, neuroscience, medicine, nursing, or other health related professions</td>
<td>Yes</td>
<td>None</td>
<td>3 LORs</td>
</tr>
<tr>
<td>University of Colorado Denver</td>
<td>Bachelors</td>
<td>science, health or engineering</td>
<td>Yes</td>
<td>Yes</td>
<td>3 LORs</td>
</tr>
<tr>
<td>University of Delaware</td>
<td>Bachelors</td>
<td>movement-related field</td>
<td>Yes</td>
<td>Yes + prof/clinical experience in rehab area</td>
<td>3 LORs</td>
</tr>
<tr>
<td>University of Florida</td>
<td>Bachelors</td>
<td>field that can be applied to PhD</td>
<td>Yes</td>
<td>Yes</td>
<td>3 LORs</td>
</tr>
<tr>
<td>University of Iowa</td>
<td>Bachelors</td>
<td>physical therapy, occupational therapy, engineering, biology, chemistry</td>
<td>Yes</td>
<td>Yes</td>
<td>3 LORs</td>
</tr>
<tr>
<td>University of Kansas Medical Center</td>
<td>Bachelors</td>
<td>biological sciences, statistics, calculus</td>
<td>Yes</td>
<td>Yes + CV</td>
<td>3 LORs</td>
</tr>
<tr>
<td>University of Kentucky</td>
<td>Masters (must be eligible for licensure)</td>
<td>communication disorders, physical therapy, occupational therapy, or athletic training</td>
<td>Yes</td>
<td>Yes + CV</td>
<td>3 LORs</td>
</tr>
<tr>
<td>University of Maryland</td>
<td>Bachelors</td>
<td>biology, engineering, exercise physiology, exercise science, kinesiology, medicine, nursing, occupational therapy, physical therapy</td>
<td>Yes</td>
<td>Yes</td>
<td>3 LORs</td>
</tr>
<tr>
<td>University of Medical Sciences Arizona</td>
<td>Masters</td>
<td>Health related field</td>
<td>No</td>
<td>Yes</td>
<td>2 LORs</td>
</tr>
<tr>
<td>University of Minnesota</td>
<td>Bachelors</td>
<td>field related to rehab science</td>
<td>Yes</td>
<td>Yes + CV</td>
<td>3 LORs</td>
</tr>
<tr>
<td>Institution</td>
<td>Required Degree</td>
<td>Major</td>
<td>GRE Required</td>
<td>Statement of Goals</td>
<td>Letters of Reference</td>
</tr>
<tr>
<td>---------------------------------</td>
<td>-----------------</td>
<td>----------------------------------------------------------------------</td>
<td>--------------</td>
<td>----------------------------------------------------------</td>
<td>----------------------</td>
</tr>
<tr>
<td>University of Pittsburgh</td>
<td>Masters</td>
<td>Rehab related field</td>
<td>Yes</td>
<td>Yes + CV + Writing sample</td>
<td>3-5 LORs</td>
</tr>
<tr>
<td>University of Southern California</td>
<td>Bachelors</td>
<td>science major; research-based Masters recommended</td>
<td>Yes</td>
<td>Yes + CV</td>
<td>3 LORs</td>
</tr>
<tr>
<td>University of Texas Medical Branch</td>
<td>Bachelors</td>
<td>rehabilitation medicine/ science, physical and occupational therapy, nursing, neuroscience, exercise sciences, kinesiology, bioengineering, human factor engineering/design, and rehabilitation/clinical psychology</td>
<td>Yes</td>
<td>Yes + clinical and research experience</td>
<td>3 LORs</td>
</tr>
<tr>
<td>University of Washington</td>
<td>Bachelors</td>
<td>occupational therapy, physical therapy, speech/ language pathology, rehab counseling, prosthetics &amp; orthotics, medicine, nursing, engineering, or other fields related to rehab science</td>
<td>Yes</td>
<td>Yes + CV</td>
<td>3 LORs</td>
</tr>
<tr>
<td>Virginia Commonwealth University</td>
<td>Masters</td>
<td>movement science related field</td>
<td>Yes</td>
<td>Yes</td>
<td>3 LORs</td>
</tr>
<tr>
<td>Washington University in St. Louis</td>
<td>Bachelors</td>
<td>movement science related discipline: physical therapy, exercise physiology, kinesiology, occupational therapy, biomechanical engineering</td>
<td>Yes</td>
<td>Yes + CV + Writing sample</td>
<td>3 LORs</td>
</tr>
</tbody>
</table>

#### 2.2. Foreign Language Competence

A Test of English as a Foreign Language (TOEFL) for those who do not speak English as a primary language will be required (see Section 2.1 above).

#### 2.3. Program of Study

Two focused areas of specialization will be established that represent the expertise of our Department as well as the UCSF community as a whole. They include: Musculoskeletal Biomechanics and Clinically Informed Neuroscience. These areas of specialization are supported by established research infrastructure, including basic science laboratories on the Parnassus and SFGH campuses, movement analysis labs on the Mission Bay campus, imaging facilities, clinical physical therapy and health and wellness facilities, and the Neurobehavioral Core for Rehabilitation Research (see Appendix B for equipment available for research purposes in the Physical Therapy Outpatient Practice). The latter is a Core facility, supported by the Department of Physical Therapy and Rehabilitation Science that is available to the research community to study behavior of mouse models of injuries/diseases and to address activity-based restoration of function. In addition, SFSU has a movement analysis lab and a lab dedicated to clinical research.

These two areas of specialization include academic coursework offered at UCSF, and represent research interests of current faculty within the Department of Physical Therapy and Rehabilitation Science. Specifically, the unit requirements and required/elective courses in each area of specialization would be as follows.

**Specific Field of Emphasis: Rehabilitation Science**

**Plan:** Doctor B

**Unit Requirements:**
- **Total core units:** 12
- **Total rotation units**: 6-9
- **Total elective units**: 9-12
- **Total research units**: 108
- **Grand total units**: 135-141

**Required and Recommended Courses:**

**First year**: Focus on core courses in Rehabilitation Science, Statistics, Research Ethics, and Basic Sciences

The primary focus of the first two years of the PhD program will be to expose the student to the basic core courses in Rehabilitation Science and provide opportunity for students to experience and ultimately select a laboratory and Principal Investigator with whom to complete their dissertation. Courses taken in the first year include: RS 100 Introduction to Rehabilitation Science, BMS 214 Ethics and the Responsible Conduct of Research, EPI 150.03/202 Designing Clinical Research, biostatistics courses, and other basic science courses needed, based upon the student’s needs and interests (Anatomy, Physiology, Neuroscience, Statics and Dynamics, etc.). The remainder of the first year of study will be filled with Research Lab rotations (10-20 hours/week), the teaching assistantship or practicum, and the Doctoral Colloquium.

Also during their first year, with the guidance of the Steering Committee, students will each form a Graduate Committee of at least three faculty members comprised of two faculty within the PhD Program, and one member from an external department whose expertise is related to the candidate’s research interest (this may be too early for a dissertation topic). The Chair of the Committee will be a member of the PhD Program faculty and may be the student’s primary research mentor. One faculty member should be from the chosen sub-field and presumed dissertation topic of the student. The Graduate Committee will review the student’s plan of study, actively advise him/her on appropriate choices, and make decisions as to acceptable progress. Guidelines for typical and acceptable courses of study will be used, but exceptions may be liberally considered by the Graduate Committee depending on the needs of the student. The Graduate Committees will be overseen by the Steering Committee to ensure consistency in the expectations for training and a level of achieved competence by all students.

Students will be required to complete three quarters of lab rotations (3 units each), similar to the lab rotation requirement in other established PhD Programs at UCSF (e.g. Biomedical Sciences, Biological and Medical Informatics and Pharmaceutical Sciences and Pharmacogenomics). The objective of these rotations is for the student to have the opportunity to:

1. Apply concepts taught in formal classes
2. Learn practical aspects of conducting research, including how to work within a multidisciplinary team
3. Acquire exposure to areas of research other than the student’s primary area
4. Launch projects with potential for developing into qualifying examination or dissertation research topic
5. Decide on a primary research mentor, if not already identified

Three lab rotations will be required over three quarters before advancing to Candidacy status. A plan for which research teams to rotate with should be part of the Year 1 Plan of Study approved by the Graduate Committee. The subject matter for each rotation, however, is not prescribed by the PhD Program and would be determined by the needs of the research team and the student.

In the lab rotations, PhD students will participate in active research teams at UCSF or SFSU, or affiliated institutions. The PI and the student will set a plan for the lab rotation, including expectations. The PI is responsible for monitoring participation and student learning in the lab rotation.

**Second year**: Begin to focus on specific area of research in either the Musculoskeletal Biomechanics or Clinically Informed Neuroscience track

Within the first two years of study, the student, with the assistance of his/her Graduate Committee, will be
expected to choose a research emphasis, concordant with the expected dissertation topic, that will guide topic-specific and experiential study. Formulation of the topic will be the responsibility of the student with the oversight and advice of his/her Graduate Committee and primary research mentor.

By the end of the second year in the PhD program, the student is expected to have selected a research focus and a primary research mentor. The goal of the second year is to allow the student to finalize his/her dissertation focus and obtain the necessary knowledge and skills to successfully execute the dissertation. Coursework to be taken during this time includes electives within the selected domain, such as RS 330 Biomechanics of Human Motion or RS 340 Activity and Its Effects on CNS Disease/Injury Across the Lifespan, additional courses in biostatistics, and continuing with the Doctoral Colloquium. It is expected that the student will have at least 20 hours per week for research experiences, including pilot studies for the dissertation proposal, as appropriate.

The primary research mentor will be the principal advisor and supporter of the graduate student. The primary research mentor must have the means to provide financial support from existing research grants for tuition and stipend for years three and beyond.

Figure 1: Committee Structure

2.4. Field Examination

None.

2.5. Qualifying Examination

In the PhD program, doctoral students must take and pass a combined written and oral Qualifying Examination. The Qualifying Examination provides evidence the student is able to:

- Critically read, understand, and evaluate current literature in the discipline
- Integrate and synthesize ideas within the field
- Demonstrate comprehensive knowledge of the literature in the field
- Critically evaluate empirical evidence
- Demonstrate a comprehensive understanding of techniques critical to scholarship in the field
- Communicate clearly and effectively to specialist and non-specialist audiences
After completing all required coursework in the first two years, including at least five quarters, a student may apply to the Graduate Division to take the qualifying examination with the written approval of the Chair of his or her Graduate Committee. The examination is offered at the convenience of the student and his or her Graduate Committee and consists of a detailed six-page National Institutes of Health (NIH) style grant proposal to answer a rehabilitation science research question in a field related to his/her primary research area (sections of the NIH style grant proposal will include: 1) Introduction; 2) Specific aims; and 3) Research strategy, including the significance, innovation, and approach to be utilized). Students submit their proposal to the Qualifying Examination Committee at least 30 days prior to the date of their scheduled qualifying examination. The student must meet individually with each member of the Qualifying Examination Committee at least once prior to scheduling the qualifying examination. The Qualifying Examination Committee is comprised of a minimum of four faculty members, three of whom must be UCSF Academic Senate faculty members in the PhD program. Faculty from SFSU or other academic institutions as well as non-Academic Senate UCSF faculty can, with written permission from the Graduate Division, serve on the Qualifying Examination Committee. The faculty member designated the chair of the Qualifying Examination Committee must be a UCSF Academic Senate member who is a faculty member in the PhD program. The chair of the Qualifying Examination Committee cannot be the same individual who chairs the student’s Graduate Committee.

The oral portion of the qualifying examination lasts up to three hours and is closed to the general public, with the exception of the primary research mentor, who is only an observer. The student will be allowed to make a 10-15 minute presentation on his/her research plan with a dry erase board made available for a “chalk talk”. Questions for the oral examination will typically be based on the presentation, but can include materials covered from any required class in the curriculum, as well as anything pertaining to the student’s area of specialization. The purpose of the oral examination is to determine the student’s mastery of content within the rehabilitation science program. Upon finishing their course of study and taking the examination, students should be able to apply reasoning related to rehabilitation science to their chosen substantive areas and resolve methodological problems. The examination will cover the breadth and depth of a student’s knowledge in his/her area of specialization within the field of rehabilitation science.

In accordance with the UCSF Graduate Division guidelines, at least one meeting of the whole committee must be held to discuss the results of the examination. The committee may grade the examination either “Pass” (or “Contingent Pass”, pending response to committee concerns on the proposal) or “Fail”. In line with UCSF Graduate Division guidelines, if a student fails the examination, the committee must make a recommendation for or against a second examination. The committee must be the same as for the original exam. If the student failed in all areas, the re-examination must be on all subjects involved. A partial failure, in which the student passes some fields, but not others, also counts as a first examination. However, re-examination after partial failure may be restricted to those areas in which the original performance was unsatisfactory. The minimum time between examinations is three months. Students who fail the oral examination a second time will be dismissed from the PhD program.

2.6. Dissertation

Each doctoral student conducts research under the supervision of a primary research mentor and a Dissertation Committee. The student and primary research mentor recommend a Dissertation Committee, which is formally appointed by the Graduate Division. Once a student successfully passes the qualifying examination, the student’s Graduate Committee will disband, and a Dissertation Committee will be formed. This Committee will be composed of three faculty knowledgeable in the field related to the student’s research. The Dissertation Committee is responsible for overseeing the research conducted by the student, and offering an outside, unbiased assessment to the primary research mentor. The chair of the Dissertation Committee must be a UCSF Academic Senate faculty member and member of the PhD program. The chair of the Dissertation Committee may have been a member, but not the chair, of the student’s Qualifying Examination Committee, and may not be the student’s primary research mentor. A Dissertation Committee must have a minimum of three faculty members in the PhD program. Faculty from SFSU or other universities may be appointed to serve on the Dissertation Committee. All research involving
human subjects, including analyses of previously collected data, must have been approved (or declared exempt) in writing by the UCSF Committee for Human Research in order to be included in a dissertation, regardless of which or how many other such committees elsewhere have previously approved the research. Additionally, research using animals must have been approved in writing by the UCSF Institutional Care and Use Committee in order to be included in the dissertation.

The goal for the dissertation is to provide the student independent-investigator involvement, including idea conception, study design, methodological structure, acquisition, processing, and interpretation, with mentoring and oversight from the Dissertation Committee. It is anticipated that the student’s dissertation will include two or three separate projects addressing a single focused dissertation objective with sufficient depth and breadth to contribute to the body of literature in the field. The expectation is that this work will generate at least three independent manuscripts, to be published in peer-reviewed journals.

2.7. Final Examination

Dissertation Defense
A closed Defense of the Dissertation will be required for all students. Each student will have 45 minutes to orally present his/her dissertation written project, including the background, methods, results, discussion, and conclusions, to the Dissertation Committee and primary research mentor. This presentation and subsequent questioning will represent the acceptance or refusal by the Committee of the student’s body of work throughout the dissertation process. After the formal presentation by the student, the Committee will be allowed to ask questions, propose changes to the written dissertation, and/or request additional investigations, which must be within the scope of the approved research proposal. At the completion of the questioning, the student will be asked to leave the room while the Committee discusses the student’s performance and ultimately decides if the body of work satisfactorily meets the requirements of the Doctor of Philosophy in Rehabilitation Science. Once a decision has been made, the student will be informed of the outcome. Options include: Pass without modification to written dissertation; Pass With Modifications to the written dissertation; and Failure of Initial Attempt with an option to revise the dissertation and re-present.

Final Presentation
After the Dissertation Committee has approved the completed dissertation, a final presentation will be required for all students, prior to graduation. The presentation will be open to the local scientific community, general public, and family and friends. Announcements will be made to the appropriate UCSF, SFSU, and outside communities regarding the dissertation presentation. After the completion of the presentation, the student will be required to field questions from the general audience.

2.8. Explanation of Special Requirements

None.

2.9. Relationship of Master’s and Doctor’s Programs

As detailed above under the Admissions section, admission to the PhD program will require that an applicant has a baccalaureate degree, and a master’s degree will be optional, but preferred. If an applicant is accepted without a master’s degree, the applicant will take a required set of preparatory courses as a first step in his/her training.

2.10. Special Preparation for Careers in Teaching

In the PhD program, all doctoral students are expected to teach, serving as a Teaching Assistant for a course at least one quarter or semester in length before the Qualifying Examination. This teaching experience requires students to organize their own knowledge in the field so that they can effectively present and explain the material to others. It also serves as an important foundation for future academic positions.
In addition, students in the program may receive additional teaching training by enrolling in a teaching training through the Haile T. Debas Academy of Medical Educators and the Office of Medical Education, which offers courses and workshops for faculty and pre-doctoral fellows in writing a course syllabus, assessment instruments, and innovative teaching techniques. PhD students may also take advantage of the Teaching Improvement Program/Teaching Observation Program offered through the Academy.

2.11. Sample Program

Below is an initial proposed curriculum. There are two general tracks available to students. All students will take the following courses (new courses indicated with an asterisk):


YEAR 1

Fall Quarter
- C - RS 100 Introduction to Rehabilitation Science (2 units)
- C - RS 150 Gross and Regional Anatomy (1 unit)
- D - RS 300 Doctoral Colloquium (1 unit)
- LR - RS 200 Research Lab Rotation (3 units) or at SFSU PT 996 Directed Studies (3 semester units)

Winter Quarter
- C - Biostat 187 Introduction to Statistical Theory and Practice (5 units)
- D - RS 300 Doctoral Colloquium (1 unit)
- LR - RS 200 Research Lab Rotation (3 units) or at SFSU PT 996 Directed Studies (3 semester units)

Spring Quarter
- C - BMS 214 Ethics and the Responsible Conduct of Research (2 units)
- C - EPI 150.03/202 Designing Clinical Research (2 units)
- D - RS 300 Doctoral Colloquium (1 unit)
- LR/E - RS 200 Research Lab Rotation or at SFSU PT 996 Directed Studies (3 semester units)

Summer Quarter
- T - RS 310 Teaching Practicum (3 units) or at SFSU PT 960 Teaching Practicum (3 units)
- D - RS 300 Doctoral Colloquium (1 unit)
- D - RS 350 Research (5 units) or at SFSU PT 997 Research (2 semester units)

YEAR 2

Fall Quarter
- E - Elective (3 units)
- D - RS 300 Doctoral Colloquium (1 unit)
- D - RS 350 Research (5 units) or at SFSU PT 997 Research (2 semester units)

Winter Quarter
- E - Elective (3 units)
- D - RS 300 Doctoral Colloquium (1 unit)
- D - RS 350 Research (5 units) or at SFSU PT 997 Research (2 semester units)

Spring Quarter
- E - Elective (3 units)
- D - RS 300 Doctoral Colloquium (1 unit)
- D - RS 350 Research (5 units) or at SFSU PT 997 Research (2 semester units)
- Qualifying Examination

Summer Quarter
- D - RS 300 Doctoral Colloquium (1 unit)
- D - RS 350 Research (8 units) or at SFSU PT 997 Research (2 semester units)
YEARS 3

- All quarters will be RS 350 Research (8 units) and RS 300 Doctoral Colloquium (1 unit)

Total core units: 12 quarter units (year 1)

Total lab rotation units: 6-9 quarter units (year 1)
  Rotations in labs; students must enroll in rotations for at least two quarters in the fall, winter, and/or spring of the first year.

Total elective units: 9-12 quarter units (year 2)

Total research units (research + quarterly 1-unit doctoral seminar): 108 quarter units (years 1 through 4)
  36 quarter units (years 1 and 2), and 72 quarter units (years 3 and 4)

Grand total units: 135 - 141 quarter units

Students enroll in elective coursework, based on consultation with their Graduate Committee, in the second year of the program. Given the interdisciplinary nature of the program and the UCSF academic culture, included below is only a short list of the available opportunities for students:

**Required Coursework:**
- RS 100 Introduction to Rehabilitation Science (2 units)
- RS 150 Gross and Regional Anatomy (1 unit)
- Biostat 187 Introduction to Statistical Theory and Practice or equivalent (5 units)
- BMS 214 Ethics and the Responsible Conduct of Research (2 units)
- EPI 150.03/202 Designing Clinical Research (2 units)

**Elective Coursework of Interest to All Students:**
- BioE 25 Careers in Biotechnology (1 unit)
- BMS 225A Human Disease: Technologies and Biomedical Applications (1.5 units)
- BMS 225B Tissue and Organ Biology (3 units)
- BMS 255 Basic Genetics and Genomics (4 units)
- BMS 260 Cell Biology (4 units)
- MICRO 204 Molecular and Cellular Immunology (3 units)
- PT 251 Research Design (3.5 units)
- TICR Summer Clinical Research Workshop (required to take 2+ courses in series)
  - EPI 150.03 Designing Clinical Research (2 units)
  - Biostat 212 Introduction to Statistical Computing in Clinical Research (1 unit)
  - EPI 218 Database Management Systems for Clinical Research (1 unit)
  - EPI 227 Building a Career in Clinical Research (0.5 unit)

**Elective Coursework within the Musculoskeletal Biomechanics in Rehabilitation Science emphasis:**
- BI 201 Principles of MR Imaging (4 units)
- BI 202 Physical Principles of CT, PET, and SPECT Imaging (4 units)
- BI 240 Musculoskeletal Imaging (3 units)
- BioE 221 Tissue Mechanobiology (2.5-3 units)
- RS 130 Basics in Musculoskeletal Imaging (3 units)
- RS 330 Biomechanics of Human Motion (2 units)
- RS 331 Running Biomechanics and Overuse Injuries - Journal Club (2 units)

**Elective Coursework within the Clinically Informed Neuroscience emphasis:**
- ANA 207 Neuroscience (5 units)
- N 294B Medical Genetics for Nursing (3 units)
● NS 219 Topics in Basic or Translational Neuroscience (topics include: Epigenetics in the Brain; Brain Injury; Molecular Genetic Tools; Basal Ganglia; Neuroinflammation) (3 units)
● NS 225 Neurobiology of Disease (3 units)
● NS 245 Behavioral Neuroscience (3 units)
● PT 420 Mentored Research (2.5 units)
● *RS 110 Principles and Applications of Evidence-based Practice (3 units) and at SFSU PT 910 Evidence Based Practice (4 semester units)
● *RS 340 Activity and Its Effects on CNS Disease/Injury Across the Lifespan (2 units)
● RS 400 Topics in Clinically Informed Neuroscience (e.g. Challenges in Translation of Science to the Clinic) (2 units)

Many other courses are offered as part of other existing graduate programs at UCSF, SFSU, and at other institutions and UC campuses through the Intercampus Exchange Program.

2.12. Normative Time from Matriculation to Degree

The time needed to complete the PhD in Rehabilitation Science will vary depending on the student’s training and experience prior to enrolling in the PhD program and the time it takes to complete the dissertation research. Students who have completed undergraduate level training require at least two years to complete their coursework and pass their qualifying examination, followed by an additional two to three years to complete their research and file the dissertation. Those who have completed Masters level training may progress more quickly through the coursework. Thus, the mean time to completion of a PhD in Rehabilitation Science for students entering with a Bachelor’s degree is expected to be approximately five years. To facilitate timely progress in the program, all students will be required to complete annual progress reports and to discuss them with their adviser and Graduate Committee or Dissertation Committee.
SECTION 3: PROJECTED NEED

3.1. Student Demand for the Program

We propose an enrollment of two new students every other year for six years, until 12 students are enrolled. We expect no difficulty in admitting this number of high quality applicants, as most top-rated programs in rehabilitation science turn away strong applicants. The following is a table of peer institutions, which includes the number of applications received each year and the number of students admitted. It is clear from this information that there are many more students interested in PhD programs in Rehabilitation Science than there are available openings.

Table 6: Student Demand at Peer Institutions

<table>
<thead>
<tr>
<th>Institution</th>
<th># Apps</th>
<th># Students Admitted</th>
<th>Employment of Graduates</th>
<th>Top 5 Areas of Training</th>
<th>Funding Sources</th>
<th>Faculty Openings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Duquesne University</td>
<td>5 per year</td>
<td>0-2 per year</td>
<td>100% academia</td>
<td>1) Orthopedics 2) Clinical Biomechanics</td>
<td>Graduate assistant funding from the dept</td>
<td>Not at the present time</td>
</tr>
<tr>
<td>Ohio State University</td>
<td>6 per year</td>
<td>3 per year</td>
<td>67% academia 33% clinical research</td>
<td>1) Pediatrics 2) Biomechanics 3) Neuro 4) Human Factors 5) Diet &amp; Nutrition</td>
<td>No training grants; students are on grants of their mentors; some receive University fellowships</td>
<td>2 openings in PT: one in ortho and one in neuro</td>
</tr>
<tr>
<td>University of Delaware</td>
<td>30-40 per year</td>
<td>2-4 per year</td>
<td>80% academia 15% industry 5% non-research</td>
<td>1) Applied Anatomy and Biomechanics 2) Exercise Physiology 3) Tissue/Molecular Biomechanics 4) Motor Control &amp; Behavior 5) Rehabilitation Engineering</td>
<td>40% on TA-ship funded by department; remainder are primarily on faculty grants</td>
<td>Yes, 2-3 openings appropriate for PhD in Rehab Science</td>
</tr>
<tr>
<td>University of Minnesota</td>
<td>12 per year</td>
<td>2-3 per year</td>
<td>95% into academia</td>
<td>1) Muscle adaptation 2) Musculoskeletal Injuries 3) Outcomes of Therapeutic Intervention 4) Postural Control 5) Stroke Recovery and Neuroplasticity</td>
<td>Mentor’s grants, TA positions, funds from country of origin, university fellowships, PT Foundation, NIH predoc awards, AHA predoc awards</td>
<td>Yes, openings in cardiopulmonary and rehab</td>
</tr>
<tr>
<td>University of Southern California</td>
<td>30 per year</td>
<td>6 per year</td>
<td>95% into academia</td>
<td>1) Biomechanics 2) Computational Neurorehabilitation 3) Exercise Physiology 4) Motor Learning and Motor Control 5) Neuroplasticity and Imaging</td>
<td>TA and RA positions. RA positions come from grants</td>
<td>None</td>
</tr>
<tr>
<td>Washington University at St. Louis</td>
<td>15-20 per year</td>
<td>2-3 per year</td>
<td>mainly into academia (90-95%) and some go to industry (5-10%)</td>
<td>1) Translational Physiology 2) Movement and Movement-related Dysfunction 3) Musculoskeletal Analysis</td>
<td>T32 (supports 3 students per year), departmental funds (2 students supported), F31s, TL1 program (3 students funded), R01s or other grants to the PIs of the labs the students are working in</td>
<td>anticipate hiring 3-5 tenure faculty in the next five years</td>
</tr>
</tbody>
</table>
On the demand side, the need for medical scientists is rapidly increasing as the general population begins to age. The Bureau of Labor Statistics has documented in the Occupational Outlook Handbook that the number of Medical Scientist positions is expected to increase by 36% (from 100,000 to 136,400 positions) between 2010 and 2020, a rate much higher than the national average for all occupations. Additionally, the growth of Postsecondary Teacher positions is projected to increase by 17% as enrollments at postsecondary institutions continue to rise.

According to the aggregate program data for APTA-accredited Physical Therapy programs, in 2011-12, there were 132 current vacancies in allocated faculty positions, and 83 projected vacancies in allocated faculty positions. In 2012-13, there were 153 current vacancies in allocated faculty positions, and 105 projected vacancies in allocated faculty positions. The average age of core faculty in APTA-accredited Physical Therapy programs is between 50 and 60 years of age, and 71% of all core faculty are between 45 and 65 years of age. Additionally, in 2012-13, 88% of core faculty in APTA-accredited Physical Therapy programs were self-identified as White or Caucasian. These statistics support the growing need for the next generation of a diverse pool of qualified academic researchers and educators who can contribute to the body of research and educate future physical therapists who represent the diversity of the communities they will serve.

3.2. Opportunities for Placement of Graduates

Graduates of the PhD Program in Rehabilitation Science will be prepared as researchers, educators, and leaders in the field of rehabilitation science. Our interdisciplinary educational approach prepares students to conduct collaborative and translational research by integrating knowledge from multiple perspectives ranging from the cellular to the systems level to solve complex problems of physical disablement. Upon graduation, students will pursue academic careers in research and higher education. These individuals will be prepared to address research, education, service delivery, and policy challenges requiring an interdisciplinary perspective. Openings in academia for faculty positions are numerous in this field, and range in positions in Physical Therapy, Gerontology, Oncology, Physiotherapy, Health Sciences, Rehabilitation, and Movement Science departments.

Exceptional students with substantial experience prior to completion of the PhD may be prepared to begin faculty positions immediately upon completion of their dissertation. However, in order to be successful in rigorous academic settings, a postdoctoral fellowship will be recommended to graduates after completion of the PhD. During a postdoctoral fellowship, graduates will complete the process of publishing their dissertation research and work as full-time researchers with a faculty mentor (typically not the primary research mentor). The objective of the postdoctoral fellowship is to provide the graduate time to develop a line of independent investigation to launch their career so that upon accepting a faculty position, the graduate’s area of scholarship is defined and the individual is well on his/her way to securing substantial extramural funding to launch an original research program. Graduates will have developed extensive skills as teachers while in the program, also preparing them to succeed in this demanding aspect of the academic career.

3.3. Importance to the Discipline

The PhD Program in Rehabilitation Science will be housed within UCSF, which will allow it to become a premier opportunity for researchers interested in the field. UCSF is first among public institutions and ranked second among all institutions nationwide in research support from the National Institutes of Health (NIH) for fiscal year 2011. UCSF is also one of the leading institutional recipients of science-based stimulus funds under the American Recovery and Reinvestment Act. Acclaimed faculty conducting investigations involving humans, as well as animal

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models, are discovering new solutions for preventing and treating a wide array of diseases, including cardiovascular disease, neurological disorders, cancer, diabetes, genetic disorders, immunological and infectious disease, and reproductive and developmental disorders. UCSF has started multiple groups within the University specifically related to the field of Rehabilitation Science, including the Institute for Health and Aging, the Cardiovascular Research Institute, and the Institute for Neurodegenerative Diseases.

Additionally, the Physical Therapy profession has developed a set of research goals that the proposed PhD program will be able to directly address. The proposed PhD program will initially focus on a subset of the profession’s priorities, including:

- **Basic Science Research**
  - Examine how genetic, anatomical, biomechanical, physiological, or environmental factors contribute to excessive stress, injury, or abnormal development of body tissues and systems, and measure the effects of physical therapy interventions on structural properties and physiological responses of healthy, injured, or diseased tissues.
  - Examine skill acquisition and motor development in individuals with movement disorders.
  - Examine the relationships between biomarkers and impairments in body structure and function, limitations in activity, and restrictions in participation.
  - Define the role for physical therapy in the maturation and modeling of genetically engineered tissues.
  - Determine the mechanisms by which existing and novel physical therapy interventions modify disease and age-related or injury-induced changes in normal cellular structure and function using appropriate human and animal models.

- **Clinical Research**
  - Examine the relationships among levels of functioning and disability, health conditions, and contextual factors for conditions commonly managed by physical therapists, and develop and evaluate models of health and disability to guide the investigation, prevention, and treatment of these health conditions.
  - Evaluate or develop effective physical therapy interventions and technologies to address movement disorders and chronic disease, and to prevent or reduce the risk of disability and optimize health outcomes.
  - Develop and evaluate effective patient/client classification methods and decision support tools, effectiveness and efficacy of physical therapy interventions, criteria for progression in levels of care, contextual and adherence factors that affect prognosis and predictors of recovery, in order to optimize clinical decision making and patient/client outcomes.

- **Education/Professional Development**
  - Develop and evaluate the most effective methods for facilitating physical therapist acquisition and use of available information resources for evidence-based practice.
  - Evaluate the skills needed by practitioners to provide optimal patient/client care, patient/client advocacy, and cost-effective care.

- **Epidemiology**
  - Examine the incidence, prevalence, and natural course of health conditions and impairments of body functions and structure, activity limitations, and participation restrictions associated with health conditions commonly managed by physical therapists.
  - Investigate the effects of contextual factors on the effectiveness of interventions provided by physical therapists.

- **Health Services Research/Policy**
  - Evaluate the incorporation of patient/client values and expectations in decision-making, and the effect of physical therapy interventions and service delivery models on economic and patient/client outcomes and consumer choice.

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Develop innovative medical informatics applications for physical therapy and assess their impact on clinical decision making and patient/client outcomes.

- Measurement Development and Validation
  - Develop new measurement tools and evidence to guide selection and interpretation of measures to enhance clinical decision making for specific conditions and populations.
  - Determine how contemporary technology (e.g. ultrasound, gene array, magnetic resonance) can be used to measure the effects of injury/disease and physical therapy intervention on body structure and function.

3.4. Ways in which the Program will Meet the Needs of Society

As the population continues to age, the development of programs in the interdisciplinary field of rehabilitation will be essential to ensure new research is produced to support the healthcare needs of society. The professions of physical and occupational therapy are expected to expand in upcoming decades with longer projected age spans of the general population and the increased prevalence of obesity. With this increased demand, rehabilitation specialists will be needed to provide effective and efficient care. However, the current evidence behind the practice of physical and occupational therapy is lacking in nearly all areas of clinical practice. Rehabilitation scientists with advanced research training are in critical demand to begin to evaluate these issues, to evaluate the effectiveness of current injury prevention and rehabilitation science, and to develop new potential injury prevention and rehabilitation strategies.

The program has established two areas of specialization within the field of rehabilitation science, given the healthcare needs of society. The Clinically Informed Neuroscience specialization was developed based on the increased prevalence of neurodegenerative diseases (e.g. Multiple Sclerosis, Parkinson’s Disease), stroke and traumatic brain injuries (TBI) in the US population. According to the CDC, stroke kills almost 130,000 Americans each year—1 in every 19 deaths. Every year, more than 795,000 people in the United States have a stroke; about 610,000 of these are first or new strokes and one in four are recurrent strokes. Currently, stroke costs the United States an estimated $38.6 billion each year, which includes the cost of health care services, medications, and missed days of work. Stroke is a leading cause of serious long-term disability. Additionally, an estimated 1.7 million people sustain a traumatic brain injury (TBI) annually. Of them, 52,000 die, 275,000 are hospitalized, and 1.365 million—nearly 80%—are treated and released from an emergency department. Direct medical costs and indirect costs of TBI, such as lost productivity, totaled an estimated $60 billion in the United States in 2000.

The Musculoskeletal Biomechanics specialization was established to address the increasing prevalence of arthritis in the aging and obese population. According to the CDC, arthritis is the most common cause of disability in the United States, limiting the activities of nearly 21 million adults. Scientific studies have shown that physical activity can reduce pain and improve function, mood, and quality of life for adults with arthritis. Physical activity can also help manage other chronic conditions that are common among adults with arthritis, such as diabetes, heart disease, and obesity. Currently, 50 million people are affected with arthritis and it is estimated that one in two people will get symptomatic knee osteoarthritis in their lifetime. Additionally, more than 36% of adults in the US are currently obese, and medical costs associated with obesity were estimated at $147 billion in 2008.

3.5. Relationship of the Program to Research and/or Professional Interests of Faculty

The formation of a PhD Program in Rehabilitation Science has been part of the Department’s strategic plan since 2008. The multiple research programs and interests of the faculty members would benefit greatly from the

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constant presence of PhD-level graduate students within the department. Existing research programs in basic neuroscience, radiology, orthopedic surgery, and biomechanics, along with a faculty representation in the Musculoskeletal Quantitative Imaging Research (MQIR) group in the Department of Radiology and Biomedical Imaging, the mini courses offered through the Neuroscience community, and a variety of grand round options, all provide opportunities for graduate students to develop projects for their dissertations and other research and educational interests. Department faculty currently have access to other UCSF programs in Bioengineering, Neuroscience, and the Biomedical Sciences, but none of those areas has a focus on rehabilitation.

The Department sees the top priority of the PhD program to find a strong match between the current research projects of program faculty and incoming PhD student interest. Given this priority, the Department intends to start the program by focusing on a few key areas of rehabilitation science from ongoing research lines of the Department faculty.

3.6. Program Differentiation

The proposed PhD in Rehabilitation Science has two primary characteristics that differentiate it from other existing programs within the UC system or in the State of California.

First, since the program will be based within a school of medicine, as compared to a school of public health, the orientation toward and opportunities for training and research in clinical problem solving and translational sciences as well as links to excellent basic science departments are very strong. UCSF is world famous for the outstanding quality of its basic sciences and opportunities abound for lab rotations and other training in basic science laboratories for interested students. Likewise, the campus’ excellent professional schools, all rated within the top three in NIH funding nationwide, provide opportunities to learn about the application of rehabilitation science in the clinical setting. A comparison of T-32 grant activity at UCSF and comparable institutions demonstrates the high level of grant activity at UCSF as compared to other institutions offering a similar degree program.

Table 7: Comparison of T-32 Grant Activity in 2012 and 2013

<table>
<thead>
<tr>
<th>Institution</th>
<th>University Training Grants</th>
<th>Rehabilitation Training Grants</th>
</tr>
</thead>
<tbody>
<tr>
<td>Drexel University</td>
<td>2012: $0 (n=0)</td>
<td>2012: $0</td>
</tr>
<tr>
<td></td>
<td>2013: $0 (n=0)</td>
<td>2013: $0</td>
</tr>
<tr>
<td>Duquesne University</td>
<td>2012: $0 (n=0)</td>
<td>2012: $0</td>
</tr>
<tr>
<td></td>
<td>2013: $0 (n=0)</td>
<td>2013: $0</td>
</tr>
<tr>
<td>Loma Linda University</td>
<td>2012: $0 (n=0)</td>
<td>2012: $0</td>
</tr>
<tr>
<td></td>
<td>2013: $0 (n=0)</td>
<td>2013: $0</td>
</tr>
<tr>
<td>Medical University of South Carolina</td>
<td>2012: $3,523,823 (n=14)</td>
<td>2012: $0</td>
</tr>
<tr>
<td></td>
<td>2013: $3,603,611 (n=13)</td>
<td>2013: $0</td>
</tr>
<tr>
<td>MGH Institute of Health Professions</td>
<td>2012: $5,764,405 (n=21)</td>
<td>2012: $0</td>
</tr>
<tr>
<td></td>
<td>2013: $6,589,139 (n=19)</td>
<td>2013: $0</td>
</tr>
<tr>
<td>Northwestern University</td>
<td>2012: $8,054,128 (n=32)</td>
<td>2012: $708,233</td>
</tr>
<tr>
<td></td>
<td>2013: $7,325,680 (n=30)</td>
<td>2013: $626,729</td>
</tr>
<tr>
<td>The Ohio State University</td>
<td>2012: $2,973,598 (n=13)</td>
<td>2012: $0</td>
</tr>
<tr>
<td></td>
<td>2013: $3,268,764 (n=16)</td>
<td>2013: $0</td>
</tr>
<tr>
<td>The University of North Carolina at Chapel Hill</td>
<td>2012: $15,722,227 (n=57)</td>
<td>2012: $318,397</td>
</tr>
<tr>
<td></td>
<td>2013: $14,818,902 (n=50)</td>
<td>2013: $432,763</td>
</tr>
<tr>
<td>Texas Tech University Health Sciences Center</td>
<td>2012: $0 (n=0)</td>
<td>2012: $0</td>
</tr>
<tr>
<td></td>
<td>2013: $0 (n=0)</td>
<td>2013: $0</td>
</tr>
<tr>
<td>University of Alabama at Birmingham</td>
<td>2012: $4,560,500 (n=22)</td>
<td>2012: $195,471</td>
</tr>
<tr>
<td></td>
<td>2013: $5,275,467 (n=21)</td>
<td>2013: $262,501</td>
</tr>
<tr>
<td>University at Buffalo, The State University of New York</td>
<td>2012: $607,953 (n=4)</td>
<td>2012: $0</td>
</tr>
<tr>
<td></td>
<td>2013: $805,318 (n=5)</td>
<td>2013: $0</td>
</tr>
<tr>
<td>Institution</td>
<td>University Training Grants</td>
<td>Rehabilitation Training Grants</td>
</tr>
<tr>
<td>------------------------------------------</td>
<td>------------------------------------------------</td>
<td>-------------------------------</td>
</tr>
<tr>
<td><strong>University of California, San Francisco</strong></td>
<td><strong>2012: $18,004,693 (n=57)</strong>&lt;br&gt;<strong>2013: $18,350,321 (n=55)</strong></td>
<td><strong>2012: N/A</strong>&lt;br&gt;<strong>2013: N/A</strong></td>
</tr>
</tbody>
</table>
| University of Colorado Denver            | 2012: $6,919,474 (n=26)  
2013: $7,560,108 (n=31) | 2012: $0  
2013: $0 |
| University of Delaware                   | 2012: $346,526 (n=2)  
2013: $394,142 (n=2) | 2012: $67,866  
2013: $155,291 |
| University of Florida                    | 2012: $2,464,065 (n=13)  
2013: $1,948,748 (n=11) | 2012: $205,731  
2013: $0 |
| University of Iowa                       | 2012: $7,195,268 (n=25)  
2013: $7,263,834 (n=26) | 2012: $0  
2013: $0 |
| University of Kansas Medical Center      | 2012: $1,604,541 (n=4)  
2013: $1,530,652 (n=8) | 2012: $214,931  
2013: $174,859 |
| University of Kentucky                   | 2012: $2,185,694 (n=11)  
2013: $1,744,988 (n=10) | 2012: $0  
2013: $0 |
| University of Maryland                   | 2012: $3,841,749 (n=18)  
2013: $3,562,960 (n=17) | 2012: $0  
2013: $0 |
| University of Medical Sciences Arizona   | 2012: $1,927,366 (n=13)  
2013: $1,182,950 (n=8) | 2012: $0  
2013: $0 |
| University of Minnesota                  | 2012: $9,868,557 (n=34)  
2013: $9,903,968 (n=31) | 2012: $256,351  
2013: $274,442 |
| University of Pittsburgh                 | 2012: $12,620,803 (n=57)  
2013: $13,516,467 (n=58) | 2012: $28,157  
2013: $28,157 |
| University of Southern California        | 2012: $3,058,674 (n=10)  
2013: $2,104,168 (n=8) | 2012: $0  
2013: $0 |
| University of Texas Medical Branch       | 2012: $1,943,937 (n=9)  
2013: $2,082,273 (n=9) | 2012: $0  
2013: $0 |
| University of Washington                 | 2012: $21,983,127 (n=61)  
2013: $20,272,808 (n=56) | 2012: $0  
2013: $0 |
| Virginia Commonwealth University         | 2012: $1,801,414 (n=6)  
2013: $1,384,248 (n=6) | 2012: $0  
2013: $0 |
| Washington University at St. Louis       | 2012: $16,949,967 (n=50)  
2013: $16,764,449 (n=50) | 2012: $153,637  
2013: $143,012 |

Second, the campus is home to a very strong social science tradition and opportunities exist in behavioral and social epidemiology and community participatory research. Therefore, this multidisciplinary environment creates the setting for transdisciplinary approaches for training and research, which is a foundational value for the Department and program.
SECTION 4: FACULTY

The following are faculty members in the PhD in Rehabilitation Science program who are primarily housed in the Department of Physical Therapy and Rehabilitation Science and in the Department of Physical Therapy at San Francisco State University:

Table 8: Faculty in UCSF Department of Physical Therapy and Rehabilitation Science & SFSU Department of Physical Therapy

<table>
<thead>
<tr>
<th>Name</th>
<th>Title</th>
<th>Area of Expertise</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diane Allen, PT, PhD</td>
<td>WOS Faculty, UCSF Associate Professor, SFSU</td>
<td>Motion analysis, neurorehabilitation, Multiple Sclerosis, tests and measures</td>
</tr>
<tr>
<td>Nancy Byl, PT, MPH, PhD</td>
<td>Professor and Chair Emeritus</td>
<td>Focal dystonia, Parkinson’s disease, repetitive strain injury, CVA, outcomes research</td>
</tr>
<tr>
<td>Amber Fitzsimmons, PT, DPTSc</td>
<td>Assistant Professor (joint appointment in Anatomy)</td>
<td>Interprofessional education, geriatrics</td>
</tr>
<tr>
<td>Wendy Katzman, PT, DPTSc</td>
<td>Associate Professor</td>
<td>Osteoporosis, kyphosis, geriatrics</td>
</tr>
<tr>
<td>Jeannette Lee, PT, PhD</td>
<td>WOS Faculty, UCSF Associate Professor, SFSU</td>
<td>Oncology</td>
</tr>
<tr>
<td>Linda Noble, PhD</td>
<td>Professor (joint appointment in Neurological Surgery)</td>
<td>Brain and spinal cord injury; injury and repair mechanisms</td>
</tr>
<tr>
<td>Sandra Radtka, PT, PhD</td>
<td>WOS Faculty, UCSF Professor, SFSU</td>
<td>Motion analysis, pediatric neurorehabilitation</td>
</tr>
<tr>
<td>Susanna Rosi, PhD</td>
<td>Associate Professor (joint appointment in Neurological Surgery)</td>
<td>Neuroscience, neuroinflammation, the aged brain</td>
</tr>
<tr>
<td>Betty Smoot, PT, DPTSc</td>
<td>Assistant Professor (joint appointment in Anatomy)</td>
<td>Breast cancer related lymphedema</td>
</tr>
<tr>
<td>Richard Souza, PT, PhD</td>
<td>Associate Professor (joint appointments in Orthopaedic Surgery and Radiology and Biomedical Imaging)</td>
<td>Biomechanics, advanced quantitative imaging, lower extremity overuse injuries</td>
</tr>
<tr>
<td>Kimberly Topp, PT, PhD</td>
<td>Professor and Chair (joint appointment in Anatomy)</td>
<td>Cell biology of peripheral nerve, chemotherapy induced neuropathy</td>
</tr>
<tr>
<td>Linda Wanek, PT, PhD</td>
<td>WOS Faculty, UCSF Professor and Chair, SFSU</td>
<td>Musculoskeletal rehabilitation; muscle cell biology</td>
</tr>
</tbody>
</table>

Faculty outside the Department of Physical Therapy and Rehabilitation Science must be vetted through an approval process. The faculty member will provide one letter of support from a current faculty member in the PhD in Rehabilitation Science program and one letter from the faculty member’s department chair, as well as a copy of a current CV. The letters should attest to the items in the criteria list below, and the letter from the chair should also describe available lab space and grant support. The application packet is reviewed by the PhD Program Steering Committee, and membership is voted on at quarterly meetings. In certain cases, prospective faculty members may be asked to give a seminar to the PhD in Rehabilitation Science community before admission is approved.

Basic criteria for inclusion in the PhD in Rehabilitation Science Program faculty includes:

1. Research relevant to one or both of the specializations in the PhD in Rehabilitation Science program (musculoskeletal biomechanics or clinically informed neuroscience).
2. NIH R01 support to ensure external peer review and support for a student’s project.
3. Confidence that the individual would be a suitable mentor for a graduate student, which may include such considerations as time devoted to research if the candidate will have clinical responsibilities, publication record, funding resources, training record, etc.
4. Membership in the UCSF Academic Senate (may be waived in certain cases).
Faculty membership is reviewed every three years and renewal is contingent upon demonstrated involvement in the PhD program. Opportunities for involvement include teaching in PhD courses and participation in journal clubs, attending PhD in Rehabilitation Science retreats, serving on Qualifying Examination, Graduate, or Dissertation Committees, participating in the student interview process, serving as a primary research mentor, or hosting students through their laboratory rotations.

The following are faculty outside the Department of Physical Therapy and Rehabilitation Science who will be initial members of the faculty in the PhD program in Rehabilitation Science:

Table 9: Faculty in the PhD Program Who Are Appointed in Other Departments at UCSF

<table>
<thead>
<tr>
<th>Name</th>
<th>Title</th>
<th>Area of Expertise</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gary Abrams, MD</td>
<td>Professor and Director of Neurorehabilitation, Neurology Rehabilitation Section Chief, San Francisco VA Medical Center</td>
<td>Neurorehabilitation</td>
</tr>
<tr>
<td>Allan Basbaum, PhD</td>
<td>Professor and Chair Anatomy</td>
<td>Neurological basis of pain and its control</td>
</tr>
<tr>
<td>Michael Beattie, PhD</td>
<td>Professor Neurological Surgery</td>
<td>Spinal cord injury</td>
</tr>
<tr>
<td>Jacqueline Bresnahan, PhD</td>
<td>Professor Neurological Surgery</td>
<td>Spinal cord injury</td>
</tr>
<tr>
<td>Sibel Demir-Deviren, MD</td>
<td>Associate Professor Orthopedic Surgery</td>
<td>Chronic low back pain, degenerative disc disease</td>
</tr>
<tr>
<td>Brian Feeley, MD</td>
<td>Assistant Professor Orthopedic Surgery</td>
<td>Knee and shoulder orthopaedic injuries, surgical procedures</td>
</tr>
<tr>
<td>Adam Ferguson, PhD</td>
<td>Assistant Professor Neurological Surgery</td>
<td>Informatics and spinal cord injury</td>
</tr>
<tr>
<td>Donna Ferriero, MD</td>
<td>Professor Pediatrics</td>
<td>Neonatal hypoxia/ ischemia</td>
</tr>
<tr>
<td>Karunesh Ganguly, PhD</td>
<td>Assistant Professor Neurology</td>
<td>Neurorehabilitation</td>
</tr>
<tr>
<td>Kate Hamel, PhD</td>
<td>Assistant Professor Kinesiology, SFSU</td>
<td>Biomechanics and falls in the elderly</td>
</tr>
<tr>
<td>Robert Hiatt, MD, PhD</td>
<td>Professor Epidemiology and Biostatistics</td>
<td>Oncology and disease prevention; epidemiology and public health</td>
</tr>
<tr>
<td>Galateia Kazakia, PhD</td>
<td>Assistant Professor Radiology and Biomedical Imaging</td>
<td>Bone microarchitecture, quantitative computed tomography, mechanisms of bone failure to load.</td>
</tr>
<tr>
<td>Thomas Lang, PhD</td>
<td>Professor Radiology and Biomedical Imaging</td>
<td>Quantitative computed tomography, positron emission tomography, bone and muscle adaptations to stimuli.</td>
</tr>
<tr>
<td>Jon Levine, MD, PhD</td>
<td>Professor Oral and Maxillofacial Surgery</td>
<td>Signaling in pain sensory neurons; neural-endocrine control of inflammation; musculoskeletal pain.</td>
</tr>
<tr>
<td>Xiaojuan Li, PhD</td>
<td>Associate Professor Radiology and Biomedical Imaging</td>
<td>Post-traumatic osteoarthritis, quantitative magnetic resonance imaging.</td>
</tr>
<tr>
<td>Thomas Link, MD, PhD</td>
<td>Professor Radiology and Biomedical Imaging</td>
<td>Imaging of osteoporosis, imaging techniques for assessment of bone quality and density.</td>
</tr>
<tr>
<td>Jialing Liu, PhD</td>
<td>Professor Neurological Surgery</td>
<td>Stroke</td>
</tr>
<tr>
<td>Name</td>
<td>Title</td>
<td>Area of Expertise</td>
</tr>
<tr>
<td>-------------------------------</td>
<td>--------------------------------------------</td>
<td>-------------------------------------------------------</td>
</tr>
<tr>
<td>Anthony Luke, MD, MPH</td>
<td>Professor Orthopaedic Surgery</td>
<td>Sports injuries, particularly running overuse injuries</td>
</tr>
<tr>
<td>Benjamin Ma, MD</td>
<td>Associate Professor Orthopaedic Surgery</td>
<td>Orthopaedic surgical approaches, post-traumatic osteoarthritis</td>
</tr>
<tr>
<td>Sharmila Majumdar, PhD</td>
<td>Professor Radiology and Biomedical Imaging</td>
<td>Osteoporosis, osteoarthritis, radiology and quantitative imaging</td>
</tr>
<tr>
<td>Mervyn Maze, MB ChB</td>
<td>Professor and Chair Anesthesia and Perioperative Care</td>
<td>Exercise and inflammation post-anesthesia</td>
</tr>
<tr>
<td>Patrick McQuillen, MD</td>
<td>Associate Professor Pediatrics/Critical Care</td>
<td>Disorders of brain development</td>
</tr>
<tr>
<td>Christine Miaskowski, RN, PhD</td>
<td>Professor Physiological Nursing</td>
<td>Pain and symptomatology in oncology</td>
</tr>
<tr>
<td>Sri Nagarajan, PhD</td>
<td>Associate Professor Radiology and Biomedical Imaging</td>
<td>Functional brain imaging, brain plasticity, learning, sensorimotor control</td>
</tr>
<tr>
<td>Mark Schumacher, PhD, MD</td>
<td>Professor Anesthesia and Perioperative Care</td>
<td>Ion channels and nociceptors; chronic pain</td>
</tr>
<tr>
<td>Raymond Swanson, MD</td>
<td>Professor Neurology</td>
<td>Excitotoxic and oxidative neuronal death, Parkinson’s disease</td>
</tr>
<tr>
<td>Zena Vexler, PhD</td>
<td>Professor Neurology</td>
<td>Neonatal stroke</td>
</tr>
<tr>
<td>Midori Yenari, MD</td>
<td>Professor Neurology</td>
<td>Stroke</td>
</tr>
</tbody>
</table>
SECTION 5: COURSES

The following are present and proposed courses for the PhD in Rehabilitation Science (proposed courses are indicated with an asterisk). Given the relatively small class size of the PhD program (2 students every other year), there will be minimal to no impact on existing course loads.

Department of Physical Therapy and Rehabilitation Science

**PT 251 Research Design** (3.5 units)
Instructor: Betty Smoot, PT, DPTSc
This course explores the underlying theoretical concepts that guide the design of clinical research studies. Students will be introduced to the scientific method and to a variety of research methods and designs. Students will 1) learn research designs that will be applicable to their future physical therapy practice, 2) develop a research question and design an appropriate study for that question, and 3) learn to critically appraise and become proficient consumers of research literature.

**PT 420 Mentored Research Concentration** (2.5 units)
Instructor: Varies
Students have the option of pursuing a research concentration pathway. This pathway includes all requirements of the PT 419 Research Seminar. As a mentored research experience, students are both supervised and work alone or as part of a team on a research project. Research mentors include faculty within the UCSF/SFSU Graduate Program in Physical Therapy, UCSF/SFSU researchers outside of the Program, as well as faculty at consortium institutions.

*RS 100 Introduction to Rehabilitation Science* (2 units)
Instructor: Richard Souza, PT, PhD & Linda Noble, PhD
The purpose of this course is twofold: 1) to provide an introduction to the areas of rehabilitation science research, and 2) to provide historical perspective on the major issues in rehabilitation science. Students will learn about resources and on-going research projects within the University. Students will also read classic papers of the last 150 years with the objective of understanding the fundamental discoveries that shape the discipline of rehabilitation science.

*RS 110 Principles and Applications of Evidence-based Practice* (3 units)
Instructor: Diane Allen, PT, PhD
This course provides instruction on the principles of evidence-based clinical practice, and statistical methods reporting efficacy and effectiveness. Students learn hierarchical levels of evidence and complete a meta-analysis of research findings in an area of interest. The seminar component of the course will enable the student to delve deep into a topic related to his/her dissertation research area.

*RS 130 Basics in Musculoskeletal Imaging* (3 units)
Instructor: Richard Souza, PT, PhD
The purpose of this class is to understand the principles behind various imaging procedures, and develop skills in looking at musculoskeletal images. These skills would be beneficial to the student exploring research careers in areas that use imaging as a tool or outcome. Course content will be provided in part through established coursework in the DPT curriculum (PT 210) but will include the addition of a weekly seminar with the Course Director to review the latest literature in musculoskeletal imaging.

*RS 150 Gross and Regional Anatomy* (1 unit)
Instructor: Kimberly Topp, PT, PhD
This course provides an opportunity for students to investigate a regional of human anatomy, which has direct relevance to his/her area of research interest. The course includes mentored cadaveric dissection, radiological imaging of the same regional anatomy, ultrasound imaging and focused study of unembalmed material. The primary goals are to gain a deep understanding of the region of interest and to relate the knowledge to studies in
the Musculoskeletal Biomechanics or Clinically Informed Neuroscience tracks. Example foci are lower limb joints, nerve paths, spinal cord in situ.

*RS 200 Laboratory Rotation (5 units)
**Instructor:** Various
This course allows the students to rotate through different faculty laboratories to learn new instrumentation and scientific methodology as well as undertake an individual study with emphasis on special problems in rehabilitation science including areas related to the student’s long term interests, future research interests or clinical specialization.

*RS 300 Doctoral Colloquium (1 unit)
**Instructor:** Richard Souza, PT, PhD & Linda Noble, PhD
PhD students in Rehabilitation Sciences program enroll in this seminar throughout their course of doctoral studies. This course provides a forum for discussion of the current research of students and faculty members, as well as discussions of practice influence on research and translation of research to practice. The course also serves as a forum for topics in professional development, including manuscript reviews; selection of journals for publication of one’s work; ethical decisions in publication, grant review, authorship; participation in professional organizations; best practices in teaching, research decisions, collaborations, mentoring; and scholarship and funding opportunities, strategies and decisions.

*RS 310 Teaching Practicum (1-4 units)
**Instructor:** Varies
Training in teaching in a course offered by the Graduate Program in Physical Therapy under the supervision of instructor in charge. Laboratory teaching, presentation of lecture material, experience in setting up and correcting of examinations, and participation in course are included.

*RS 330 Biomechanics of Human Motion (2 units)
**Instructor:** Richard Souza, PT, PhD
The course will introduce the student to concepts of mechanics as they apply to human motion. Primary areas of study will include anthropometry, kinematics, kinetics, muscle function, and muscle modeling. Emphasis will be placed on the biomechanics of locomotion using the inverse dynamics approach for calculating moments of force and joint power. The course will also provide practical experimentation and interpretation examples which build upon general biomechanical concepts (e.g. inverse dynamics). Weekly discussions will focus on the interpretation of these data and the extrapolation of these advanced concepts using clinical examples.

*RS 331 Running Biomechanics and Overuse Injuries - Journal Club (2 units)
**Instructor:** Richard Souza, PT, PhD
Students will have the opportunity to be part of an evidence-based approach to evaluating and treating running injuries through a comprehensive biomechanics evaluation. This course will consist of three parts: 1) observing UCSF RunSafe running assessments throughout the year; 2) reading, analyzing and presenting recent literature in a journal club format; and 3) processing, analyzing and presenting video-based running biomechanics data. The UCSF RunSafe and Running Biomechanics Elective will be mentored by Richard Souza, PT, PhD. The RunSafe observations and data processing will take place at the Human Performance Center at the Orthopaedic Institute on the Mission Bay campus. A final running biomechanics evaluation and presentation will be performed by all students that take this elective through evaluating of each others running form. This will be presented to Dr. Souza at the end of the elective and will be graded as pass or no pass.

*RS 340 Activity and Its Effects on CNS Disease/Injury Across the Lifespan (2 units)
**Instructor:** Linda Noble, PT, PhD
This reading-intensive mini-course, led by Linda Noble, PhD, will explore the interaction between defined activity and its effects on clinically relevant models of neurodegeneration, neural injury, and neuroinflammation. This 2-week course will review the current literature, led by faculty in the Departments of Physical Therapy and Rehabilitation Science, Neurological Surgery, Anatomy, Physiology and Neurology.
*RS 400 Topics in Clinically Informed Neuroscience (2 units)
Instructor: Linda Noble, PT, PhD
This mini-course will investigate the research literature that would support specific interventions in human disease, and the specific challenges in applying the research findings in the clinical environment. There will be discussion about the translation of bench research to clinical populations, as well as discussions of how clinical observations may inform and improve bench science. Course topics will be relevant for students in either the Musculoskeletal Biomechanics or the Clinically Informed Neuroscience track.

*RS 350 Research (1-8 units)
Instructor: Varies
Laboratory rotations for doctoral students enrolled in the PhD in Rehabilitation Science Program.

SFSU Department of Physical Therapy

PT 910 Evidence Based Practice (4 semester units)
Instructor: Diane Allen, PT, PhD
Students will continue the evidence-based review they started in PT 209, performing a meta analysis to answer their own research question. Students will present their findings orally and in a publication-style manuscript for the DPT culminating experience.

PT 960 Teaching Practicum (3 semester units)
Instructor: Varies
Develop necessary teaching skills for classroom, clinic, and laboratory. Students take this course at least twice and teach in the clinic at least one semester and in the classroom, one semester.

PT 996 Directed Studies (3 semester units)
Instructor: Varies
Development of research skills in preparation for doctoral laboratory original research. Student will be in a laboratory setting with faculty, post-doctoral and pre-doctoral students. Consists of seminars, journal clubs, and laboratory assignments.

PT 997 Research (2 semester units)
Instructor: Varies
Collection of data on original research project under the direction of dissertation advisor and dissertation committee. Determination of objectives and evaluation criteria by advisor based on stage of the project.

Department of Anatomy

ANA 207 Neuroscience (5 units)
Instructor: Susanna Rosi, PhD
The structural organization and function of the physiology of the central nervous system with an emphasis on the physiology of striated muscle and peripheral nerve relative to control mechanisms within the nervous system is presented. Emphasis is on clinical functional correlations of motor control.

Department of Bioengineering

BioE 25 Careers in Biotechnology (1 unit)
This introductory seminar is designed to give freshmen and sophomores an opportunity to explore specialties related to engineering in the pharmaceutical/biotech field. A series of one-hour seminars will be presented by industry professionals, professors, and researchers. Topics may include biotechnology and pharmaceutical manufacturing; process and control engineering; drug inspection process; research and development; compliance and validation; construction process for a GMP facility; project management; and engineered solutions to
environmental challenges. This course is of interest to students in all areas of engineering and biology, including industrial engineering and manufacturing, chemical engineering, and bioengineering.

BioE 221 Tissue Mechanobiology (2.5 - 3.0 units)
A central role for many tissues is to support physical forces (tension, compression, shear, pressure). This course will introduce the mechanisms by which cells respond to load; how these mechanisms are relevant to normal function & disease etiology; progression; prevention & treatment; an overview of tissue mechanics (relationships between force, stress/strain), mechanisms of cell/matrix interactions, examples of tissue modeling & remodeling in response to physical stimuli.

Department of Biomedical Imaging

BI 201 Principles of MR Imaging (4 units)
This course aims to teach the basic principles behind magnetic resonance imaging. Topics taught physics of magnetic resonance, including resonance, excitation, and relaxation; image formation with excitation pulses and gradient fields; image reconstruction via the Fourier Transform (including review of Fourier Transform); MRI scanner hardware, including magnets and coils; image contrast; artifacts due to flow, motion, and field variations. Time-permitting, modern MRI techniques will also be covered, including fast imaging methods and multi-coil configurations.

BI 202 Physical Principles of CT, PET, and SPECT Imaging (4 units)
This course is designed to provide the basic knowledge base to understand the physical principles of x-ray computed tomography (CT), positron emission tomography (PET), and single photon emission computed tomography (SPECT). Through “real” examples of how x-ray CT, PET, and SPECT are used in medical diagnosis and disease management, we will combine physical and mathematical foundations with actual applications for thorough understanding of the principles of these imaging techniques. Principles and developments of advanced CT, PET, and SPECT imaging technologies will be also discussed as integral parts of this course.

BI 240 Musculoskeletal Imaging (3 units)
This course will utilize the basics learnt in the core imaging courses, and explore the specific theoretical and experimental needs for imaging the musculoskeletal system and tissues. It will focus on tissue composition, system function, and address quantitative imaging aspects that link imaging metrics to biochemistry, biomechanics, function and movement. The course will explore the role of imaging and image processing in understanding, and studying, musculoskeletal degeneration, aging, injury, as well as regenerative strategies, and therapeutic approaches.

Department of Biomedical Sciences

BMS 214 Ethics and the Responsible Conduct of Research (2 units)
This course will cover topics related to the responsible conduct of research such as conflicts of interest, responsible authorship, policies regarding the use of human and animal subjects, handling misconduct, proper data management, research funding rules and procedures. Students will review and present case studies for class discussion.

BMS 225A Human Disease: Technologies & Biomedical Applications (1.5 units)
Integrative course emphasizing technologies for cell & molecular biology and the application of these methods to understand human disease. Intended to provide a foundation for graduate students in methods used to understand human cells, tissues, & organs, and to illustrate how these methods illuminate physiology and pathobiology. Rather than a comprehensive course, selected topics will be discussed in depth. The emphasis may shift each year, depending upon which topics are relevant and timely.

BMS 225B Tissue and Organ Biology (3 units)
An integrative course emphasizing frontiers in cell and molecular biology of human tissue and organ systems. It is
intended to provide a foundation in human anatomy, histology, immunology, physiology and pathobiology for graduate students. Rather than a comprehensive course, selected topics will be discussed in depth. The emphasis may shift each year, depending on which topics are relevant and timely.

**BMS 255 Basic Genetics and Genomics (4 units)**
The scope of this graduate level course in genetics is to convey an understanding of basic genomics and molecular genetics, of the use of genetic animal model systems and of the analytical principles of simple and complex human genetic traits.

**BMS 260 Cell Biology (4 units)**
The scope of this course is to convey an understanding of the function and organization of molecules and organelles inside and outside the cell and how these are used to construct a multicellular tissue and organ. The course will concentrate on questions related to how cells function, including how they grow, divide and die, and how they move, secrete and communicate.

**Department of Biostatistics**

**Biostat 187 Intro Statistical Theory & Practice (5 units)**
Review of basic statistical theory, sampling, descriptive statistics, and probability. Presentation of confidence intervals, hypothesis testing, one- and two-factor analysis of variance, correlation, simple linear regression, and chi-square tests. A preparation for more advanced work.

**Department of Epidemiology and Translational Science**

**EPI 150.03 Designing Clinical Research For Residents And Students (2 units)**
This course guides residents and students through the essential components for writing a clinical research protocol, developed around their own clinical research question. Students attend lectures and small group seminars as well as a peer review session in the last week of the course. The course will cover research questions, hypotheses, specific aims, study types, sample size estimation, power calculations, and data analysis.

**EPI 218 Data Management for Clinical Research (1 units)**
Instruction in choosing the appropriate data management system, design of research data bases, options in data entry, form and report generation, computer security, and budgeting for data management personnel and equipment.

**EPI 227 Building an Academic Career (0.5 units)**
Trainees learn about choosing a mentor, time management, generating finished projects, getting grants and getting a job; about how UCSF administration works, and about sources of clinical research funding including industry and foundations in addition to NIH and other government agencies.

**Department of Microbiology**

**MICRO 204 Molecular and Cellular Immunology (3 units)**
Topics to be covered: hematopoiesis, structure and genetics of immunoglobulins, lymphocyte surface molecules, T cell receptors, signal transduction, antigen presentation, MHC restriction, tolerance, T cell effector mechanisms, lymphocynes, and autoimmunity.

**Department of Neuroscience**

**NS 219 Special Topics in Basic and Translational Neuroscience (3 units)**
Each course offering will focus on the literature of a current important area of Neuroscience research. Students will be expected to read assigned papers critically before class and to present and discuss papers in class. Students will also be expected to write and present a brief research proposal based upon their reading. Topics in molecular,
cellular, developmental, systems and computational neuroscience, and neurological and behavioral disorders will be covered in separate course offerings.

**NS 225 Neurobiology of Disease** (3 units)
Lectures and student-led discussions on physiological and molecular bases of diseases such as Alzheimer's, Parkinson's, multiple sclerosis, epilepsy, autism, addiction, triple repeat and prion diseases.

**NS 245 Neurobiology of Behavior** (3 units)
Lectures and discussion of primary research concerning the neural basis of behavior. Topics will include basic concepts of learning and neuroethology with examples from vertebrate and invertebrate systems. A comparative approach will be taken to understanding psychological constructs such as drive, motivation and emotion. Emphasis is on neural circuit analysis of behaviors such as sound localization, drug self-administration and fear conditioning.

**Department of Nursing**

**N 294B Medical Genetics for Nursing** (3 units)
Course addresses the genetic basis of human disease (cardiovascular, oncology, gerontology); genetic screening and diagnosis, ethical, legal and social implications related to genetic information and technology; ethnic, racial and cultural considerations for providing genetic services; and genetic therapeutics, such as, pharmacogenetics, gene therapy, stem cell transplants, enzyme replacement.

**TICR Summer Clinical Research Workshop**

**EPI 150.03 Designing Clinical Research For Residents And Students** (2 units)
This course guides residents and students through the essential components for writing a clinical research protocol, developed around their own clinical research question. Students attend lectures and small group seminars as well as a peer review session in the last week of the course. The course will cover research questions, hypotheses, specific aims, study types, sample size estimation, power calculations, and data analysis.

**BIOSTAT 212 Introduction to Statistical Computing in Clinical Research** (1 unit)
This course will introduce clinical researchers to the use of computer software for managing and analyzing clinical research data. Currently available statistical packages will be described and the roles of spreadsheet and relational database programs discussed. Use of STATA for managing, cleaning, describing, and analyzing data will be taught in lecture and laboratory sessions.

**EPI 218 Data Management for Clinical Research** (1 units)
Instruction in choosing the appropriate data management system, design of research data bases, options in data entry, form and report generation, computer security, and budgeting for data management personnel and equipment.

**EPI 227 Building an Academic Career** (0.5 units)
Trainees learn about choosing a mentor, time management, generating finished projects, getting grants and getting a job; about how UCSF administration works, and about sources of clinical research funding including industry and foundations in addition to NIH and other government agencies.
SECTION 6: RESOURCE REQUIREMENTS

Included with this proposal is the budget for the PhD in Rehabilitation Science program for five years (2016-2020). In 2016, we project two students entering the program, and one of these students will likely qualify for a merit-based scholarship. Both students will be supported by the block allocation provided by the Graduate Division, covering tuition and a stipend in the amount of $21,500 per student. Additional funding sources in 2016 to cover program expenses include Kean Foundation funding. In 2017, these same two students will move forward in the program, supported again by the block allocation from the Graduate Division, which will cover tuition and a stipend of $21,500 per student. Additional revenues for this year include projections for two students qualifying for merit-based scholarship funding, and internal reallocation of departmental discretionary funds (reserves) and/or development funds.

Two new students will be added to the program every other year. It is anticipated that all new students entering the program will be supported by the department for the first two years, and supported in subsequent years by grant funding from primary investigators’ grants. We project that by 2018 we will have secured a T-32 training grant and these funds will be used going forward to support students during the first two years of the program. Admission into the training program will be based upon qualifications and availability of slots at the time of application.

Faculty whose salaries are partially supported by state funding will be instructors in this program and there will be no impact to their participation in the current Doctor of Physical Therapy (DPT) program.

1) FTE Faculty
The PhD Program team includes a Program Director and instructors, totaling the equivalent of 0.3 faculty FTEs. There will be no impact to the existing DPT program in this model.

2) Library Acquisition
There are no anticipated additional costs for library acquisitions as most of the books and journals necessary for the PhD program are already available in the library or online. Students will have access to online resources for articles, such as PubMed and Google Scholar. The PhD in Rehabilitation Science program will also be supported by the online resources of the UC Digital Library system.

3) Computing Costs
All students are expected to have a computer and internet access. A laptop or tablet is needed for on-campus class activities and homework. Student are expected to be experienced in using Microsoft Word, Excel, PowerPoint, the Web, Adobe Reader, Anti-virus software, and E-mail. Students receive the standard desktop support available from the UCSF Library and IT Services.

4) Equipment
No additional equipment costs are anticipated.

5) Space and Other Capital Facilities
Facility: Office space to accommodate faculty and staff for the program is provided by the Department of Physical Therapy and Rehabilitation Science, as well as home departments of other faculty involved in the program (including Anatomy, Radiology and Biomedical Imaging, and Neurological Surgery).

Classes: Students will enroll in pre-existing courses, and the addition of two students will not require additional classroom space. Our students will be able to take advantage of the range of classrooms currently available to the Department faculty. Large classrooms are used for shared keynote lectures and educational activities and smaller rooms scheduled for breakout sessions.
6) Other Operating Costs
Non-faculty payroll costs include 0.06 FTE of staff support (MSO, Finance Analyst, and Program Administrator).

7) Impact on Existing Doctor of Physical Therapy Degree Program
There is no anticipated financial impact on the existing Doctor of Physical Therapy Degree Program.
SECTION 7: GRADUATE STUDENT SUPPORT

The PhD Program will cover the tuition costs and provide a $21,500 stipend during the first two years of the program using a combination of block funding provided by the Graduate Division, scholarship funds, and a T-32 training grant. After this point, the expectation is that students will join the primary research mentor’s grant with the same level of support (covering tuition plus a stipend).

The Program will encourage students to seek merit-based scholarship or fellowship funding during the first two years. The UCSF Graduate Division offers a range of scholarships in which PhD in Rehabilitation Science students will be eligible. They include:

- ARCS (Achievement Rewards for College Scientists) Scholarship - $12,000 stipend
- Chuan Lyu Chancellor’s Fellowship - $40,000 award
- CRCC (Cancer Research Coordinating Committee) Fellowship - $30,000 stipend
- DYFP (Dissertation-Year Fellowship Program) - $23,000 stipend
- Eugene Cota-Robles Fellowship - $14,000 stipend
- Fletcher Jones Fellowship - $20,000 stipend
- Graduate Research Mentorship Fellowship – $12,000 stipend
- Julius R. and Patricia A. Krevans Fellowship - $10,000 stipend
- Lloyd M. Kozloff Fellowship - $10,000 stipend
- Matilda Edlund Scholarship - $20,000 stipend
- NIGMS IMSD (Initiative for Maximizing Student Diversity) Program - $30,000 stipend
- Ralph H. Kellogg Endowed Chancellor’s Fellowship - $25,000 stipend

California PT Fund – up to $10,000 research grant

Foundation for Physical Therapy
- Florence P. Kendall Doctoral Scholarship – 1-year, $5,000 scholarship
- Promotion of Doctoral Studies (PODS) I Scholarship - 1-year, $7,500 scholarship
- Promotion of Doctoral Studies (PODS) II Scholarship - 1-year, $15,000 scholarship
SECTION 8: GOVERNANCE

The PhD program is being offered by a unit that offers graduate degrees.
SECTION 9: CHANGES IN SENATE REGULATIONS

None anticipated.
APPENDICES

Appendix A: PhD Budget for FY16-20

Appendix B: Equipment Available in the Physical Therapy Outpatient Practice

Appendix C: List of Proposed External Reviewers

Appendix D: Faculty Biosketches

Appendix E: Letters of Support from Schools, Departments and Programs
Appendix A: PhD Budget for FY16-20
## PROPOSED PhD Program - Physical Therapy
### Consolidated Statement of Revenues, Expenses and Transfers
#### FY16-FY20

### Total Student Enrollment:

<table>
<thead>
<tr>
<th>FY2016 Budget</th>
<th>FY2017 Projection</th>
<th>Variance</th>
<th>Yr over Yr % Change</th>
<th>FY2018 Projection</th>
<th>Variance</th>
<th>Yr over Yr % Change</th>
<th>FY2019 Projection</th>
<th>Variance</th>
<th>Yr over Yr % Change</th>
<th>FY2020 Projection</th>
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<td>9</td>
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### REVENUES:

- **Graduate Division: Merit-Based**
  - 7,500
- **Graduate Division: Support (Block) Allocation**
  - 75,323
- **Graduate Division: 1st Year Funding**
  - 0%
- **Other Revenues**
  - 60,000

### Kean Scholarship Gift Fund

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<th>FY2017</th>
<th>FY2018</th>
<th>Variance</th>
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### Departmental Reserves/Development

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<th>FY2019</th>
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### PI Grant Support (Rosi, Souza, Noble)

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### F-31 Grant (or T32 Grant)

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### TOTAL REVENUES

- 142,823

### EXPENSES:

- **Student Support**
  - 2
- **Student Tuition/ fee**
  - 31,396
- **Student Stipends**
  - 43,000

### Subtotal Student Support

- 74,396

### Operating Expenses

- **FTEs**
  - 0.30
- **Academic**
  - 40,208
- **Academic Salaries**
  - 40,208
- **Academic Benefits**
  - 15,279

### Subtotal Academic

- 55,487

- **FTEs**
  - 0.06
- **Non-Academic**
  - 5,284
- **Non-Academic Salaries**
  - 5,284
- **Non-Academic Benefits**
  - 2,156

### Subtotal Non-Academic

- 7,440

### Subtotal Payroll

- 62,927

### Subtotal Operating Expenses

- 67,147

### TOTAL EXPENSES

- 141,543

### Income/(loss) before transfers in/out

- 1,280

### Total transfers in/out

- 0

### Year end income/(loss)

- 1,280

### FUND BALANCES:

#### Total fund balances, beginning of year

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<th>FY2017</th>
<th>FY2018</th>
<th>Variance</th>
<th>Yr over Yr % Change</th>
<th>FY2019</th>
<th>Variance</th>
<th>Yr over Yr % Change</th>
<th>FY2020</th>
<th>Variance</th>
<th>Yr over Yr % Change</th>
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</table>

#### Total fund balances, end of year

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<th>FY2018</th>
<th>Variance</th>
<th>Yr over Yr % Change</th>
<th>FY2019</th>
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<th>Variance</th>
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### Per student operating cost

- 33,074

### Average per student support cost

- 37,198
Appendix B: Equipment Available in the Physical Therapy Outpatient Practice

One important resource that students will be able to take advantage of while in the PhD Program is the successful clinical practice at the UCSF Mission Bay Outpatient Physical Therapy Practice, seeing over 21,000 physical therapy visits each year. The practice leadership and clinical providers are committed to supporting rehabilitation science research. The Outpatient Practice includes 15 practitioners, 11 of which have board-certified clinical specialties, including: Orthopaedic Clinical Specialists, Neurological Clinical Specialists, Certified Strength and Conditioning Specialists, Sports Certified Specialists, Performance Enhancement Specialists, and Certified Lymphedema Specialists.

Equipment available in the Outpatient Practice include:

- Alter-G body weight suspension treadmill
- PrimusRS by BTE
- FreeMotion Dual Cable Cross F624
- Pilates Studio Reformer® By Balanced Body
- Pilates EXO® Chair by Balanced Body
- LeMond Fitness G-Force RT Recumbent Bike
- BIODEX Unweighing System and Active Trainer Harnesses by Guldmann
- Vertec (for vertical jump measurement)
- Agility ladder
- Large high low mat
- TRX Suspension Training
- BAPS Board Biomechanical Ankle Platform System
- Indo Board (for functional balance training)
- Stabilizer Pressure Biofeedback Unit by Chattanooga Group
- Trampoline
- BOSU
- Turf Cordz (for speed and resistance training)
- Leg Press
- Leg Curl
- Spin and Upright Bikes
Appendix C: List of Proposed External Reviewers for the PhD Proposal

**Fabrisia Ambrosio, MPT, PhD**  
Assistant Professor  
University of Pittsburgh  
Department of Physical Medicine & Rehabilitation  
412-365-4850  
ambrosiof@upmc.edu

**Aileen Anderson, PhD**  
Associate Professor  
University of California, Irvine  
Department of Anatomy and Neurobiology  
(949) 824-6750  
aja@uci.edu

**Mary F. Barbe, PhD**  
Professor  
Temple University  
Department of Anatomy and Cell Biology  
(215) 707-6422  
mary.barbe@temple.edu

**Ann E. Barr-Gillespie, PT, DPT, PhD**  
Vice Provost and Executive Dean  
Pacific Oregon University  
College of Health Professions  
503-352-7372  
barr-gillespie@pacificu.edu

**James R. Carey, PT, PhD**  
Professor  
Program in Physical Therapy  
University of Minnesota  
(612) 626-2746  
carey007@umn.edu

**Rebecca L. Craik, PT, PhD, FAPTA**  
Professor and Chair  
Arcadia University  
Department of Physical Therapy  
craikr@arcadia.edu

**Gammon M. Earhart, PT, PhD**  
Associate Director, Movement Science PhD Program  
Associate Professor  
Washington University at St. Louis  
Departments of Physical Therapy, Neurology, Neurobiology  
(314) 286-1425  
earhartg@wustl.edu
Ramona Hicks, PhD
Program Director, Extramural Research Program
NIH/NINDS
hicksra@ninds.nih.gov

Kornelia Kulig, PT, PhD, FAPTA
Professor
University of Southern California
Division of Biokinesiology and Physical Therapy
(323) 442-2911
kulig@usc.edu

Richard L. Segal, PT, PhD, FAPTA
Professor and Chair
Medical University of South Carolina
Department of Health Professions
College of Health Professions
segal@musc.edu
Appendix D: Faculty Biosketches

Enclosed Faculty Biosketches Include:

- Gary Abrams, MD, Professor and Director of Neurorehabilitation, Neurology
- Diane Allen, PT, PhD, Associate Professor, Physical Therapy, SFSU
- Allan Basbaum, PhD, Professor and Chair, Anatomy
- Michael Beattie, PhD, Professor, Neurological Surgery
- Jacqueline Bresnanan, PhD, Professor, Neurological Surgery
- Nancy Byl, PT, MPH, PhD, Professor and Chair Emeritus, Physical Therapy and Rehabilitation Science
- Sibel Demir-Deviren, MD, Associate Professor, Orthopaedic Surgery
- Adam Ferguson, PhD, Assistant Professor, Neurological Surgery
- Donna Ferriero, MD, Professor, Pediatrics
- Amber Fitzsimmons, PT, DPTSc, Assistant Professor, Physical Therapy and Rehabilitation Science
- Karunesh Ganguly, PhD, Assistant Professor, Neurology
- Kate Hamel, PhD, Assistant Professor, Kinesiology, SFSU
- Robert Hiatt, MD, PhD, Professor, Epidemiology and Biostatistics
- Wendy Katzman, PT, DPTSc, Associate Professor, Physical Therapy and Rehabilitation Science
- Galateia Kazakia, PhD, Assistant Professor, Radiology and Biomedical Imaging
- Thomas Lang, PhD, Professor, Radiology and Biomedical Imaging
- Jeannette Lee, PT, PhD, Assistant Professor, Physical Therapy, SFSU
- Jon Levine, MD, PhD, Professor, Oral and Maxillofacial Surgery
- Xiaojuan Li, PhD, Associate Professor, Radiology and Biomedical Imaging
- Thomas Link, MD, PhD, Professor, Radiology and Biomedical Imaging
- Jialing Liu, PhD, Professor, Neurological Surgery
- Anthony Luke, MD, MPH, Professor, Orthopaedic Surgery
- Benjamin Ma, MD, Associate Professor, Orthopaedic Surgery
- Sharmila Majumdar, PhD, Professor, Radiology and Biomedical Imaging
- Marvyn Maze, MB ChB, Professor and Chair, Anesthesia and Perioperative Care
- Patrick McQuillen, MD, Associate Professor, Pediatrics and Critical Care
- Christine Miaskowski, RN, PhD, Professor, Physiological Nursing
- Srikantan Nagarajan, PhD, Associate Professor, Radiology and Biomedical Imaging
- Linda Noble, PhD, Professor, Physical Therapy and Rehabilitation Science
- Sandy Radtka, PT, PhD, Professor, Physical Therapy, SFSU
- Susanna Rosi, PhD, Associate Professor, Physical Therapy and Rehabilitation Science
- Mark Schumacher, PhD, MD, Professor, Anesthesia and Perioperative Care
- Betty Smoot, PT, DPTSc, Assistant Professor, Physical Therapy and Rehabilitation Science
- Richard Souza, PT, PhD, Associate Professor, Physical Therapy and Rehabilitation Science
- Raymond Swanson, MD, Professor, Neurology
- Kimberly Topp, PT, PhD, Professor and Chair, Physical Therapy and Rehabilitation Science
- Zena Vexler, PhD, Professor, Neurology
- Linda Wanek, PT, PhD, Professor and Chair, Physical Therapy, SFSU
- Midori Yenari, MD, Professor, Neurology
BIOGRAPHICAL SKETCH

Provide the following information for the key personnel and other significant contributors in the order listed on Form Page 2.
Follow this format for each person. DO NOT EXCEED FOUR PAGES.

NAME
Gary M. Abrams

POSITION TITLE
Professor
Rehabilitation Section Chief

eRA COMMONS USER NAME
ABRAMSG

EDUCATION/TRAINING (Begin with baccalaureate or other initial professional education, such as nursing, and include postdoctoral training.)

<table>
<thead>
<tr>
<th>INSTITUTION AND LOCATION</th>
<th>DEGREE (if applicable)</th>
<th>YEAR(s)</th>
<th>FIELD OF STUDY</th>
</tr>
</thead>
<tbody>
<tr>
<td>State University of New York, Buffalo</td>
<td>BA</td>
<td>1970</td>
<td>Psychology</td>
</tr>
<tr>
<td>University of Pittsburgh</td>
<td>MD</td>
<td>1974</td>
<td>Medicine</td>
</tr>
<tr>
<td>Columbia University</td>
<td></td>
<td>1975-1978</td>
<td>Neurology</td>
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A. Personal Statement

I have long-standing interest and experience in the clinical investigation of techniques for neurological evaluation and neural compensation and repair, particularly as it relates to the functional consequences associated with acquired brain injury (ABI). During my career, I have worked collaboratively with many investigators in the areas of stroke recovery, brain injury and pain management, with research that has included novel orthotics, robotics, and rehabilitation therapy interventions. As an educator, I have actively participated in the training of medical students, pre-doctoral physical therapy graduate students, and post-doctoral trainees in multiple disciplines. I have mentored 2 recent VA Research Career Development Awardees, who are currently clinical investigators in the neurological rehabilitation field. I have been particularly interested in fostering interdisciplinary collaboration of neuroscientists, physical therapists, engineers, psychologists, etc in the San Francisco Bay Area in order to address multi-faceted problems associated with restoration of participation and community reintegration for individuals with disabilities.

Time and Effort: 35% Research; 45% Clinical; 10% Administrative; 10% Teaching

B. POSITIONS and HONORS:

1980-1986   Assistant Professor of Neurology, College of Physicians & Surgeons, Columbia University, New York, NY. Assistant Attending Neurologist, Columbia-Presbyterian Medical Center, New York, NY.

1982-1995   Attending Neurologist, Helen Hayes Hospital, West Haverstraw, New York.
1986-1993   Medical Director and Chief of Columbia-Presbyterian Medical Services; Chief of Neurorehabilitation, Helen Hayes Hospital, West Haverstraw, NY.

1987-1995   Associate Professor of Clinical Neurology, College of Physicians & Surgeons, Columbia University, New York, NY. Associate Attending Neurologist, Columbia-Presbyterian Medical Center, New York, NY.

1995-2000   Associate Professor of Clinical Neurology, University of California, San Francisco, San Francisco, CA. Attending Neurologist, University of California Medical Center, San Francisco, CA.

1995-2000   Director of Rehabilitation Medicine, UCSF/Mount Zion Medical Center, San Francisco, CA.

1997-2000   Chief of Neurology, UCSF/Mount Zion Medical Center, San Francisco, CA.

2000-2001   Rehabilitation Section Chief, San Francisco Veteran Affairs Medical Center, San Francisco, CA.

2001-2010   Director, Neurorehabilitation Clinic, University of California Medical Center, San Francisco, CA.

2010-       Professor of Clinical Neurology, University of California, San Francisco, San Francisco, CA.
Other Experience and Professional Memberships

American Academy of Neurology, Fellow
World Federation for NeuroRehabilitation
Society for Neuroscience
Consultant, Orthopaedic and Rehabilitation Devices Panel, Food and Drug Administration, 1997-present
Consultant Cardiovascular Devices Panel, Center for Devices and Radiological Health, Food and Drug Administration, 2003-present
American Society for Neurorehabilitation, Certified; Board of Directors – 2009-

Honors

1970               Phi Beta Kappa, Upsilon Beta
1974                Student Scientific Day Award, Upjohn Company, University of Pittsburgh
1978                Chief Resident, Neurological Institute of New York, Columbia University
1980-1985          Teacher Investigator Development Award, NIH/NINCDS, #NS00478
1993                Fellow, American Academy of Neurology
2001                Robert B. Layzer Outstanding Teacher Award, UCSF Department of Neurology
2007                Haile T. Debas UCSF Academy of Medical Educators – Award for Excellence in Mentoring and Advising.

B. SELECTED PUBLICATIONS: (Selected from 64 peer-reviewed publications)


Additional recent publications (in chronological order)


Research Support:

Ongoing Research Support

VA SDR-04-408 (Seal PI) 10/01/10-09/30/14
Neuropsychological Screening of OEF/OIF Veterans in VA Primary Care
To examine the reliability, validity, and sensitivity of the VA TBI screen used in the primary care setting for identifying TBI and cognitive symptoms and to examine issues relating to overlap with current mental health diagnoses
Role: Co-Investigator

VANCHCS Project # B7467I (D'Esposito PI) 10/01/10-09/30/14
Neural Bases of Cognitive Rehabilitation for Brain Injury
Extension of work investigating neurophysiological correlates of cognitive rehabilitation strategy using functional MRI.
Role: Co-Investigator

NIH/NCI R01 CA 151692 (Miaskowski PI) 04/01/11-03/31/16
Characterization of and Treatment for Chemotherapy Neuropathy
Clinical investigation of chemotherapy neuropathy including pilot trial of phototherapy
Role: Co-Investigator

DoD W81XWH-11-2-0145 (Batki PI) 07/01/13-12/31/14
Topiramate Treatment of Hazardous and Harmful Alcohol Use in Veterans with TBI
Clinical trial of topiramate as adjunctive treatment for hazardous alcohol use in veterans.
Role: Co-Investigator

VA 1IO1RX001111-01A1 (Novakovic-Agopian PI) 01/01/13-12/31/15
Rehabilitation of Executive Functioning in Veterans with PTSD and TBI
Trial of novel cognitive rehabilitation program to enhance emotional regulation in symptomatic control of post-traumatic stress disorder.
Role Co-Investigator

NIH/NINDS U10 NS086494-0 (Smith PI) 10/01/13-09/30/18
Nor-Cal – Coordinating Stroke Center

UCSF is site for NINDS sponsored Stroke Trial Network. Will be team member leading evaluation and participation in future trials investigating issues related to stroke rehabilitation and recovery.
Role: Co-Investigator

Completed:
Innovative Neurotronics NCIRE#001599 05/01/11-06/30/13
Randomized Trial of the Innovative Neurotronics WalkAide Compared to Conventional Ankle-Foot Orthosis (AFO) in Stroke patients (INSTRIDE)
Multi-center randomized trial of FES-based AFO with conventional AFO for treatment of foot-drop following stroke.
Role: PI.

R01 CA118658 - NIH/NCI (Miaskowski PI) 07/01/06-06/30/11
Long-Term Arm Morbidity Following Breast Cancer Treatment.
Determine prevalence, severity, and the timing of lymphedema (LE); changes in shoulder mobility/grip strength associated with LE; compare behavioral symptoms, functional status, and quality of life in women who develop LE; elucidate genetic markers for neuropathic pain and LE following breast cancer surgery.
Role: Co-Investigator

VA RCDA (Chen PI) 07/01/06-06/03/10
Investigations of Rehabilitation Induced Plasticity in Brain Networks.
Study of behavior induced changes after TBI using neurophysiological monitoring with fMRI
Role: Co-Mentor for VA RCDA

UC-CITRIS Seed Funding (Rosen PI) 07/01/10-06/30/11
Paradigm Shift of Neurorehabilitation of Stroke Patients Using Wearable Robotics.
Trial of newly developed upper extremity robotic device for rehabilitation of chronic stroke patients testing robotic therapy vs. conventional physical therapy.
Role: Co-PI

R24 HD039629 (RehabNet~West/NIH). 07/01/04-06/30/05
MR Imaging of Neuroplasticity with Stroke Rehabilitation.
Pilot study investigating metabolic, structural, and perfusion changes with magnetic resonance imaging following constraint induced upper extremity therapy for stroke.
Role: PI
**BIOGRAPHICAL SKETCH**

Provide the following information for the Senior/key personnel and other significant contributors in the order listed on Form Page 2. Follow this format for each person. **DO NOT EXCEED FOUR PAGES.**

<table>
<thead>
<tr>
<th>NAME</th>
<th>POSITION TITLE</th>
</tr>
</thead>
</table>
| Allen, Diane D | Associate Clinical Professor—UCSF  
Associate Professor—SFSU |

**eRA COMMONS USER NAME (credential, e.g., agency login)**  
SFSUALLEN

**EDUCATION/TRAINING** *(Begin with baccalaureate or other initial professional education, such as nursing, include postdoctoral training and residency training if applicable.)*

<table>
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<tr>
<th>INSTITUTION AND LOCATION</th>
<th>DEGREE (if applicable)</th>
<th>MM/YY</th>
<th>FIELD OF STUDY</th>
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<tbody>
<tr>
<td>Boston University, Boston, MA</td>
<td>Post-doctoral Fellowship</td>
<td>06/07</td>
<td>Measurement in Rehabilitation</td>
</tr>
<tr>
<td>University of California, Berkeley</td>
<td>PhD</td>
<td>06/05</td>
<td>Education: Quantitative Measurement and Evaluation</td>
</tr>
<tr>
<td>University of North Carolina, Chapel Hill</td>
<td>MS</td>
<td>06/91</td>
<td>Medical Allied Health Services: Emphasis in Neuromuscular Science</td>
</tr>
<tr>
<td>University of California, San Francisco</td>
<td>BS and Certificate</td>
<td>06/78</td>
<td>Physical Therapy</td>
</tr>
<tr>
<td>University of California, Santa Barbara</td>
<td></td>
<td>06/77</td>
<td>Pre-Physical Therapy</td>
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</table>

**A. Personal Statement**

My areas of research and academic expertise are in qualitative and quantitative tests and measures, neuro-rehabilitation, and evidence-based practice. I am currently collaborating with other researchers in investigating the effects of Balance-Based Torso-Weighting on balance and gait for people with multiple sclerosis. As a recipient of one of the first PCORI grants (Patient-Centered Outcomes Research Institute), I am also investigating outcomes across six dimensions of movement for patients undergoing physical therapy. For this research, we have developed a computer-adaptive test (CAT) version of a patient-report instrument. We utilize this instrument to examine whether movement abilities improve more when the physical therapy episode of care focuses on the dimensions of movement with the largest patient-perceived gaps between current and preferred movement ability. I teach courses in the Doctor of Physical Therapy and Doctor of Physical Therapy Science programs and have mentored students in both programs as they pursue their own or collaborative research agendas. I also provide statistical consultation for students and colleagues.

**B. Positions and Honors**

**Principals Positions Held**

<table>
<thead>
<tr>
<th>YEAR</th>
<th>PRESENT</th>
<th>INSTITUTION</th>
<th>DEGREE</th>
<th>FIELD OF STUDY</th>
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<tr>
<td>2008</td>
<td>present</td>
<td>University of California San Francisco/San Francisco State University</td>
<td>Associate Professor</td>
<td>Graduate Program in Physical Therapy</td>
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<tr>
<td>2007</td>
<td>present</td>
<td>Samuel Merritt University, Oakland, CA</td>
<td>Adjunct Associate Professor</td>
<td>Department of Physical Therapy</td>
</tr>
<tr>
<td>2007</td>
<td>present</td>
<td>Kaiser Permanente Neurologic Physical Therapy Residency Program</td>
<td>Instructor</td>
<td></td>
</tr>
<tr>
<td>2007</td>
<td>2008</td>
<td>University of California San Francisco/San Francisco State University</td>
<td>Lecturer</td>
<td>Graduate Program in Physical Therapy</td>
</tr>
<tr>
<td>1991</td>
<td>2007</td>
<td>Samuel Merritt College</td>
<td>Adjunct Assistant Professor</td>
<td>Department of Physical Therapy</td>
</tr>
<tr>
<td>2006</td>
<td>2007</td>
<td>School of Public Health, Boston</td>
<td>Post-doctoral Fellow</td>
<td>Health and Disability</td>
</tr>
<tr>
<td>Year1</td>
<td>Year2</td>
<td>Institution</td>
<td>Position1</td>
<td>Institution</td>
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<tr>
<td>2002</td>
<td>2005</td>
<td>University of California, Berkeley</td>
<td>Graduate student researcher</td>
<td>Research Institute Graduate School of Education</td>
</tr>
<tr>
<td>2002</td>
<td>2003</td>
<td>Interim Health Care, San Jose, CA</td>
<td>Contract Physical Therapist</td>
<td></td>
</tr>
<tr>
<td>2001</td>
<td>2002</td>
<td>University of California, Berkeley</td>
<td>Graduate student researcher</td>
<td></td>
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<tr>
<td>1991</td>
<td>2000</td>
<td>Stanford University Hospital</td>
<td>Contract Physical Therapist</td>
<td></td>
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<tr>
<td>1988</td>
<td>1990</td>
<td>Hillhaven Convalescent Center</td>
<td>Staff Physical Therapist</td>
<td></td>
</tr>
<tr>
<td>1989</td>
<td>1990</td>
<td>University of North Carolina at Chapel Hill</td>
<td>Graduate Assistant Instructor</td>
<td></td>
</tr>
<tr>
<td>1987</td>
<td>1988</td>
<td>University of North Carolina at Chapel Hill</td>
<td>Graduate Assistant Instructor</td>
<td></td>
</tr>
<tr>
<td>1985</td>
<td>1987</td>
<td>Medical Personnel Pool, Raleigh, North Carolina</td>
<td>Contract Physical Therapist</td>
<td>Division of Occupational Therapy</td>
</tr>
<tr>
<td>1982</td>
<td>1985</td>
<td>Holy Cross Hospital, Austin, Texas</td>
<td>Contract Physical Therapist</td>
<td>Division of Physical Therapy</td>
</tr>
<tr>
<td>1982</td>
<td>1985</td>
<td>Nursefinders of Austin, Inc., Austin, Texas</td>
<td>Staff Physical Therapist</td>
<td></td>
</tr>
<tr>
<td>1982</td>
<td>1982</td>
<td>Texas School for the Deaf, Austin, Texas</td>
<td>Physical Therapist</td>
<td></td>
</tr>
<tr>
<td>1981</td>
<td>1981</td>
<td>Christian Medical College and Hospital, Vellore, India</td>
<td>Instructor, Clinical Coordinator, and Staff Physical Therapist</td>
<td></td>
</tr>
<tr>
<td>1978</td>
<td>1981</td>
<td>Goleta Valley Community Hospital, Goleta, California</td>
<td>Staff Physical Therapist</td>
<td></td>
</tr>
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</table>

C. Selected Peer-Reviewed Publications


**D. Research Support**

**On-going Research Support**

**Pilot Grant**  
Allen (PI)  
10/31/2012 - 12/31/2014

**Patient-Centered Outcomes Research Institute**  
Mind the Gap—Targeting Differences in Patients’ Current and Preferred Abilities
Role: PI

Completed Research Support

**R15HD066397**          Widener (PI)          09/16/2010 - 09/15/2013
National Institute of Child Health and Human Development
Movement Ability Changes with Balance-Based Torso-Weighting in Multiple Sclerosis.
Role: Co-PI

**IM101137**            Katz (PI)            01/01/2008 - 01/01/2010
Bristol-Myers Squibb Research and Development
Global Epidemiology and Outcomes Research. Development and Validation of a Short-Form Valued Life Activity Disability and Task Modification Instrument (VLA-SF) for Use among Individuals with Rheumatoid Arthritis
Role: consultant, research design, data analysis

**Greenwald (PI)**      01/01/2011 - 12/31/2011
California Physical Therapy Fund
Motor Imagery for Gait Improvement in Acute Stroke Rehabilitation: a Randomized Controlled Trial
Role: Collaborator
BIOGRAPHICAL SKETCH

Provide the following information for the key personnel and other significant contributors in the order listed on Form Page 2 (key personnel). Follow this format for each person. DO NOT EXCEED FOUR PAGES.

NAME
Allan I. Basbaum

POSITION TITLE
Professor and Chair

eRA COMMONS USER NAME
Abasbaum

EDUCATION/TRAINING (Begin with baccalaureate or other initial professional education, such as nursing, and include postdoctoral training.)

<table>
<thead>
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<th>INSTITUTION AND LOCATION</th>
<th>DEGREE</th>
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<th>FIELD OF STUDY</th>
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<tbody>
<tr>
<td>McGill University, Montreal, Canada</td>
<td>BSc</td>
<td>1968</td>
<td>Psychology</td>
</tr>
<tr>
<td>Univ. Pennsylvania, Philadelphia</td>
<td>PhD</td>
<td>1972</td>
<td>Psych/Anatomy</td>
</tr>
<tr>
<td>Univ. College London, United Kingdom</td>
<td>Postdoc</td>
<td>1972-74</td>
<td>Neurophysiology</td>
</tr>
<tr>
<td>Univ. California, San Francisco</td>
<td>Postdoc</td>
<td>1974-77</td>
<td>Neuroanatomy</td>
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</table>

A. Personal Statement

My laboratory examines the mechanisms through which tissue and nerve injury produce changes in the peripheral and central nervous system, resulting in persistent pain. The hallmark of our work is its multidisciplinary approach to the problem, using molecular, neuroanatomical, pharmacological and behavioral analyses in wild type and genetically modified mice. Recently, we developed a transgenic mouse in which wheat germ agglutinin transneuronal labeling of complex circuits can be triggered from neurons in any region of the brain or spinal cord, during development or in the adult. We are using these mice to study the development and adult organization of CNS circuits engaged by small diameter primary afferent nociceptors (“pain fibers”) and to study their modifications after tissue or nerve injury. In the course of our work we use a host of behavioral tests to study pain processing. Most recently, we have turned out attention to the possibility of overcoming the neurological consequences of peripheral nerve damage, by transplanting embryonic cortical GABAergic precursor cells into the spinal cord, a procedure that we find can ameliorate the persistent pain associated with nerve damage.

B. Positions and Honors

1966-1968 Research Assistant (Ronald Melzack), McGill University
1972-1974 Postdoctoral Fellow, (Patrick D. Wall) Univ. College London
1974-1977 N.I.H. Postdoctoral Fellow (Howard Fields), UCSF
1977-'80/1980-'84 Assistant/Associate Prof, Depts. Anatomy and Physiology, UCSF
1984-1997 Professor, Dept. Anatomy (joint appt. in Dept. Physiology), UCSF
1998 to present: Professor and Chair, Department of Anatomy, UCSF

N.I.H. Research Career Dev. Award (1978); Alfred P. Sloan Fellow (1979); Jacob Javits Invest. Award (1985-92; 1992-99; 2007-2014); SFN Public/Special Lecturer (1986; 1997); UCSF Medical School Teaching Awards (1987-2002); F.W. Kerr Memorial Prize of the American Pain Soc. (1993); Bristol-Myers Squibb Prize for Distinguished Achievement in Pain Research (1994); John Bonica Distinguished Lecture and Prize (2002); Editor-in-Chief: Pain (2003-present); Fellow, Amer. Acad. Arts and Sciences (2003); Member, Inst. of Medicine (2005); Fellow, Royal Society, UK (2006); Fellow, British Acad. Medical Sciences (2007); Yngve Zotterman Prize, Stockholm Physiol. Soc. (2007); Fellow, American Assoc. Anatomists, (2009); Joseph Erlanger Lecture, Amer Physiol. Soc. (2010); Fellow, American Assoc Advancement Science (2010); Faculty Lecturer, UCSF (2012), Founder’s Award, American Academy of Pain Medicine, 2013
C. Selected Publications


NAME
Beattie, Michael, Stephen

POSITION TITLE
Professor, Director of Research

EDUCATION/TRAINING
(Begin with baccalaureate or other initial professional education, such as nursing, include postdoctoral training and residency training if applicable.)

<table>
<thead>
<tr>
<th>INSTITUTION AND LOCATION</th>
<th>DEGREE (if applicable)</th>
<th>MM/YY</th>
<th>FIELD OF STUDY</th>
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<tbody>
<tr>
<td>University of California, Davis</td>
<td>B.S.</td>
<td>06/72</td>
<td>Biological Psychology</td>
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<tr>
<td>Ohio State University</td>
<td>M.A.</td>
<td>06/74</td>
<td>Neuropsychology</td>
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<tr>
<td>Ohio State University</td>
<td>Ph.D.</td>
<td>06/77</td>
<td>Neuropsychology/Neuroanatomy</td>
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<tr>
<td>Ohio State University</td>
<td>NIH Postdoctoral fellow</td>
<td>06/78</td>
<td>Neuroanatomy</td>
</tr>
<tr>
<td>Michigan State University</td>
<td>Postdoctoral</td>
<td>06/79</td>
<td>Neurophysiology</td>
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A. Personal Statement
I have been working on the cell biology of spinal cord injury and repair for many years, and have mentored numerous graduate students, postdocs, and residents, many of who have gone on to successful scientific and clinical careers. I have also served as the director of an NIH training grant and a Neuroscience Graduate Program (at Ohio State), and am currently a member of the UCSF Biomedical Sciences Program. Our laboratory is known for developing useful animal models for brain and spinal cord injury in rodents and non-human primates. The environment here at the Brain and Spinal Injury Center is ideal for combined scientific and clinical training, with basic scientists and physician-scientists working together to translate biomedical science into clinical practice at a level 1 trauma center. Current funded projects include
1) development of anti-inflammatory therapies for acute and chronic applications in brain and spinal cord injury, 2) development of the non-human primate model of cervical spinal cord injury with the California SCI Consortium, 3) development of models of chronic cervical spinal cord compression in rodents that will allow MR Imaging of treatment effects, 4) the effects of combined brain and spinal cord injury on neurological outcomes, 5) the role of de- and re-myelination in recovery from cord and brain trauma, 6) the role of synaptic plasticity in rehabilitation after SCI, 7) the effects of acute critical care and blood pressure management on outcomes after human and rodent SCI. The laboratory is actively seeking translational solutions to SCI and TBI, collaborating with BASIC physicians and scientists. The lab supports the research of fellows and residents in neurosurgery, anesthesiology, neurology, and radiology along with postdoctoral fellows, graduate students and a spectacular technical staff. My professional duties include service on editorial boards, NIH and foundation grant review boards, and service to the National Neurotrauma Society. My administrative and teaching duties are as Director of Research for BASIC, supervising and coordinating preclinical research projects and funding, and mentoring junior faculty, postdocs, and students.

B. Positions and Honors
Principals Positions Held

<table>
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<tr>
<th>Year</th>
<th>Institution</th>
<th>Position</th>
<th>Field</th>
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<tr>
<td>1992</td>
<td>Ohio State University</td>
<td>Professor</td>
<td>Cell Biology, Neurobiology, and Anatomy and Neurological Surgery</td>
</tr>
<tr>
<td>2002</td>
<td>Ohio State University</td>
<td>Brumbaugh Professor and Chair</td>
<td>Neuroscience</td>
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<tr>
<td>2003</td>
<td>Ohio State University</td>
<td>Director</td>
<td>Neurobiology of Disease Institute</td>
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Program Director/Principal Investigator: Beattie, Michael S.

2003  2006  Ohio State University  Director  Neuroscience Graduate Program
2006  present  University of California, San Francisco  Professor  Dept. of Neurological Surgery, Brain and Spinal Injury Center (BASIC)
2010  present  University of California, San Francisco  Director of Research  UCSF Brain and Spinal Injury Center

Other Positions Held Concurrently
2007  present  University of California, San Francisco  Member, UCSF Biomedical Sciences Graduate Program
2008  present  University of California, San Francisco  Member, UCSF Institute for Regeneration Medicine

Honors Awards
1997  Rudolf Magnus Visiting Professor and Lecturer  Rudolf Magnus Institute, Univ of Utrecht, NL
2000  John D. and E. Olive Brumbaugh Chair of Brain Research and Teaching  Ohio State University College of Medicine
2013  2012 Reeve-Irvine Research Medal for meritorious research in spinal cord injury  Reeve-Irvine Research Center, UC Irvine

Memberships

Service to Professional Organizations
2012  2013 National Neurotrauma Society  Vice-President

C. Selected Peer-Reviewed Publications (from over 110)

D. Research Support

On-going Research Support

NS 038097 Beattie (PI) 06/01/2005 - 02/28/2016
NIH, NINDS
Mechanisms of secondary damage in spinal cord injury
The aims of this project include extending current studies of AMPAR trafficking in neurons to glial cells, further testing the hypothesis that membrane AMPAR trafficking effects are recruited over time and space by the expanding wave of secondary injury, and using drugs that affect different points in the sequence of TNFα-mediated CP-AMPAR insertion to expand the preclinical evaluation of this target for clinical application
Role:PI

1R01 NS069537-01 Ferguson (PI) 03/01/2010 - 12/31/2014
NIH/NINDS
Metaplasticity and recovery after spinal cord injury: cellular mechanisms
The proposed project explores cellular mechanisms that regulate a form of spinal cord learning that is thought to contribute to recovery of function after SCI.
Role:Beattie, co-I; Ferguson, PI

No number Tuszynski (PI) 03/01/2010 - 02/28/2014
California spinal cord injury consortium
VA Merit Award to Mark Tuszynski, San Diego VAHC (interagency personnel agreement)
This IPA provides salary support for work on the VA-California SCI consortium, which has developed a non-human primate model of SCI. Animal work is done at UC Davis. Data analysis and evaluation is done at UCSF.
Role:Bresnahan and Beattie, UCSF PIs

1R01 NS067092-01A1 Ferguson (PI) 07/01/2010 - 06/30/2015
NIH/NINDS
Bioinformatics for translational spinal cord injury research
By pooling data from several laboratories and making cross-species comparisons, we will leverage existing experimental data to identify common metrics of SCI that can be used for evaluating mechanism of SCI that translate across species.
Role:Beattie, Co-I; Ferguson, PI

No number 06/01/2010 - 05/31/2012
Veterans Administration Pilot Grant
Development of cervical contusion model of SCI in primates (Bresnahan and Beattie, UCSF PIs (interagency agreement))
Role:Tuszynski, PI

NS042291-A1 Bresnahan (UCSF PI)
Tuszynski (PI) 08/15/2011 - 08/14/2016
NIH, NINDS
Plasticity and regeneration in the primate spinal cord
This project proposes to examine the molecular, physiological, and behavioral effect of cortical stimulation on the pattern of recovery of function after cervical hemisection in the primate spinal cord. Chronic intermittent cortical stimulation and chondroitinase treatments will be tested in this primate model of SCI.
Role:Co-I, UCSF subcontract

SRA Beattie (PI) 01/01/2012 - 06/30/2014
Sanofi-Aventis
Sanofi-BASIC collaboration, project 1: Traumatic brain injury biomarkers
This project examines the effects of SAR127963 on biomarkers of inflammation in peripheral blood mononuclear cells in TBI patients
Role:PI

SRA Beattie (PI) 01/01/2012 - 12/31/2013
Sanofi-Aventis
Sanofi-BASIC collaboration project 2: Protection of oligodendrocytes with SAR127963 after TBI in rats
Examine the neuroprotective effects of SAR127963 on oligodendrocytes after experimental TB I in th rat
Role:PI

A119405 Beattie (PI) 04/15/2012 - 04/01/2014
SanBio, Inc.
SB623 cells in sub-acute and chronic cervical spinal cord injury.
The neuroprotective efficacy of human SB623 mesenchymal derived stem cells will be tested in sub-acute and chronic unilateral cervical spinal cord contusion injuries using a battery of forelimb function tests and histological outcome measures.
Role:PI

SC120259 Beattie (PI) 10/01/2013 - 09/30/2016
DoD, CDMRP, SCIRP
SC120259 - Effects of Early Acute Care on Autonomic Outcomes in SCI: Bedside to Bench and Back.
This project will study human critical care practices, including blood pressure management, as predictors of outcome after SCI in patients at SF General Hospital, and in parallel rodent work, determine the relationship between early mean arterial pressure and outcome after thoracic contusion injuries.
Role:PI

CHN 260965 Bresnahan (PI) 07/01/2013 - 06/30/2016
Craig H. Neilsen Foundation
Neuroprotection in a contusion SCI model in the non-human primate.
This award will fund the continued development of a unilateral cervical contusion injury model of SCI in NHPs, and fund a trial of anti-TNF therapies.
Role:Co-I

Completed Research Support

1 R21 AG032518-02, Beattie (PI) 06/01/2009 - 05/31/2011
NIH, NIA
Cervical spinal injury and demyelination in aged rats
This project aims to develop a model of chronic cervical spondylosis in the rat. An MRI-compatible device is
being developed that can produce incremental compression. This model will serve as a platform for
developing therapeutics for this growing clinical problem.

Role: PI

W81XWH-10-1-0910  Beattie (PI)  09/01/2010 - 08/31/2013
DoD/CDMRP SCIRP Translational Partnership Award
Mild TBI and spinal cord injury: a bedside to bench approach to model development
This translational partnership award will use information from clinical practice on combined TBI and SCI to
develop animal models that can help predict effective treatments for combined injuries.
Role: M. Beattie (initiating PI), G. Manley, G. Creasey, partner PIs
BIOGRAPHICAL SKETCH

Provide the following information for the key personnel and other significant contributors in the order listed on Form Page 2. Follow this format for each person. DO NOT EXCEED FOUR PAGES.

NAME
Jacqueline C. Bresnahan, Ph.D.

POSITION TITLE
Professor

eRA COMMONS USER NAME
BRESNAHAN01

EDUCATION/TRAINING (Begin with baccalaureate or other initial professional education, such as nursing, and include postdoctoral training.)

<table>
<thead>
<tr>
<th>INSTITUTION AND LOCATION</th>
<th>DEGREE (if applicable)</th>
<th>YEAR(s)</th>
<th>FIELD OF STUDY</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kent State Univ., Kent, OH</td>
<td>B.A.</td>
<td>1968</td>
<td>Psychology</td>
</tr>
<tr>
<td>The Ohio State University, Columbus, OH</td>
<td>M.A.</td>
<td>1970</td>
<td>Psychology</td>
</tr>
<tr>
<td>The Ohio State University, Columbus, OH</td>
<td>Ph.D.</td>
<td>1973</td>
<td>Psychology</td>
</tr>
<tr>
<td>The Ohio State University, Columbus, OH</td>
<td>Postdoc</td>
<td>1977</td>
<td>Neuroanatomy</td>
</tr>
</tbody>
</table>

A. Personal Statement

My research program has been a cooperative effort with Dr. Michael Beattie for many years. We have focused on understanding the biological responses of the spinal cord to injury including cell death and repair after trauma, and the process of recovery of function after injury. Our laboratory has participated in the development of a number of models to study this devastating injury, including a number of outcome measures currently in wide use in the field. In 2006, we joined the Brain and Spinal Injury Center at UCSF with the goal of focusing on translational research. At that time, we joined the California Spinal Cord Consortium and have participated in the development of the primate model of spinal cord injury with a special focus on the behavioral outcome measures. We have also now developed a contusion model of SCI in the NHP which can be used as a translational platform for testing both cell based and neuroprotective therapies that show promise in rodent models of SCI.

B. Positions and Honors

Professional Experience

1968-73  Teaching Assistant, Instructor & Research Associate, Dept. Psychology, Ohio State University.
1973-77  Post-Doctoral Fellow, Dept. of Anatomy, The Ohio State University
1977-84  Clinical Assistant Professor, Dept. of Anatomy, The Ohio State University.
1984-85  Clinical Associate Professor, Dept. of Anatomy, The Ohio State University.
1985-91  Associate Professor, Dept. of Anatomy, The Ohio State University
1991-1999 Professor, Dept. of Cell Biology, Neurobiology and Anatomy, The Ohio State University
1999-2006 Professor, Dept. of Neuroscience, The Ohio State University
2004-2006 Professor, Dept. of Psychology, The Ohio State University
2001-2006 Associate Dean for Basic Research, College of Medicine and Public Health, Ohio State Univ.
2006-present  Professor Emeritus, Department of Neuroscience, The Ohio State University
10/2006-present  Professor, Dept. of Neurological Surgery, Brain and Spinal Injury Center, University of California, San Francisco, CA

Honors and Awards:

1983 - 1987  Member, Neurological Disorders Program Project Review A Committee, NINDS, NIH
1985  Chairman, Site Visit Committee, NINDS, NIH
1985  Chairman, Special Study Section, NINDS, NIH
1991  Member, Special Review Panel, NIH
1982, 1991  Member, Technical Merit Review Panel, NINCDS, NIH
1998 – 2002  Member, VA Merit Review Panel
2003 – 2008  Member, NSD-A Study Section, NINDS, NIH, Chair 2007-2008
1994 – 1999  Scientific Advisory Council, American Paralysis Assoc
1999 -present  Member, Scientific Advisory Council, Christopher and Dana Reeve Foundation
2009 – 2012  Chair, Scientific Advisory Council, Christopher and Dana Reeve Foundation
2001 - 2006  Scientific Review Panel, Texas Institute for Rehabilitation Research, Mission Connect
1997 -present  Scientific Advisory Board, Acorda Therapeutics
1993 -present International Scientific Advisory Board, International Neurotrauma Society
1998 President, National Neurotrauma Society
2014 President, National Neurotrauma Society
2000 - 2006 Member, PPG External Advisory Board, University of Texas at Galveston
2001 - 2009 Member, COBRE Grant External Advisory Board, University of Louisville
2008 - 2012 Member PPG Internal Advisory Board, UCSF
2003 Faculty Teaching Award, College of Medicine, The Ohio State University
2005 Neuroscience Teaching Award, Dept. of Neuroscience, The Ohio State University
2012 Reeve-Irvine Research Medal for Spinal Cord Injury Research

C. Selected peer-reviewed publications (from over 100)


Other Support

ACTIVE

R01 NS038079 (Co-PIs: Beattie/Bresnahan)  08/15/2011 – 03/31/2016   2.4 calendar mos.
NIH/NINDS $229,041 TDC
Mechanisms Of Secondary Damage After Spinal Cord Injury
This work is aimed at understanding the biology of the expanding lesion and the mechanisms of cell death and repair that might be modified or enhanced to promote regeneration and recovery after spinal cord injury in a rat contusion model.
Role: Co-Principal Investigator

R-01 NS042291 (Tuszynski/Bresnahan)   08/15/2011 – 03/31/2016   1.44 calendar mos.
NIH/NINDS $65,929 TDC
Plasticity and Regeneration in the Primate Spinal Cord
The aims of this project are to examine the effects of cortical stimulation on plasticity and recovery of function after hemisection injury to the cervical spinal cord of the rhesus monkey.
Role: Subcontract Principal Investigator

Craig H. Neilsen Foundation (Bresnahan)  07/01/2013-06/30/2016   1.08 calendar mos.
$190,930 TDC
Neuroprotection in a Contusion SCI Model in the NHP
Our overall objective is to provide a translational platform for the evaluation of therapies for cervical spinal cord injury (SCI) that moves promising preclinical findings in rodents to the nonhuman primate (NHP), and ultimately to human trials.

$250,000 TDC
Effects of Early Acute Care on Autonomic Outcomes in SCI:Bedside to Bench and Back
The objective of this proposal is to understand the role of cardiovascular variables in the recovery process after acute spinal cord injury using clinical data to model the range of variations, then testing methods to determine how to achieve the best outcome.
Role: Co-Investigator

R01 NS069537 (Ferguson)      03/01/2010 – 02/28/2014   0.40 calendar mos.
NIH $242,800 TDC
Metaplasticity And Recovery After Spinal Cord Injury: Cellular Mechanisms
The proposed project explores cellular mechanisms that regulate a form of spinal cord learning that is thought to contribute to recovery of function after SCI.
Role: Co-Investigator

R01 NS067092-01A1 (Ferguson)  05/01/2010 – 04/30/2015   0.60 calendar mos.
NIH $214,375
Bioinformatics for translational spinal cord injury research
This represents a new direction for the field of experimental SCI and we expect this approach to help define outcome metrics that are comparable across species, facilitating translational SCI research.
Role: Co-Investigator
BIOGRAPHICAL SKETCH
Provide the following information for the Senior/key personnel and other significant contributors in the order listed on Form Page 2.
Follow this format for each person.

NAME
Nancy Nies Byl

POSITION TITLE
Professor Emeritus

eRA COMMONS USER NAME (credential, e.g., agency login)
Byln

EDUCATION/TRAINING
(Begin with baccalaureate or other initial professional education, such as nursing, include postdoctoral training and residency training if applicable.)

<table>
<thead>
<tr>
<th>INSTITUTION AND LOCATION</th>
<th>DEGREE (if applicable)</th>
<th>MM/YY</th>
<th>FIELD OF STUDY</th>
</tr>
</thead>
<tbody>
<tr>
<td>University of California, San Francisco</td>
<td>BS</td>
<td>1963</td>
<td>Physical Therapy</td>
</tr>
<tr>
<td>University of California, Berkeley</td>
<td>MPH</td>
<td>1968</td>
<td>Public Health</td>
</tr>
<tr>
<td>University of California Berkeley and San Francisco State University</td>
<td>PhD</td>
<td>1985</td>
<td>Education</td>
</tr>
</tbody>
</table>

A. Personal Statement
I have been a practicing clinician in physical therapy for 50 years. In this period of time, I pursued advanced education to provide a foundation to provide leadership in education and research. While I have assumed leadership in academic development, administration and both basic and clinical research, I consistently maintained my clinical skills as a physical therapist through patient care in our UCSF Faculty Practice. Currently I provide consultations, direct patient care, oversee group classes of intensive exercise for patients with PD and carry out clinical research studies in the PT Health and Wellness Center at Mission Bay. Over the last 3 decades I have transitioned from animal based models of wound healing and overuse syndromes to clinical research studying the etiology of focal dystonia to applications of rehabilitation technology and learning based intervention strategies to facilitate recovery of function in patients post CVA, PD, brain trauma and chronic pain. Working with collaborators in neuroscience, we designed an animal model to study the etiology of focal hand dystonia. Our findings created a paradigm shift in the understanding of focal dystonia as neural maladaptation of sensory and motor processing versus psychopathology. Based on these findings we developed a learning based sensorimotor training program as a critical factor in recovery for patients post neurological dysfunction. I work collaboratively with researchers in the Departments of Radiology and Neurology to try to understand the biomarkers associated with patients who recover substantially post stroke or post dystonia and those who do not as well as design and test the effectiveness of learning based training.

B. Honors and Positions

Honors
1959 Deans List
1960 Deans List
1961 Deans List
1962 Deans List
1968 Honor Society, School of Public Health, University of California, Berkeley
1982 Honors, Qualifying Examination for Candidacy
1988 University of California, San Francisco Faculty Development Award
1992 Outstanding Research Award, California Chapter, American Physical Therapy Association
1993 Charles Magistro Outstanding Service Award, California American Physical Therapy Assn
2000 Catherine Worthingham Fellow, APTA
2000 Royce B Noland Award of Merit, CAPTA
2001 Outstanding Graduate Alumni, San Francisco State University
2004 Lucy Blair Service Award, American Physical Therapy Association
2005 Outstanding Research Presentation, CAPTA Annual Meeting Research Special Interest Group
2006 Keynote Speaker, Smart Prosthetics, Academy of Science, Keck Foundation
2007 Outstanding Lecturer, Medical Students, UCSF School of Medicine
2008 Keynote speaker, Brain Conference on Learning, Jensen Learning Corporation
2008 Keynote speaker: Research Day USC, School of Dentistry, Case Western, SOM, Div Rehab
2009 Keynote speaker, White coat ceremony, Samuel Merritt University
2009 Keynote speaker, Research Day UCSF/SFSU
2010 Special Issue Editor, Journal of Hand Therapy, Focal Hand Dystonia
2013 Keynote speaker, White Coat Ceremony, UCSF/SFSU
2013 Anne Shumway Cook Research Lecturer, APTA, Section on Neurology
2013 Marian Rogers Special Lecturer, Rancho Los Amigos, Downey, CA

Positions:

Present
Professor and Chair Emeritus Department of Physical Therapy and Rehabilitation Science, University of California, San Francisco, School of Medicine
Professor, Emeritus SFSU Graduate Program in Physical Therapy,
Professor, Emeritus Joint UCSF/SFSU Bioengineering
Physical Therapist Consultant, UCSF, Peter Ostwald Health Program for Performing Artists
Professor, Emeritus PT Health and Wellness Center, Bakar Fitness Center, Rukker Community Center, Campus Life Services, Mission Bay

Past Positions at UCSF

1968-69 Acting Director, Health Services Research, Division of Ambulatory and Community Medicine, Department of Medicine
1971-84 Deans Advisory Committee, Curriculum in Physical Therapy
1972-79 Lecturer, Division of Ambulatory and Community Medicine, Department of Medicine, School of Medicine
1975-79 Physical Therapy Consultant, General Medical Clinics, Division of Ambulatory and Community Medicine, Department of Medicine, School of Medicine
1974-79 Coordinator, Interdisciplinary Teaching Program, (grant) Division of Ambulatory and Community Medicine, Department of Medicine, School of Medicine
1975-79 Evaluator, Primary Care Teaching Program (grant), Division of Ambulatory and Community Medicine, Department of Medicine, School of Medicine
1974-79  Clinical Preceptor, Curriculum in Physical Therapy, School of Medicine
1972-2006  Lecturer, Department of Family and Community Medicine
1984-85  Lecturer, Curriculum in Physical Therapy, School of Medicine
1985-86  Assistant Professor in Residence, Acting Director, Curriculum in Physical Therapy
1986-89  Assistant Professor, Director, Curriculum in Physical Therapy
1989-97  Associate Professor, Director UCSF Graduate Program in Physical Therapy
1989-1998  Administrative Director, Center for Human Performance Testing, Education and Research, Graduate Program in Physical Therapy, School of Medicine
1989-2009  Administrative Coordinator, UCSF Peter Ostwald Health Program for Performing Artists, School of Medicine
1989-2009  Physical therapy faculty member and clinician, Faculty Practice, Department of Physical Therapy and Rehabilitation Science
1989-2007  Co Director UCSF/SFSU Graduate Program in Physical Therapy
1997-1999  Professor, Director, UCSF Graduate Program in Physical Therapy
1999-2000  Professor, Interim Chair, UCSF Department of Physical Therapy and Rehabilitation Science, School of Medicine
2000-2007  Professor and Chair, Department of Physical Therapy and Rehabilitation Science, School of Medicine, University of California San Francisco
2007-2008  Professor, Department of Physical Therapy and Rehabilitation Science, School of Medicine, University of California, San Francisco
2007-2008  Director/Coordinator PT Health and Wellness Center, Bakar Fitness Center, Rukker Community Center, Mission Bay
2008-present  Professor Emeritus, PT Health and Wellness Center Bakar Fitness center

**PROFESSIONAL LICENSURE**

9/63-present  Registered Physical Therapist; State of California, Board of Medical Quality Assurance, Physical Therapy Examining Committee  License 479

**Professional Memberships**
Member American Physical Therapy Association
Member of the California Physical Therapy Association
Member of the American Society of Hand Therapy
Member of the Movement Disorders Society
Member of the Society for Neuroscience

Editorial Board/Reviewer

J of Physical Therapy Education, reviewer 1990-present
Journal of Isokinetics and Exercise, Editorial Board 1990-present
Journal of Orthopedics and Sports Physical Therapy, Reviewer 1990-present
Physical Therapy, reviewer 1993-present
PT Talk: Newsletter to Insurance Industry 1993-present
J of Clinical Ultrasound, invited reviewer 1994-present
Perceptual Motor Skills, invited reviewer 1995-present
Internal J of Occupational Medicine, guest reviewer 1995-present
J of Investigative Dermatology, guest reviewer 1998-present
J of Hand Therapy, reviewer 1995-present
J of Hand Therapy, Editorial Board 1998-present
J of Hand Therapy, Speciall Editor 2008-present
Neurology Guest reviewer 2000-present
Muscle and Nerve; Guest reviewer 2001-present
Annals of Neurology, Guest reviewer 2001-present
Movement Disorders Guest reviewer 2001-present
Archives of Physical Medicine and Rehabilitation Guest Reviewer 2004-present
Lancet, Guest Reviewer 2003-present
Neural Repair and Neural Plasticity guest reviewer 2003-present
Stroke Guest reviewer 2004-present
J of Neurophysiology Guest Reviewer 2004-present
Neuroscience Letters- Guest Reviewer 2004-present
J of Physical Medicine Guest Reviewer 2007-present
J of Neurophysiology Guest Reviewer 2006-present
Brain, Guest Reviewer 2009-present
Clinical Rehabilitation, Guest Reviewer 2009-present
Journal of Neurophysiology, Guest Reviewer 2009-present

PUBLICATIONS


7. Byl N and Gaylord-Ross R. Projecting the need for physical therapy in a pediatric population: a study polling the opinion of experts. Totline 11(2). 8-13, 1985


15. Byl, N, Wells, L, Grady, D, Friedlander, A, Sadowsky, S. Consistency of repeated isokinetic testing: effect of different examiners, sites and protocols, J of Isokinetics and Exercise, 1: 122-130, 1991


32. Byl, N. Ultrasound as an Enhancer of Topically Applied Drugs, Phys Ther 75: 539-553, 1995


45. Nagarajan, SS, Blake DT, Wright BA, Byl N, Merzenich MM. Practice-related improvements in somatosensory interval discrimination are temporally specific but generalize across skin location, hemisphere, and modality. J of Neuroscience 1998: 18 (4), 1559-1570

46. Topp K, Byl N. Repetitive Strain Injury-Focal Hand Dystonia: An anatomic analysis, Movement Disorders, 1999 14 (2); 295-206

47. Byl NN, Kohlase, W, Engel, G. Functional limitations immediately after cast immobilization and closed reduction of distal radius fractures J of Hand Therapy 1999 12:201-211


49. Byl, N, McKenzie, A. Treatment effectiveness of patients with a history of repetitive hand use and focal hand dystonia: A planned prospective follow up study J of Hand Therapy, Oct-Dec 2000, 289-301


60. Byl, NN. What can we learn from animal models of focal hand dystonia Rev Neurol (Paris) 2003, 159: 1-17


64. Mehling, WE, Hamel, KA, Acree, M, Byl, N, Hecht, FM. Randomized, controlled trial of breath therapy for patients with chronic low back pain. Alternative Therapies 2005; 11 : 44-52

65. Satyendra, L, Byl, N. Evidence Based Review of Achilles Tendonitis and the Effectiveness of Isokinetic Exercise, Isokinetics and Exercise, 2006, 14: 71-80


70. Coq, O., Strata, F, Russier, M, Safadi, FF, Merzenich, M, Byl, N, Barbe, M Impact of neonatal asphyxia and hind limb immobilization on musculoskeletal tissues and S2 map organization: Implications for Cerebral Palsy Accepted 10/2007, Experimental Neurology 2008 ;210,95-108


74. Byl, N, Archer, E, McKenzie, A Effectiveness of learning based memory and sensorimotor training for focal hand dystonia: the benefit of PT supervision and compliance J of Hand Ther 2009; 22,183-197


76. Leighton, H, Webster, B, Byl, N, Nagajaran, S Neuroimaging and focal hand dystonia J of Hand Ther 2009; 22, 125-134


78. Lui, L, Byl  N The Effect of Moderate Exercise on Function and Disease Progression in Amyotrophic Lateral Sclerosis:An Evidence-Based Review J Neurol Phys Ther 2009; 33: 68-87 Review PMD 195569 16 JNPT 2009;33: 000–000)


82. Gorman, S, Byl, N, Radtka, S Measurement Scale for Sitting Balance for Patients Acute Post Stroke, J of Neurology Reports 2010; 24; 150-160

83. Byl, N, Caguimbaga, J Dual Task Training un Aerobic Conditions for Patients with Parkinson’s Disease: The Use of an Air Distributed Body Weight Support System, Advance in PT 2010; 327; 7-12


86. Byl N, Managing Focal Hand Dystonia, Current Opin Rheumatol, 2012; 24 (2):222-31


88. Webster R, Hinkley L, Byl N, Nagarajan S Changes in sensory responses in focal hand dystonia Brain Mapping, 9-2012 accepted


90. Westlake, KP, Byl N. Translating science to clinical practice: Neural plasticity and neuro-rehabilitation J of Hand Therapy, Accepted 10-2012


93. Byl N, Abrams G, Nagarajan S, Simpkins M, Rosen J. Effectiveness of task specific repetitive training guided by a physical therapist or a dynamic orthosis, J Hand Therapy, accepted 9/2013

Book Chapters


8. Byl NN, Merzenich MM. Principles of Neuroplasticity, Chapter 16, Physiological Basis of Rehabilitation, 2000


10. Byl, NN, Neuroplasticity Chapter 4, in Motor Control in Children, Patricia Montgomery (Ed) 2001


**Research Grant Support:**

**Recent Funded Research**

NIH RO1 Sensorimotor Rehabilitation and Focal Hand Dystonia  
PI Srikantan Nagarajan  Co-PI Nancy Byl (20%)  
2009-2012

NIH R01 Brain Recovery and Reorganization Post Stroke  
PI Sirkantan Nagarajan; CoPI Kelly Westlake Byl Consultant 10%  
2009- 2012

CITRESS  PI Jacob Rosen, Byl N, Abrams G  
Upper Limb Rehabilitation with Robotic Exoskeleton: Bilateral, Unilateral and Usual PT  
2010-2012

NSF Kyoungchul, Kong and T Kemicuchi,  Co PI  
Networked Rehabilitation System  Byl Consultant 5% time  
2009-2014

Ekso Bionics  Byl N and Riley A  
CVA and Integration of a Robotic Exoskeleton for Ambulation  
2012-2013

**Funded and Completed Research**

Tibion  Byl N  
Effectiveness of the Bionic Leg 100 : Case Series  
2010

Ames Laboratory  
PI Paul Cordo, PhD Subacute Stroke Program: Robotic training  
2007-2010
Nancy Byl, PhD, PT PI UCSF Site and Evaluator 5% time

Alterg       PI N Byl  PI
Dual Task and Aerobic Training: Patients with PD Equipment and AA 2009-2010

Dystonia Foundation PI Leighton Hinkley 2008-2010
Neuroimaging and Connectivity: Focal Hand Dystonia
Byl, N Mentor

Stroke Foundation PI Westlake Kelly 2008-2010
Neuroimaging and brain reorganization post stroke
Byl, N Mentor

Canadian Foundation for Rehabilitation PI Westlake K 2008-2010
Fellowship Neuroimaging and brain reorganization Post stroke
Byl, N consultant

NIH RO1 PI Dr. Christine Miakowski 2006-2009
Effect of Flying on Lymphadema in Patients With Breast Cancer
Byl Consultant (15%)

VA       Gary Abrams, MD PI 2004-2005
Stroke Rehabilitation: New Imaging Techniques
Byl Consultant and evaluator 12 %

Northstar       Gary Abrams, MD PI 2005-2007
Randomized Clinical Trial: Electrical Stimulation and Stroke Rehab
Byl Consultant and evaluator (15%)

REAC       Kate Hamel, PhD (PI) Nancy Byl, co-PI 2004-2005
Shared Equipment Grant

Lee Family Foundation Nancy Byl, Erica Pitsch, Co PI 2004-2006
Stroke Rehabilitation: Body Weight Supported Gait Training
Byl Evaluator 5% time

NIH RO1 Dr. Mark Eisner, PI 2004-2009
Longitudinal Study of Disability in Patients with COPD
Byl Consultant 5% time

NS 3483E Michael Merzenich, PhD (PI) 1992-2000
Neuroplasticity,
Byl Consultant and provided financial support for primate research on focal dystonia (Keck Center for Neuroscience)
NINDS-NS 10414     Steve Lisbrger, PhD (PI)            1995-2006
     Neuroplacticity
     Byl Consultant

NIH Grant KO1           Phil Starr, MD (PI)     1999-2004
NINDS     Training Grant, Career Research Award
     Pallidal Physiology of Human and Primate Dystonia
     Byl Consultant

     PI Bart Kylstra          2005-2007
NIH SBIR (Small Business Innovation Research) Phase II grant
     2 R44 HD043567-02,"Manual Wheelchair Utilizing Single Lever for Propulsion"
     Byl Consultant 2% time

     PI   Susan Brown, PhD           2005-2007
NIH    Department of Education
     Sensory Training for Adults with Cerebral Palsy
     Byl Consultant ; equipment supplied for UCSF to become a site

NIH    RO1     B. Halloran, MD (PI)          1994-1996
     Effect of Vitamin D on Strength in the Elderly
     Byl Consultant

NIH    RO1     H.Genant, MD (PI)          1995-1997
     Effect of Exercise and Calcium on Bone Mineralization and Strength
     Byl Consultant

NIH    RO1     TK Hunt, PI          1991-93
     Wound Healing and Oxygen
     Byl    Research Associate

NIH Training Grant      Robert Crede, MD (PI)
     Interdisciplinary Teaching in the Health Sci 1971-1979
     Byl Project Coordinator

NIH Training Grant      Robert Crede, MD (PI) 1975-1979
     Teaching Rehabilitation in Primary Care
     Byl Co PI and Curriculum Coordinator

NIH Training Grant      Robert Crede, MD (PI) 1971-1976
     Residency in Primary Care: Pediatrics and Internal Medicine
     Byl Co PI and Evaluator

Total Control Systems    NightWrest Splints                        2007-2008
PI: Nancy Byl
Use of NightWrest Splints for RSI
Supply splints and support for research assistant

UCSF Mt Zion Endowment
Nancy Byl PI
Multidisciplinary Balance Clinic

REAC Gary Abrams, MD and Nancy Byl co-PI’s
Stroke Rehabilitation and BWSTT 2002-2003

REAC Nancy Byl PhD, PT, (PI) 2001
School of Medicine, UCSF Shared Equipment Grant

REAC Nancy Byl PhD, PT, (PI) 1997
School of Medicine, UCSF Primate studies: Etiology of FHD

Academic Senate Nancy Byl, PhD, PT (PI) 1994, 1996
Neuroplasticity changes in the sensorimotor cortex with repetitive overuse

CAL PT Fund
Smith, MSPT (student PI) 2000
Nancy Byl, Faculty PI
Effectiveness of neuroplasticity and sensorimotor training for patients with CVA

Roalia Ulloa, MSPT (Student PI) 1999
Nancy Byl and Kimberly Topp, Faculty mentors
Neurovascular Entrapment: Effects of Progressive Stretch

Nancy Byl PhD, PT, (PI) 1997
Visual imagery and bone healing

Bonnie Brill (PI) 1995
Magnetic imaging of the carpal tunnel with different splints

Nancy Byl PhD, PT, (PI) 1994
Use of the Clavinova for Motor Retraining
A. Personal Statement

It has been known for decades that the disease processes associated with chronic low back pain are marked by altered spine kinematics. I have been trying to establish quantified descriptions of physiologic and pathologic spinal kinematics and demonstrate how these are influenced by disc and facet joint degeneration and paraspinal muscles as well as to define a treatment-focused functional grading scheme that can tailor treatment interventions with the potential improvement in patients’ outcomes. Our long-term goal from this study is to develop improved diagnostic classification systems that guide patient-specific treatment decisions to help avoid unnecessary spine surgeries so as to improve outcomes and reduce cost.

My second research project is about Modic I degenerative disc disease (DDD). DDD is the most common cause of LBP, accounting for 39% of its incidence. As a result, estimates suggest there are average 4 million adults in the US with DDD-related LBP that failed conservative management and await therapeutic intervention, of which there are few options beyond spinal fusion and disc replacement. The success rate of surgeries for DDD has been reported as 41–57%, with early complication rate of 16% and reoperation rate of 5-11%. A major obstacle for the development of new therapeutic interventions and diagnostic modalities is uncertainty regarding why some degenerated disc hurt, since most of adults have degenerated disc that are asymptomatic. In fact, disc degeneration is normal in humans, the prevalence of which increases with age from 6% in those under 20, to 79% in those over 60. The etiologic factors that distinguish silent from symptomatic or physiologic from pathologic, degeneration are unclear. We theorize that some degenerated discs hurt because tissue microdamage at the disc/vertebra interface allows anaerobic bacteria to invade into the avascular disc and induce an inflammatory response at the endplate and outer annulus. Because of low virulence of microorganism, the patients present a chronic inflammatory response with accompanying symptoms without having clinical presentation of an infection. If this hypothesis is proven true, the course of diagnosis and treatment of this very prevalent condition could be significantly changed, with a potential improvement in patient outcomes.

As an Associate Professor of Orthopaedic Surgery at University of California, San Francisco, Spine Center, I have treated more than 13,000 patients with spinal disorders and performed more than 10,000 fluoroscopy guided spine injections. Regularly following up all my patients after treatments including physical therapy with exercise programs, medications, and spine injections has helped me to develop anecdotal experience to distinguish between patients who would benefit from improving muscle function versus surgical interventions. Even though we are a tertiary center for the treatment of spinal disorders, 76% of our patients show
improvement with non-surgical treatments. As a physiatrist, my primary goal is to help my patients to achieve maximum functionality of the musculoskeletal system.

I would more than happy to contribute creation of a preeminent center of learning and discovery in rehabilitation science at the doctoral level and share my extensive clinical and research experience with the doctoral students.

B. Positions and Honors

Positions and Employment

1997-1999  Clinician, Physical Medicine and Rehabilitation Specialist, Ankara State Hospital, Ministry of Health, Ankara, Turkey
1997-1999  Chief, Pulmonary and Cardiovascular Rehabilitation Unit, Department of Physical Medicine and Rehabilitation, Ankara, Turkey Hospital, Ministry of Health, Ankara, Turkey
1999-2000  Research Associate, Department of Physiological Nursing, University of California at San Francisco
2001-2002  Specialist, Department of Physiological Nursing, University of California at San Francisco
1999-2002  Visiting Associate Researcher/Visiting Postdoctoral Scholar, Department of Orthopaedic Surgery University of California, San Francisco
2002-2010  Assistant Clinical Professor, Department of Orthopaedic Surgery, University of California, San Francisco
2010- Present  Associate Clinical Professor, Department of Orthopaedic Surgery, University of California, San Francisco

Other Experience and Professional Memberships

1994-Present  Turkish National Society of Physical Medicine and Rehabilitation
2002-Present  American Academy of Physical Medicine and Rehabilitation
2009-Present North American Spine Society

Honors

2003  European PM&R Board Certified
2000  Chosen as one of (the most scientific) 25 papers among 5,000 papers in International Conference, American Thoracic Society
1993  Ranked in the 99th percentile in the country-wide residency examination
1986  Ranked in the 99th percentile in OSS and OYS (national student selection and placement examinations given annually in Turkey to 1,200,000 examinees)

C. Selected Peer-reviewed Publications


D. Research Support

Completed Research Support

"The Minimal Clinically Important Difference for Degenerative Spinal Disorders: Finding the Threshold of Clinically Significant Change"
Principal Investigator: Vedat Deviren, MD, Co-Investigators: Sigurd Berven, MD & Sibel Demir-Deviren, MD

As we begin to utilize patient-based health status outcomes as a measure of the utility for a given intervention, it becomes important to differentiate between statistically and clinically significant changes in health status. Small differences in health-related quality of life or health related outcome measures may be statistically significant, yet clinically unimportant. The minimal clinically important difference (MCID) defines a threshold of change that is recognized by the patient as valuable and appreciable. The primary purpose of this project is to establish the minimal clinically important difference for the SF-36, SRS, and Oswestry Disability Index in patients undergoing treatment (surgical and non-surgical) for cervical and lumbar degenerative spinal disorders. Secondary aims of this study include: Comparing different methods of measuring the MCID and evaluating the effect of measurement method, prognosis, and diagnosis on the magnitude of the MCID.
A. Personal Statement

My laboratory focuses on spinal cord injury (SCI) and traumatic brain injury (TBI) research with support of the NIH/NINDS, DoD, VA and a variety of private foundations. My team consists of graduate student trainees from the UCSF doctorate of physical therapy training program, post-baccalaureate and postdoctoral students. In addition I serve as faculty on the UCSF-Biomedical Science Graduate program. My goal is to help train next-generation scientists to help integrate diverse outcome measures using bioinformatics approaches to provide a holistic complete understanding of complex interrelationships between behavioral, physiological, and morphological manifestations of recovery. I have the training necessary guide graduate students in their conceptual and technical education about biomedical research projects. With a PhD in psychology, I have significant formal training in multivariate statistics and serve as PI on an NIH R01 that specifically focuses on applying this statistical knowledge to complex datasets produced in bio-behavioral neuroscience research. In addition, I offer consultation on other technical elements biomedical research. My graduate work and 6 years of postdoctoral training focused on behavioral, cellular and molecular mechanisms of cell death and plasticity after neurotrauma, providing the background to understand the technical language of a variety of research projects. I also serve as PI on an NIH R01 that focuses on mechanisms of neurological metaplasticy and have experience with a variety of basic biological techniques including behavioral assessment, immunohistochemistry, microscopy, algorithmic image analysis, and biochemistry. This background allows me to understand nuances of data from diverse sources within biomecine. I take pride in passing this knowledge along to trainees, successfully sponsoring two postdoctoral fellowships and sending post-baccalaureate students onto prestigious graduate and medical schools.

B. Positions and Honors

Positions and Employment
1995-1998 Research Assistant, Dept. of Psychology, Southwestern University, Texas.
1998-2004 Teaching Assistant, Instructor & Research Assistant, Dept. Psychology, Texas A&M University.
2004-2006 Postdoctoral Researcher, Dept. of Neuroscience, The Ohio State University.
2006-2012 Visiting Scholar, Dept. of Neuroscience, The Ohio State University.
2007-2010 Individual NIH NRSA Postdoctoral Fellow, University of California, San Francisco.
2010-present Assistant Professor, University of California, San Francisco.

Other Experience and Professional Memberships
1998-present Society for Neuroscience
2006-present American Association for the Advancement of Science
2006-present New York Academy of Sciences
2004-present National Neurotrauma Society
1998-2006 American Psychological Association, Division 6
2009 Chair, Society for Neuroscience Nanosymposium: “Spinal Cord Injury: Beyond Biology to Therapy”
2007-present Reviewer: Behavioral Neuroscience; Brain Research; European Journal of Neuroscience; Journal of Neuroscience; Journal of Neurotrauma; PLoS One
2012-present External advisory board for NIH common data elements project for spinal cord injury
2012-present Outside consultant NIH common data elements working group for preclinical traumatic brain injury
2012 Planning committee for NIH-funded workshop “Growth cones and axon regeneration: entering the age of informatics”

Honors
Phi Kappa Phi
Psi Chi
Texas A&M University Thesis Minigrant, 2000
Texas A&M University Faculty for Neuroscience Travel award, 1999, 2001, 2003
Society for Neuroscience Chapters/Eli Lilly Graduate Student Travel Award, 2002
Texas A&M University Assoc. of Former Students Distinguished Graduate Doctoral Research Award, 2004
Winner, OSU Medical Center Graduate and Postgraduate Research Day Poster competition, 2006
The Michael Goldberger Prize from the National Neurotrauma Society, 2007
Individual NIH National Research Service Award, 2007-2010
NIH Early Stage Investigator, 2010

C. Selected Peer-reviewed Publications (selected from 119 peer-reviewed papers and abstracts)

Most relevant to the current application

Additional recent publications of importance to the field (in chronological order)


D. Research Support

**Ongoing Research Support**

R01 NS069537 Ferguson (PI) 03/01/10-02/28/14 (in NCE)  
**Metaplasticity and Recovery After Spinal Cord Injury: Cellular Mechanisms**  
This project explores cellular mechanisms that regulate a form of spinal cord plasticity that is thought to contribute to recovery after SCI.  
Role: Principal Investigator

R01 NS067092-01 Ferguson (PI) 05/01/10-04/30/15  
**Bioinformatics for Translational Spinal Cord Injury**  
This project proposes to build a large database repository of basic spinal cord injury research data to enable multivariate datamining and knowledge discovery with the goal of identifying the best translational metrics for evaluating experimental therapeutics across species.  
Role: Principal Investigator

R01 NS038079-11 Bresnahan/Beattie (PIs) 09/01/11-08/31/16  
**Mechanisms of Secondary Damage After Spinal Cord Injury**  
The aims of this project include extending current studies of AMPAR trafficking in neurons to glial cells, further testing the hypothesis that membrane AMPAR trafficking effects are recruited over time and space by the expanding wave of secondary injury, and using drugs that affect different points in the sequence of TNFα-mediated CP-AMPAR insertion to expand the preclinical evaluation of this target for clinical application.  
Role: Co-Investigator

R01 NS042291 Tusznyski (PI) 09/01/11-08/31/16  
NIH/NINDS  
**Plasticity and Regeneration in the Primate Spinal Cord**  
This project supports studies of mechanisms of endogenous plasticity and recovery within the primate spinal cord following spinal cord injury.  
Role: Co-Investigator on UCSD Subaward to UCSF PI Bresnahan
IPA Tuszynski (PI) 01/01/09-09/30/13
VA RR and D Merit Review Award
California Spinal Cord Injury Consortium
This project supports a combinatorial treatment evaluation in the primate after spinal hemisection.
Role: Statistician *salary support only, provided via IPA

W81XWH-10-1-0910 Beattie (PI) 09/01/10-08/31/13
SCI with Brain Injury: Bedside to Bench Modeling for Developing Treatment and Rehabilitation Strategies
This project supports a new collaboration between basic scientists at UCSF and clinicians at the UCSF, Palo Alto VA, the Santa Clara Valley Rehabilitation Center.
Role: Co-Investigator

224308 Ferguson (PI) 07/01/12-06/30/14
Neilsen Foundation
Visualizing Translational Spinal Cord Injury Research
This project aims to improve clinical translation of basic SCI research findings through the development of a novel integrative toolkit for SCI data-mining and multivariate data visualization.
Role: Principal Investigator

WFL-US-008/12 Ferguson (PI) 07/01/12-06/30/14
Wings for Life Foundation
Datasharing and Bioinformatics for Previously Funded Projects
This project aims to expand our ongoing database development for SCI research with data contributions from the European Union.
Role: Principal Investigator

Completed Research Support

F32 NS053059 Ferguson (PI) 03/03/07-02/28/10
Role of AMPAR Trafficking in Spinal Cord Injury
This was a fellowship award to support my work on mechanisms of cell death in secondary injury after spinal cord trauma, focusing on excitotoxicity.
Role: Principal Investigator
BIOGRAPHICAL SKETCH

Provide the following information for the Senior/key personnel and other significant contributors in the order listed on Form Page 2. Follow this format for each person. DO NOT EXCEED FOUR PAGES.

NAME
Donna M. Ferriero, M.D.

POSITION TITLE
Professor of Neurology and Pediatrics

eRA COMMONS USER NAME (credential, e.g., agency login)
DFerriero

EDUCATION/TRAINING (Begin with baccalaureate or other initial professional education, such as nursing, include postdoctoral training and residency training if applicable.)

<table>
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<tr>
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<th>DEGREE (if applicable)</th>
<th>MM/YY</th>
<th>FIELD OF STUDY</th>
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<tr>
<td>Rutgers University, NCAS, NJ</td>
<td>BA</td>
<td>1967-71</td>
<td>Zoology</td>
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<tr>
<td>Rutgers University, New Brunswick, NJ</td>
<td>MS</td>
<td>1971-73</td>
<td>Immunology</td>
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<tr>
<td>Univ. Calif. San Francisco, CA</td>
<td>MD</td>
<td>1975-79</td>
<td>Medicine</td>
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<tr>
<td>Univ. Calif. San Francisco, CA</td>
<td>postdoc</td>
<td>1985-87</td>
<td>Neurobiology</td>
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A. Personal Statement
As Principal Investigator of the Neonatal Brain Disorders Center, I have directed NIH-funded research for over 20 years. I have extensive mentoring experience as the PI of a K12 NSADA from NINDS since 1998. This grant requires expertise in training and mentoring that I have demonstrated through my existing funded proposals. I have mentored three KL2 scholars in addition to many K23 and K08 applicants. I have received multiple awards for mentoring, including the Chancellors Award for the Advancement of Women and the Maureen Anderson Award from the Society for Pediatric Research. Our Newborn Brain Research Institute offers rich resources for trainees who wish to pursue clinical and translational research and training at UCSF.

B. Positions and Honors
1998- present Professor and Chief Child Neurology (to 2010), UCSF, Neurology and Pediatrics
1998- present Member, Biomedical Sciences Graduate Program
2004-present Member, Institute for Regeneration Medicine
2005-11 Vice Dean, Academic Affairs, UCSF School of Medicine
2005 Institute of Medicine of the National Academy of Sciences
2007-present Co-Director, Newborn Brain Research Institute UCSF
2011-present Physician-in-Chief, UCSF Benioff Children’s Hospital
2011 Election to the Association of American Physicians
2013 Election to American Academy of Arts and Sciences

C. Selected Peer-reviewed Publications
6. 2009 Miller SP and FERRIERO DM From selective vulnerability to connectivity: insights from newborn brain imaging. Trends in Neurosci 32(9):496-505 PMC2743801
7. 2010 Osredkar D, Sall J Bickler P and FERRIERO DM. Erythropoietin promotes hippocampal neurogenesis in in-vitro models of neonatal stroke. Neurobiol of Disease, Fe 1 epub. NIHMS 175788
20. 2013 Semple, BD.; Blomgren, K; Gimlin, K; Ferriero, DM Noble-Haeusslein, LJ. Brain development in rodents and humans: Identifying benchmarks of maturation and vulnerability to injury across species. Progress in Neurobiology Apr 11. doi:pii: S0301-0082(13)00030-0

D. Research Support

Active

Type: PO1 (PI: Ferriero) 1/01/2014 – 12/31/201
Agency: NIH/ NINDS $ 824,286 (Year 1 directs)
Title: Repair after Neonatal Brain Injury

This grant proposes to study both structural and functional correlates of brain developmental maturation and network organization using advanced imaging techniques in our human populations and similar correlates in newborn rodents with a focus on defining basic mechanisms of repair. We will translate these findings to the development of appropriate hardware and software for imaging the fragile newborn to enhance our capabilities in understanding how and when reparative processes originate and are executed.

Role: Principal Investigator

Type: Foundation Ferriero (PI) Period: 10/1/10-9/30/15
Agency: Fondation Leducq
Transatlantic Network on Newborn Stroke: Inflammatory Modulation of Neurovascular Injury
Goal is to set up a network for training of junior investigators and a nidus for discovery of modulators of injury to bring to clinical trials.

*Role:* Co-Principal Investigator

**Type:** P50 NS35902  
**Agency:** NINDS  
**Title:** Mechanisms of Ischemic Neonatal Brain Injury

The goal of this project is investigate the role of ischemia in the generation of neonatal brain injury. Project 1 is evaluating MRI/S as predictors of outcome in humans; Project 2 is studying the role of fructose bis-phosphate; Project 3 is studying the role of growth factors; and Project 4 is studying the role of meningitis and inflammatory mediators- all after neonatal hypoxic-ischemic injury. The core is responsible for developing new models, housing the MR core and NIRS lab as well as centralizing techniques used in all projects. Administrative Supplement for Development of Preclinical Trials is to choose conditions for comprehensive testing of the hypothesis that hypothermia is neuroprotective.

*Role:* Principal Investigator

**Type:** R01 NS033997  
**Agency:** NINDS  
**Title:** Oxidant Mechanisms in Neonatal Brain Injury

The goal of this grant is to determine the mechanisms by which reactive oxygen species mediate cell death after hypoxic-ischemic insult in the developing nervous system. The PI is responsible for overall design and execution of the project.

*Role:* Principal Investigator

**Type:** 2K12 NS001692-  
**Agency:** NIH/NINDS  
**Title:** Neurological Sciences Academic Development Award

Academic training grant for three candidates who will pursue a career in clinical or basic science related to genotype-phenotype correlations of childhood neurological diseases.

*Role:* Principal Investigator

**Type:** R01 EB009756  
**Agency:** NIBIB/Bioengineering Research Partnerships  
**Title:** Development of Advanced Techniques for MR of the Newborn Brain

The goal of this project is to develop advanced MR tools for the evaluation of newborn brain at 3T. This bioengineering partnership consists of scientists and engineers from UCSF, Stanford, and MGH to develop not only the software tools but also hardware components for optimized acquisitions of the newborn brain.

*Role:* Co-investigator

**Type:** R01 NS050159  
**Agency:** NIH/NINDS  
**Title:** Trauma To Developing Brain -- Injury and Repair Mechanisms

The major goal of this project is determine if increased activity of the antioxidant glutathione peroxidase (GPx) will reduce inflammation and cell injury thereby supporting structural and functional recovery.

*Role:* Co-Investigator

**Type:** Child Neurology Foundation  
**Agency:** CNF/CNS Multicenter Clinical Research Grant  
**Title:** Towards the establishment of a Multicenter, Multi-National Research Network for Neonatal Seizures

This grant is to set up a consortium that will develop protocols for clinical trials in newborns with seizures.

*Role:* Principal Investigator

**Type:** T32 HD044331  
**Agency:** NINHD  
**Title:** Traumatic Brain Injury -- Traumatic Brain Injury -- Injury and Repair Mechanisms

The major goal of this project is determine if increased activity of the antioxidant glutathione peroxidase (GPx) will reduce inflammation and cell injury thereby supporting structural and functional recovery.

*Role:* Co-Investigator

**Type:** R01 NS050159  
**Agency:** NIH/NINDS  
**Title:** Towards the establishment of a Multicenter, Multi-National Research Network for Neonatal Seizures

This grant is to set up a consortium that will develop protocols for clinical trials in newborns with seizures.

*Role:* Principal Investigator
Agency: NICHD

Institutional Training for Pediatricians

The goal of this application is to train future academic pediatricians for successful careers.

Role: Principal Investigator

Type: R01 NS077767 Noble (PI) Period: 7/1/2012 - 6/30/17

Agency: NIH-

Determinants of vulnerability and recovery after trauma to the developing brain

Using genetic and pharmacologic approaches in a murine model of TBI, we will determine how unchecked, neutrophil elastase (NE)-directed proteolysis establishes an environment that is unfavorable to recovery and if early blockade of this activity supports cognitive recovery. These studies establish the basis for developing a NE-targeted therapeutic for the brain-injured child.

Role: Co-Investigator

UCSF Foundation (PI: Ferriero) 12/1/2012 – 12/31/2015 as needed
UCSF Pledge for Pediatrics $500,000 (total)

A murine model of repetitive head injury

Goals: to produce a murine model of repetitive head injury to evaluate the role of concussive changes and to test novel therapies to reverse brain damage

Role: Principal Investigator
BIOGRAPHICAL SKETCH

Provide the following information for the Senior/key personnel and other significant contributors in the order listed on Form Page 2. Follow this format for each person. DO NOT EXCEED FOUR PAGES.

NAME
Fitzsimmons, Amber

POSITION TITLE
Assistant Adjunct Professor

eRA COMMONS USER NAME (credential, e.g., agency login)
Fitzhike

EDUCATION/TRAINING (Begin with baccalaureate or other initial professional education, such as nursing, include postdoctoral training and residency training if applicable.)

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<td>UCSF/SFSU</td>
<td>DPTSc</td>
<td>09/13</td>
<td>Physical Therapy</td>
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<tr>
<td>Pacific University</td>
<td>MS</td>
<td>06/96</td>
<td>Physical Therapy</td>
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<tr>
<td>California Polytechnic State University</td>
<td>BS</td>
<td>06/93</td>
<td>Biochemistry</td>
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A. Personal Statement
My areas of research and academic interests are in health professional education using mixed method or qualitative research methodology. In my doctoral work, I investigated the extent and quality of interprofessional experiences of first year Doctor of Physical Therapy students in their first clinical clerkships. In my role as a faculty member, I am focused on imbedding interprofessional collaborative learning experiences in UCSF’s longitudinal curriculum for graduate-level learners in the schools of pharmacy, nursing, medicine, dentistry and physical therapy. I hold appointments in both the Department of Anatomy and Department of Physical Therapy and Rehabilitation Science.

B. Positions and Honors

Principals Positions Held

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<tr>
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<th>Year</th>
<th>Institution and Location</th>
<th>Position</th>
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<td>1996</td>
<td>1998</td>
<td>Saint Joseph Medical Center – Stockton, California</td>
<td>Staff Physical Therapist</td>
<td>Physical Therapy</td>
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<td>1998</td>
<td>1998</td>
<td>Group One / Ukiah Transitional Care Unit – Ukiah, California</td>
<td>Staff Physical Therapist</td>
<td>Physical Therapy</td>
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<td>1999</td>
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<td>Physical Therapy At The Health Club – Ukiah, California</td>
<td>Director of Aquatic Rehabilitation</td>
<td></td>
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<tr>
<td>2000</td>
<td>2007</td>
<td>Saint Charles Medical Center, Bend, Oregon</td>
<td>Staff Physical Therapist</td>
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<tr>
<td>2013</td>
<td>present</td>
<td>University of California, San Francisco</td>
<td>Assistant Adjunct Professor</td>
<td>Physical Therapy and Rehabilitation Science</td>
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<tr>
<td>2013</td>
<td>present</td>
<td>University of California, San Francisco</td>
<td>Assistant Adjunct Professor</td>
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Other Positions Held Concurrently

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<th>Institution and Location</th>
<th>Position</th>
<th>Field of Study</th>
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<tr>
<td>2013</td>
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<td>University of California, San Francisco</td>
<td>Interprofessional Education Lead</td>
<td>Physical Therapy and Rehabilitation Science</td>
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Honors Awards

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<th>Award Name</th>
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<tbody>
<tr>
<td>2013</td>
<td>San Francisco State University</td>
<td>Graduate Student Award for Distinguished Achievement</td>
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<tr>
<td>2012</td>
<td>University of California, San Francisco</td>
<td>Clinical Translational Research Fellowship (formerly called PACCTR)</td>
</tr>
<tr>
<td>2011</td>
<td>University of California, San Francisco</td>
<td>Interprofessional Education Curriculum Ambassador</td>
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Memberships

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<tr>
<th>Year</th>
<th>Year</th>
<th>Institution</th>
<th>Role</th>
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<tbody>
<tr>
<td>2009</td>
<td>present</td>
<td>American Physical Therapy Association - Member</td>
<td>Education, Geriatric sections</td>
</tr>
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</table>
Program Director/Principal Investigator: Fitzsimmons

2010 present American Association of Anatomists - Member
2009 present California Physical Therapy Association - Member

Service to Professional Organizations

C. Selected Peer-Reviewed Publications

D. Research Support

On-going Research Support

Completed Research Support

TL1 RR024129 07/01/2011 - 07/31/2012
This project was supported by the National Center for Research Resources, the National Center for Advancing Translational Sciences, and the Office of the Director, National Institutes of Health, through UCSF-CTSI
Role:Trainee
A. Personal Statement

I have multidisciplinary expertise in systems neuroscience, rehabilitation neurology and neural engineering. Our laboratory is interested in understanding the neural basis of biological sensorimotor learning and control, and how it can be used in brain-machine interfaces (BMI). BMIs offer the possibility of allowing subjects with permanent motor disability to exert direct neural control over assistive devices. In addition, BMIs may eventually allow us to promote functional recovery after stroke and brain injury. We use computational as well as electrophysiological techniques. We are pursuing both animal-based basic research as well as clinical translational research. We currently use chronic electrophysiological recordings to understand the neurophysiological basis of motor recovery after stroke and brain injury. We are also testing how to incorporate artificial electronic systems into the nervous system. Moreover, we are testing the feasibility of controlling complex upper-limb exoskeleton systems using electrical potentials recorded from the cortical surface (i.e. electrocorticography or ECoG) in human subjects. Our research is funded by the Veterans Health Association, the Department of Defense and multiple private foundations. I have mentored both students and residents who are interested in rehabilitation and neuroscience research. Our laboratory also has six post-doctoral fellows with multidisciplinary training in bioengineering, neuroscience and clinical research.

B. Positions and Honors

Positions and Employment

2008-2010  Instructor, Department of Neurology, University of California, San Francisco  
2009-     Staff Neurologist, San Francisco VA Medical Center  
2010-2012 Assistant Adjunct Professor, Department of Neurology, University of California, San Francisco  
2012-     Assistant Professor, in residence  
         Department of Neurology, University of California, San Francisco

Other Experience and Professional Memberships

2004- Member, American Academy of Neurology  
2008- Society for Neuroscience  
2008- American Heart Association/American Stroke Association

Honors

1994 Undergraduate Research Grant, Stanford University  
1995 Phi Beta Kappa, Stanford University  
1996-2004 Medical Scientist Training Program  
2000-2002 National Science Foundation Graduate Fellowship
2004  Neurology Award for Outstanding Medical Student  
2007  American Neurological Association Resident’s Program Scholarship  
2009  Career Development Award, Veteran Health Association  
2011  Burroughs-Wellcome Fund Career Award for Medical Scientists  

C. Selected Peer-reviewed Publications  
Most relevant to the current application  
RESEARCH AWARDS AND GRANTS

Active
CDA-2B6674W, US Department of Veterans Affairs Ganguly (PI) 08/01/09-07/31/14
A Brain-Machine Interface Using the Ipsilateral Arm Representation
Stroke is a major cause of disability as a result of unilateral damage to a brain hemisphere. This project aims to understand the neural basis of the ipsilateral neural representation and its possible use in a BMI.
Role: PI

CAMS, Burroughs Wellcome Fund Ganguly (PI) 10/01/11-08/30/16
Control of a Complex Neuroprosthetic Device Using Electrocorticography
ECoG signals can be recorded stably for extended periods. This proposal aims to test the use of ECoG based recordings to control complex prosthetic devices in non-human primates.
Role: PI

CSDA, Doris Duke Charitable Foundation Ganguly (PI) 07/01/13-06/30/16
ECoG Based Control of a Wearable Exoskeleton
The goal of this grant is to test the development of ECoG BMIs in clinical patients undergoing epilepsy monitoring.
Role: PI

W81XWH-13-2-0091, Dept. of Defense Swanson (PI) 09/27/13-09/30/16
"Mechanistic links between PARP, NAD, and brain inflammation after TBI"
The goal of this project is to apply electrophysiological monitoring to rat model of TBI.
Role: Co-PI

Pending
Searle Scholar Ganguly (PI) 06/01/14-05/31/17
Closed-loop control of cortical plasticity
This proposal aims to test the use of BMIs for rehabilitation in an animal model of stroke.

DP2, NINDS Ganguly (PI) 09/01/14-08/31/19
Neuroprosthetic Control of an Anthropomorphic Exoskeleton in Tetraplegics
The proposal aims to conduct a clinical translation trial of BMIs using ECoG signals.

Completed
0875016N, American Heart Association Ganguly (PI) 07/01/08-06/30/1
A Brain-Machine Interface Using Local Field Potentials
Role (PI)
BIOGRAPHICAL SKETCH

NAME
HAMEL, KATHRYN A.

POSITION TITLE
Associate Professor

eRA COMMONS USER NAME
SFSUHAMEL

EDUCATION/TRAINING (Begin with baccalaureate or other initial professional education, such as nursing, and include postdoctoral training.)

<table>
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<th>DEGREE (if applicable)</th>
<th>YEAR(s)</th>
<th>FIELD OF STUDY</th>
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<td>State University of New York at Buffalo</td>
<td>B.S.</td>
<td>1996</td>
<td>Mechanical Engineering</td>
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<tr>
<td>State University of New York at Buffalo</td>
<td>M.S.</td>
<td>1998</td>
<td>Biomechanics/Exercise Science</td>
</tr>
<tr>
<td>Pennsylvania State University, University Park, PA</td>
<td>Ph.D.</td>
<td>2002</td>
<td>Biomechanics/ Kinesiology</td>
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</table>

A. Personal Statement
As director of the MAREY lab at SFSU, my research priorities are currently focused on fall prevention in older adults with specific studies that address age-related changes in biomechanical and sensory integration. We have two major projects that we recently completed. The first was a NIH-funded study that looked at age-related changes in the visual control of locomotion. We simultaneously measured gaze behavior and biomechanical output in young and older adults during locomotion over challenging terrain such as obstacles, steps and stairs. The second was a pilot study looking at the developmental changes that occur in the visual control of locomotion in young children. In addition to our work on the visual control of locomotion, we began an Air Force funded project focused on deception detection at security checkpoints in the Fall of 2012 in collaboration with my colleague in Psychology, Dr. David Matsumoto. The aim of this study is to determine if deceptive behavior can be detected through the use of motion capture data during the walk up phase to a security checkpoint prior to the individual actually reaching the checkpoint itself. In addition to our research in the MAREY lab, I currently teach three graduate courses in the Kinesiology program – Advanced Biomechanics, Advanced Neuromotor Control and Physical Dimensions of Aging as well as the undergraduate course in Anatomical Kinesiology.

B. Positions and Honors.
Professional Positions
1996-98 Research and Teaching Assistant, Biomechanics Laboratory, SUNY Buffalo
1997-98 Biomechanics Intern, Kristal Systems, Amherst, NY
1999-02 Graduate Student Researcher, Center for Locomotion Studies, Penn State University
2002-2005 Assistant Professor, University of California San Francisco, Department of Physical Therapy and Rehabilitation Science
2002-2005 Director of the Movement Analysis Laboratory, University of California San Francisco
2002-2005 Joint Bioengineering Graduate Group Faculty Member, University of California San Francisco/University of California Berkeley
2006-2008 Assistant Professor, San Francisco State University, Department of Kinesiology
2008-Present Associate Professor, San Francisco State University, Department of Kinesiology
2009-Present Director of the MAREY (Movement Analysis Research on Elderly and Young) Laboratory

Awards and Other Professional Activities
1997 SUNY Buffalo Carlton R. Meyers Graduate Student Award
1999-0 Penn State University Friedman Foundation Research Grant
1999-02 NIH/NIA Penn State University Interdisciplinary Research Training Fellowship in Gerontology
2000 Gait and Clinical Movement Analysis Society Young Investigator Award
2000 NIA “Taking the Next Step: Technical Assistance Workshop”
2000-01 International Society of Biomechanics Dissertation Grant
2001  Grant to participate in the “Aging in a Welfare State” course at Jönköping University, Sweden
2003  National Institute on Aging Summer Institute on Aging Research
2005  Nominated for the Outstanding Faculty Mentorship Award at UCSF
2008  Western Society for Physical Education for College Women - Emerging Professional Award

C. Selected peer-reviewed publications (in chronological order).

Peer-reviewed publications (maiden name – Kathryn A Christina):

(* indicates graduate student working under the supervision of Dr. Hamel)

D. Research Support.

RESEARCH FUNDING UNDER REVIEW:
Subcontract to San Francisco State University from Humintell, Inc.
Co-PI (with PI Dr. David Matsumoto in Psychology): “Human deception detection from whole body motion analysis”
Total costs: $215,000

Current Research Support
Subcontract to San Francisco State University from Humintell, Inc.
Co-PI (with PI Dr. David Matsumoto in Psychology): “Human deception detection from whole body motion analysis”
Total costs: $195,000

Completed Research Support
Office of Research and Sponsored Programs Research Award 2011-2012
San Francisco State University
Primary Investigator: “Age-related changes in the visual control of locomotion”

Office of Research and Sponsored Programs Research Award 2010
San Francisco State University
Primary Investigator: “Age-related changes in the visual control of locomotion”

Summer Stipend Award
San Francisco State University
Primary Investigator: “Age-related Changes in Visual Guidance Strategies”
One month salary stipend (June 2007)

San Francisco State University
Primary Investigator: “Age-related changes in visual guidance strategies”

University of California San Francisco
“Visual Input Requirements for Safe Mobility in the Elderly” (Primary Investigator)

Toyota Motor Corporation: December 2003 – December 2004
PATH, UC Berkeley and UC San Francisco
“Investigation of Elderly Drivers” (Co-primary Investigator)

Mt. Zion Health Fund/Osher Center: March 2003 – July 2004
University of California San Francisco
Co-investigator (5% effort; PI – Wolf Mehling, MD): “Randomized Controlled Trial on the Effects of Breath Therapy in Adult Patients with Chronic Low Back Pain”

REAC Shared Equipment Grant: June 2004-June 2005
Research Evaluation and Allocation Committee, School of Medicine, University of California, San Francisco
Primary Investigator: Neurocom SMART Balancemaster

Friedman Foundation Research Grant
Penn State University
“Frictional Demands During Overground Walking and Stair Negotiation” (Principal Investigator)

International Society of Biomechanics Dissertation Grant
Penn State University
“Biomechanics of Stair Descent Under Altered Visual Conditions” (Principal Investigator)
**BIOGRAPHICAL SKETCH**

Provide the following information for the Senior/key personnel and other significant contributors in the order listed on Form Page 2. Follow this format for each person. **DO NOT EXCEED FOUR PAGES.**

**NAME**
Robert A. Hiatt, M.D., Ph.D.

**POSITION TITLE**
Professor and Chair of Epidemiology and Biostatistics
Director of Population Sciences and Deputy Director,
Helen Diller Family Comprehensive Cancer Center

**eRA COMMONS USER NAME (credential, e.g., agency login)**
rhiatt

**EDUCATION/TRAINING**
*Begin with baccalaureate or other initial professional education, such as nursing, include postdoctoral training and residency training if applicable.*

<table>
<thead>
<tr>
<th>INSTITUTION AND LOCATION</th>
<th>DEGREE (if applicable)</th>
<th>MM/YY</th>
<th>FIELD OF STUDY</th>
</tr>
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<tr>
<td>Univ. of Michigan, Ann Arbor, MI</td>
<td>B.A.</td>
<td>1964</td>
<td>Zoology</td>
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<tr>
<td>Univ. of Michigan Med School, Ann Arbor, MI</td>
<td>M.D.</td>
<td>1968</td>
<td>Medicine</td>
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<tr>
<td>San Francisco General Hospital, San Francisco, CA</td>
<td>Internship</td>
<td>1969</td>
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<tr>
<td>USPHS Hospital, San Francisco, CA</td>
<td>Residency</td>
<td>1971</td>
<td>Internal Medicine</td>
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<tr>
<td>Univ. of California, Berkeley, CA</td>
<td>MPH, PhD</td>
<td>1972, 80</td>
<td>Epidemiology</td>
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**A. PERSONAL STATEMENT**

I am Professor and Chair of Epidemiology and Biostatistics at UCSF and also the Director of Population Sciences and Associate Director for the Helen Diller Family Comprehensive Cancer Center. I came to UCSF in 2003 after being the first deputy director of the National Cancer Institute's Division of Cancer Control and Population Sciences, where, among other things, I oversaw the extramural cancer epidemiology and health disparities programs. I am a past president of the American College of Epidemiology and the American Society of Preventive Oncology.

Over the last three and a half decades as an investigator and Assistant Director of the Kaiser Permanente's Division of Research, as Director of the Northern California Cancer Center's Prevention Sciences Program, and as the Deputy Director of the National Cancer Institute's Division of Cancer Control and Population Sciences I have had multiple informal mentoring activities with scores of scientists. In recent year I have enjoyed increased opportunities to teach and mentor graduate students, post-doctoral fellows and young faculty. I am an active member of the UCSF Committee on Curriculum and Educational Policy. Finally, since assuming chair responsibilities in the Department of Epidemiology and Biostatistics I have focused attention on the development of a graduate PhD training program in Epidemiology & Translational Science that was approved and admitted its first students in the fall of 2010 and which is going along successfully in its early years. I have served as the Program Director for this graduate program and mentor all students in a bi-weekly PhD Epidemiology Seminar over the last three years. I believe strongly in the value of cross-disciplinary and inter-professional education in the health sciences and look forward toward lending my expertise to this newly proposed PhD program in Rehabilitation Sciences.

**B. POSITIONS AND HONORS**

1972 - 1973 Research Associate, Haile Sellassie I. University Addis Ababa, Ethiopia, George Williams
Hooper Foundation, UCSF, San Francisco, CA

1974 Clinical Instructor in Medicine & Director, Employee Health Service, San Francisco General
Hospital and University of California Medical School, San Francisco CA

1974, 76-81 Physician, Berkeley and Hayward Industrial Medical Groups, Berkeley and Hayward, CA

1974 - 1976 Chief, Parasitology Section, San Juan Laboratories, San Juan, Puerto Rico, Center for Disease
Control, US Public Health Service

1977 - 1998 Epidemiologist, Senior Epidemiologist (77-90), Assistant Director (91-98), Division of Research,
Kaiser Permanente Medical Care Program, Oakland, CA

1980 - 1987 Lecturer, Department of Epidemiology and International Health, School of Medicine, University
of California, San Francisco, CA
1981 - 1997 Lecturer, Department of Biomedical and Environmental Health Sciences, School of Public Health, University of California, Berkeley, CA
1981 - 1986 Physician, Internal Medicine, Berkeley Family Practice Medical Group, Berkeley, CA
1988 - 1998 Associate Director for Detection, Prevention & Education (81-86), Director of Prevention Sciences (93-98), Northern California Cancer Center, CA
1998 - 2003 Deputy Director, Division of Cancer Control & Population Sciences, National Cancer Institute, NIH, Bethesda, MD
2003 - 2007 Senior Scientist, The Permanente Federation, Kaiser Permanente Medical Care Program, Oakland, CA
2003 - Director of Population Sciences and Deputy Director, UCSF Comprehensive Cancer Center and Professor of Epidemiology & Biostatistics, UCSF School of Medicine
2006 - Adjunct Investigator, Division of Research, Kaiser Permanente Medical Care Program, Oakland, CA
2006 - Chair, Department of Epidemiology & Biostatistics, UCSF School of Medicine
2007 - Senior Advisor, Community Health Initiative, Kaiser Foundation Health Plan
2008 - Adjunct Professor, Division of Epidemiology, School of Public Health, University of California, Berkeley

Awards and Other Professional Activities

Professional Qualifications
Medical Licensure: California C-32334, Michigan 29031; 1974 American Board of Preventive Medicine, Fellow; 1976 American Board of Internal Medicine, Eligible; 1986 American College of Epidemiology, Fellow

C. SELECTED PUBLICATIONS (Since 2010 - total of 173)


D. Research Support

Ongoing Research Support

P30 CA82103-14 (McCormick) 09/19/12 - 05/13/17
NIH/NCI
Cancer Center Support Grant
Major goals: The Cancer Center Support Grant provides support for administration and infrastructure for the UCSF Helen Diller Family Comprehensive Cancer Center (HDFCCC).
Role: Director of Population Sciences and Associate Director of the HDFCCC

01 ES019457 (Hiatt) 09/01/10 – 04/30/15
NCI/NIEHS
Breast Cancer and the Environment Research Program Coordinating Center
Major goals: The BCERP CC works with three integrated cohorts of girls in centers across the country to study potential environmental causes of breast cancer by focusing on factors in puberty and adolescence. Role: Principal Investigator

RO1 (Shim) 07/01/10 - 06/30/14
NIH/NHGRI
Conceptions of Race and Ethnicity used in Gene-Environment Interaction Studies
Major goals: To anticipate and analyze how conceptions of race and ethnicity used in gene-environment interaction (GEI) research influence societal understandings of race, ethnicity, and individual and group identity; and to identify how policies and practices regarding conceptualization, measurement, and interpretation of race and ethnicity in genomic research might be elaborated in ways that render them more meaningful or robust. Role: Co-Investigator

U01 ES019435-01 (Kushi) 09/03/10-04/30/15
NCI/NIEHS
The CYGNET Study: Environmental and Genetic Determinants of Maturation of Girls
Major goals: To pursue hypotheses related to early development, puberty and adolescence with a focus on the influence of social determinants including socioeconomic status, race and ethnicity, the built environment, and other related issues like assessments of wealth, residential segregation and various stress pathways that might explain various social factors affecting early development and maturation in girls. Role: Co-investigator

P60 MD006902 (Bibbins-Domingo) 08/27/12 – 02/28/17
NMHHD
The Center for Health and Risk in Minority Youth and Adults (CHARM) -
To create the Center for Health And Risk in Minority youth and adults (CHARM), a new comprehensive center of excellence that will focus on chronic conditions and chronic disease risk in Latinos, African Americans and Asians across the arc from adolescence to young adulthood (age 8 to 35 years) as targeted prevention at this age group has the potential to greatly impact minority health and health disparities. Role: Co-Investigator

P30 A1027763 (Van Loon, K.) 07/01/11 – 02/28/14
Center for AIDS Research (CFAR)
Building a Population-Based Cancer Registry in Dar es Salaam, Tanzania: A Pilot Project to Evaluate Completeness + Validity of Pathologic Data
Major goals: As a pilot to developing a Cancer Registry for Tanzania this project assesses the completeness and accuracy of diagnoses of HIV related malignancies in Dar es Salaam, Tanzania over a 3 month period. Role: Mentor and Co-investigator

The Robert Wood Johnson Foundation (Adler) 09/03/10 – 4/30/15
The Robert Wood Johnson Health and Society Scholars Program: Implementation Phase
Major goals: To implement an interdisciplinary, post-doctoral training program focused on the contextual, behavioral and biological determinants of health in order to improve the health of populations. Role: Primary Faculty and Mentor

COMPLETED Research Support (Since 12/2010)

5995SC Esserman (UC Systemwide PI) 01/01/10-12/31/12
UC Office of the President,
Multi-campus Research Programs and Initiatives (MRPI) award
Athena Breast Health Network
Major goals: The aim of the MRPI award is to support innovative collaborations that assemble multi-disciplinary, statewide teams of UC experts to focus their efforts around specific research areas important to California. MRPI funding for Athena supports the development of an infrastructure, shared across all UC medical centers, to integrate clinical data with research and learning and thus accelerate advancements in breast cancer prevention, screening, and treatment. Role: Co-Investigator
BIOGRAPHICAL SKETCH

Provide the following information for the key personnel and other significant contributors in the order listed on Form Page 2.

Follow this format for each person. DO NOT EXCEED FOUR PAGES.

NAME
Wendy B. Katzman, PT, DPTSc

eRA COMMONS USER NAME
WKATZMAN

POSITION TITLE
Associate Professor

EDUCATION/TRAINING (Begin with baccalaureate or other initial professional education, such as nursing, and include postdoctoral training.)

<table>
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<th>DEGREE (if applicable)</th>
<th>mm/yy</th>
<th>FIELD OF STUDY</th>
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<tr>
<td>University of Texas Medical Branch, Galveston, TX</td>
<td>BS</td>
<td>8/73</td>
<td>Physical Therapy</td>
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<tr>
<td>International Society of Clinical Densitometry</td>
<td>Certificate</td>
<td>8/03</td>
<td>Clinical Densitometry</td>
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<tr>
<td>University of California San Francisco/San Francisco State University, San Francisco, CA</td>
<td>DPTSc</td>
<td>6/06</td>
<td>Physical Therapy and Rehab Sci</td>
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<tr>
<td>University of California, San Francisco, CA</td>
<td>Certificate</td>
<td>5/09</td>
<td>Clinical Research</td>
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A. Personal Statement
As a physical therapist and board certified Orthopedic Clinical Specialist, my research interests focus on age-related hyperkyphosis, an excessive curvature in the thoracic spine, and its effects on physical function in older adults. Hyperkyphosis affects approximately 14-40% of older adults and increases risk of morbidity and mortality. I am PI of an NIH RO1 grant from the National Institute of Aging, conducting a randomized controlled trial of the effects of a high-intensity spinal muscle strengthening exercise intervention on kyphosis, physical function and quality of life in community-dwelling older adults with hyperkyphosis. I am also project leader for a UC Davis P50 program project grant from the NIH Office of Research in Women’s Health and the National Institute of Arthritis and Musculoskeletal and Skin Diseases investigating sex differences in musculoskeletal conditions across the lifespan. I currently teach graduate students throughout the UCSF campus about management of osteoporosis and pelvic floor muscle dysfunction, and I provide an independent study course for physical therapy graduate students who are interested in participating in clinical research.

B. Positions and Honors

Positions and Employment:

1973-1974 Physical Therapist, Texas Institute for Rehabilitation and Research, Houston, TX
1974-1979 Physical Therapist, Pacific Medical Center, San Francisco, CA
1979-1982 Physical Therapist, Contract Physical Therapy, Berkeley, Oakland, CA
1982-1983 Chief Physical Therapist, Easter Seal Rehabilitation Center, Oakland, CA
1983-1985 Physical Therapist, Colby-Webster Physical Therapy, Berkeley, CA
1988-1994 Private Practice, Berkeley, CA
1988-1995 Director of Physical Therapy, Physiotherapy Associates, Berkeley, CA
2001-2004 Project Director, UCSF Women’s Health Research Center, San Francisco, CA
2004-2010 Assistant Professor, UCSF Department of PT and Rehab Science, SF, CA
2010-current Associate Professor, UCSF Department of PT and Rehab Science, SF, CA

Other Experience and Professional Memberships:
1987-current   Clinical Faculty, University of California San Francisco/San Francisco State University
Joint Graduate Program in Physical Therapy
1973-current   American Physical Therapy Association (APTA), Geriatric, Research and Women’s Health Sections
1996-2000   National Osteoporosis Foundation
2010-current   Gerontological Society of America
2010-current   American Society for Bone and Mineral Research

Honors and Awards:
2004     California Physical Therapy Fund Award
2005     Mt. Zion Health Fund Clinical Award
2005     APTA Geriatric Section - Adopt-A-Doc Award
2006     SFSU Graduate Student Distinguished Achievement Award
2007     CAPTA Best Faculty Manuscript Award
2010     ASBMR Travel Award
2008-2012    UCSF-Kaiser Building Interdisciplinary Research Careers in Women’s Health Scholar
2009-2012    UCSF CT5I KL2 Scholar’s Program

C. Peer-Reviewed Publications
D. Research Support

**Ongoing Research Support:**

**NIH R01 AG041921**  
Katzman, WB (PI)  
09/30/2012 – 08/30/2017  
Study of Hyperkyphosis, Exercise and Function – SHEAF  
$2,435,662  
This is a randomized controlled trial of a targeted exercise intervention to determine the effects on kyphosis and physical function in 100 community-dwelling older men and women with hyperkyphosis.  
Role: PI

**NIH P50 AR063043**  
Lane, NE (PI)  
09/01/2012 - 08/30/2017  
Specialized Center of Research; subcontract with UCDavis  
$625,000  
Sex Differences in Musculoskeletal Conditions across the Lifespan  
The goal of this project is to investigate sex differences in musculoskeletal issues across the lifespan. As project director of the kyphosis project, we will conduct a clinical trial of a targeted exercise intervention among 100 community-dwelling older men and women to determine effects on kyphosis, and to determine sex differences in response to the intervention.  
Role: Project leader

**NIH/NIAMS RO1**  
Kado, DM (PI)  
09/01/12-03/31/14  
Biological and Structural Predictors of Kyphosis Progression in Older Men  
$94,134  
The scope of the proposed projects are 1) to investigate the association of spinal muscle variables with the degree of kyphosis in older men in cross-sectional analysis in the Osteoporotic Study of Fractures in Men Study (MrOS cohort), and 2) to investigate allele variants for excessive degrees of kyphosis from the MrOS genome-wide association study. These analyses are part of Dr. Kado’s RO1 to investigate predictors of hyperkyphosis in the MrOS cohort.  
Role: Co-investigator

**Completed During the Last three Years:**

**NIH/NIAMS K24 PA-04-107**  
Lane, NE (PI)  
07/01/12-12/31/12  
NIH Midcareer investigator award in patient-oriented research  
$20,000  
The goal of this subcontract is to conduct a genome-wide association study of kyphosis defined by the Cobb angle of kyphosis in a meta-analysis of data in the Health, Aging and Body Composition study (Health ABC), the Study of Osteoporotic Fractures (SOF), and the Osteoporotic Study of Fractures in Men Study (MrOS).  
Role: Investigator

**NIAID U01 AI34989-19**  
Greenblatt, R (PI)  
07/01/12-12/31/12  
Women’s Interagency HIV Study (WIHS) IV  
$14,112  
This funding supported the development of new musculoskeletal measurements of kyphosis and spinal muscle strength variables to be included in the Musculoskeletal substudy in WIHS-IV and future WIHS-V cohort of post-menopausal HIV-infected women.  
Role: Investigator

**K12 - 5K12 HD052163**  
Katzman (PI)  
07/01/2008 – 06/30/2012  
NIH UCSF-Kaiser Building Interdisciplinary Research Careers in Women’s Health  
The goal of this mentored career development award was to complete the UCSF Advanced Training in Clinical Research (ATCR) program, and develop relationships with established researchers to collaborate on numerous projects to determine important associations of hyperkyphosis and physical function.  
Role: PI

**UCSF Resource Allocation Program**  
Katzman (PI)  
09/01/2009 – 12/31/2010  
Collaboration with the UCSF Women’s Health Clinical Research Center  
Predictors of Kyphosis and Impaired Physical Function in Elderly Women in Health ABC
The goal for this research was to measure kyphosis angle from already existing computed tomography scans and answer important research questions about spinal muscle density among older adults with hyperkyphosis using data from an NIH-sponsored, multicenter, prospective cohort study – Health, Aging and Body Composition (Health ABC).

Role: PI

Pfizer Pharmaceuticals
Katzman (PI) 09/01/2007 – 03/31/2009
Investigator Initiated Grant
Case control study of sEMG Performance of the Pelvic Floor Muscles in Women with Dry Overactive Bladder Compared to Asymptomatic Women
As PI on this study, I wrote the proposal, obtained CHR approval, developed testing protocols, collected data, and participated in analyzing data and writing the published manuscript.
Role: PI
BIOGRAPHICAL SKETCH

Provide the following information for the key personnel and other significant contributors in the order listed on Form Page 2. Follow this format for each person. DO NOT EXCEED FOUR PAGES.

<table>
<thead>
<tr>
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<th>POSITION TITLE</th>
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<tbody>
<tr>
<td>Kazakia, Galateia J</td>
<td>Assistant Professor In Residence</td>
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</table>

| eRA COMMONS USER NAME | kazakia |

EDUCATION/TRAINING (Begin with baccalaureate or other initial professional education, such as nursing, and include postdoctoral training.)

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<tr>
<th>INSTITUTION AND LOCATION</th>
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<th>YEAR(s)</th>
<th>FIELD OF STUDY</th>
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<tr>
<td>Cornell University</td>
<td>B.S.</td>
<td>May 1995</td>
<td>Mechanical Engineering</td>
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<tr>
<td>University of California, Berkeley</td>
<td>M.S.</td>
<td>May 2001</td>
<td>Bio/Mechanical Eng.</td>
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<tr>
<td>University of California, Berkeley</td>
<td>Ph.D.</td>
<td>Dec 2004</td>
<td>Bio/Mechanical Eng.</td>
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<tr>
<td>University of California, San Francisco</td>
<td>Postdoctoral</td>
<td>2004-2008</td>
<td>Radiological Imaging</td>
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A. Personal Statement

I have extensive experience using advanced in vivo imaging techniques including high resolution peripheral quantitative computed tomography (HR-pQCT) and magnetic resonance imaging (MRI) to investigate bone quality in health and disease. My expertise in bone quality assessment is aligned with the responsibilities I would undertake in mentoring students in this program.

I began developing this expertise during my graduate studies at UC Berkeley. My PhD focused on bone mechanics, including mechanical testing and finite element analysis of human tissue and engineered bone substitutes. During my postdoctoral fellowship, supported by a NIH F32 award, I expanded my interest in bone quality assessment to include advanced imaging techniques. These two areas of expertise – bone mechanics and advanced imaging technology – inform and motivate my research directions in my current position as Assistant Professor. At the start of my faculty position, I was awarded a NIH/NIAMS Career Development Award (K01) to develop techniques and metrics for in vivo characterization of cortical pore structure. This work is ongoing and the novel bone quality assessment tools being developed will be applied to the data obtained in this proposed research. Building on this area of expertise, I was recently awarded a NIH R03 to perform ex vivo analysis of cortical bone pore contents and cellular environment in cadaver specimens.

In my time as Assistant Professor, I have directed and participated in numerous human subject studies of both longitudinal and cross-sectional design focused on in vivo bone density, structure, and strength assessment. Among the human subject studies I have performed most recently are HR-pQCT and MR imaging studies investigating bone quality in the context of aging in a post-menopausal cohort, disuse in young athletes, gastric bypass surgery in a morbidly obese cohort, fracture in type II diabetics, and exercise in an elderly HIV+ population. These studies have provided exciting preliminary data and evidence of striking increases in cortical porosity. Importantly, we have found evidence of unique pathways of pore expansion among the cohorts we have studied. We plan to investigate this further to pinpoint systems associated with pore expansion in the context of aging, and to begin to isolate mechanisms and potential treatment and prevention strategies.

Through these experiences I feel I have the ability to make a significant contribution to the proposed PhD program in Physical Therapy and Rehabilitation Science, and I would be happy to mentor students in this program that have interests that align with mine.
B. Positions and Honors

Positions and Employment
1995-1998  Design Engineer, Biomechanics and Biomaterials, Hospital for Special Surgery, NY
1998-1999  Research Engineer, Biomechanics and Biomaterials, Hospital for Special Surgery, NY
1999-2004  Graduate Student Researcher, Mechanical Engineering, UC Berkeley, CA
2002    Graduate Student Instructor, Mechanical Engineering, UC Berkeley, CA
2004-2008  Postdoctoral Scholar, Radiology, UC San Francisco, CA
2009-2009  Associate Specialist, Radiology, UC San Francisco, CA
2009-present  Assistant Professor in Residence, Radiology, UC San Francisco, CA

Other Experience and Professional Society Memberships
2005-present  American Society of Bone and Mineral Research
2007-present American Association for the Advancement of Science
2013-present Orthopaedic Research Society
2008 Grant Reviewer for the American Institute of Biological Sciences
2008-present Associate Editor for Medical Physics
2012-present Scientific Advisory Board member for the International Conference on the Chemistry and Biology of Mineralized Tissues
2012-present Selection Committee member for the UC Office of Undergraduate Research Summer Research Fellowship Program
2013-present Abstract Reviewer for the Orthopaedic Research Society

Honors
1999-2002  Graduate Research Fellowship, NSF
2005-2007 National Research Service Award (F32 AR053446), NIH/NIAMS
2006 Young Investigator Award, 36th International Sun Valley Workshop on Skeletal Biology
2006 Excellence in Research Award, Musculoskeletal Quantitative Imaging Research Group, UCSF
2009 Mentored Career Development Award (K01 AR056734), NIH/NIAMS

Patents
1999 Rotationally Ratcheting Bone Screw, US 5997538
2000 Lateral Pelvic Positioner for Total Hip Arthroplasty, US 6311349

C. Selected Peer-reviewed Publications

Most relevant to the current application


D. Research Support

**ACTIVE**

K01AR056734 (Kazakia) 02/01/2009 – 6/30/2014 (NCE)

NIH/NIAMS

**In vivo imaging of cortical porosity in the peripheral skeleton**

Objective: To investigate the structure of cortical porosity using in vivo high-resolution peripheral quantitative computed tomography (HR-pQCT), and specifically 1) to develop tools for the identification and structural characterization of cortical macro-porosity in HR-pQCT images, and 2) to utilize these tools to investigate the incidence, progression, and consequence of cortical macro-porosity in human subjects.
Visualizing Cortical Pore Space Constituents
Objective: To determine cortical bone pore space contents by ex vivo histology combined with HR-pQCT and MR imaging in cadaver specimens.

Phenotypes of Pathologic Vertebral Endplate Degeneration
Objective: To investigate the relationship between vertebral disc degeneration and vertebral bone and marrow pathology.
Role: Co-Investigator

Mechanisms underlying hormonal regulation of fracture repair
Goals of the three projects are to investigate: 1) The role of IGF-1 signaling in bone fracture repair (PI: Daniel Bikle, M.D. Ph.D.), 2) The role of the calcium-sensing receptor in the callus in fracture repair (PI: Dolores Shoback, M.D.), and 3) Targeting inhibitors of bone formation to promote fracture repair (PI: Robert Nissenson, Ph.D.).
Role: Advisor

Marrow fat, bone mineral density, and body composition during gastric bypass-induced weight loss
Objective: To measure the bone marrow fat, the fat content of pores in cortical bone, and fat-related hormones in a subset of an established, actively-enrolling cohort study of the effects of gastric bypass surgery on calcium metabolism and the skeleton.
Role: Co-Investigator

Effects of Exercise on Bone Quality and Bone Strength in HIV + Individuals Age 50 and Older
Objective: To pilot the use of HR-pQCT in the assessment of bone quality changes in HIV with and without an exercise intervention.
Role: Co-Investigator

Association of Hepatitis C Virus Infection with Reduced Bone Quality
Objective: To pilot the use of HR-pQCT in the assessment of bone quality changes in HCV infected subjects. These funds are limited to use for scanner recharge and patient reimbursement only.
COMPLETED

Individual Investigator Grant (Kazakia)
UCSF Academic Senate Committee on Research
The Influence of Non-weight Bearing on Bone Structure and Strength

COMPLETED
BIOGRAPHICAL SKETCH

Provide the following information for the Senior/key personnel and other significant contributors in the order listed on Form Page 2. Follow this format for each person. DO NOT EXCEED FOUR PAGES.

NAME
LANG, THOMAS F

POSITION TITLE
Professor in Residence

University of California, San Francisco

eRA COMMONS USER NAME (agency login)
TFLANG

EDUCATION/TRAINING

(Begin with baccalaureate or other initial professional education, such as nursing. Include postdoctoral training and residency training if applicable.)

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<th>DEGREE</th>
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<th>FIELD OF STUDY</th>
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<tbody>
<tr>
<td>University of Chicago</td>
<td>BACHELOR OF ARTS</td>
<td>06/1983</td>
<td>Chemistry</td>
</tr>
<tr>
<td>University of California, Berkeley</td>
<td>DOCTOR OF PHILOSOPHY</td>
<td>08/1990</td>
<td>Chemistry</td>
</tr>
<tr>
<td>University of California, San Francisco</td>
<td>Postdoctoral Fellow</td>
<td>08/1992</td>
<td>Nuclear Medicine Imaging</td>
</tr>
</tbody>
</table>

A. PERSONAL STATEMENT

My primary research interests are the application of non-invasive imaging, in particular CT and PET, to study the morphological and functional alterations of the musculoskeletal system related to osteoporosis and sarcopenia. Over the last 15 years my laboratory has pioneered the use of volumetric quantitative computed tomography for studies of bone and muscle in large scale epidemiologic studies and clinical trials. Over the past two years, my group has pioneered the application of Voxel-Based Morphometry (VBM) to the study of proximal femoral structure, resulting in several publications listed below. As shown in our list of publications, we also have carried out exercise studies, including development of a new exercise system combining balance and resistance training modalities, that are directly relevant to the mission of the Physical Therapy Department.

B. POSITIONS AND HONORS

Positions and Employment

2007 - Professor in Residence, University of California, San Francisco
2003 - 2007 Associate Professor in Residence, University of California, San Francisco
2000 - 2003 Associate Adjunct Professor, University of California, San Francisco
1994 - 2000 Assistant Adjunct Professor, University of California, San Francisco
1992 - 1994 Medical Physicist, ADAC Laboratories

Other Experience and Professional Memberships

2013 - Associate Editor, Journal of Bone and Mineral Research
2013 - Faculty Advisor, Office of Ethics and Compliance, University of California, San Francisco
2010 - Distinguished Editor, NIH DCTS Clinical Translational Study Section
2010 - Chairman, Chancellor's Conflict of Interest Advisory Committee, University of California, San Francisco
2010 - 2012 Editorial Board Member, Journal of Bone and Mineral Research
2009 - 2013 Member, NIH CSR SBSR Study Section
2008 - 2012 Musculoskeletal Alterations Team Leader, National Space Biomedical Research Institute
2002 - 2010 Member, Chancellor's Conflict of Interest Advisory Committee, University of California, San Francisco
1994 - Member, American Society of Bone and Mineral Research

Honors

2014 Fellow, American Institute of Medical and Biological Engineering
2013 Distinguished Investigator Award, Academy of Radiology Research
2013 International Space Station Top Discoveries Award, NASA/American Astronautical Society
2013 Osteoporosis International Citation Award, Osteoporosis International
2004 Visiting Professor, Faculty of Medicine, University of Buenos Aires
1996 Young Investigator Award, World Congress of Osteoporosis

C. SELECTED PEER-REVIEWED PUBLICATIONS

- Liu XS, Cohen A, Shane E, Yin PT, Stein EM, Rogers H, Kokolus SL, McMahon DJ, Lappe JM, Recker RR, Lang T, Guo XE. Bone density, geometry, microstructure, and stiffness: Relationships between peripheral and central


D. RESEARCH SUPPORT

Ongoing Research Support

R01 AR064140- 02, National Institute of Arthritis and Musculoskeletal and Skin Diseases (NIAMS) 2013/08/01-2017/05/31
LANG, THOMAS F (PI)
CT-based modeling to analyze variation in skeletal response to osteoporosis drugs
Role: PI

NNJ11HE31A, Universities Space Research Association/NASA 2011/10/01-2015/09/30
LEBLANC, ADRIAN (PI)
Bisphosphonate as a Countermeasure to Space Flight Induced Bone Loss
Role: KP

R01 AR060700- 04, National Institute of Arthritis and Musculoskeletal and Skin Diseases (NIAMS) 2011/08/01-2015/07/31
LANG, THOMAS F (PI)
Bone quality by vQCT and HR-pQCT: translation to multi-center clinical research
Role: PI

R01 DK 069350, NIH/NIDDK 2010/07/01-2015/06/30
BILIZEKIAN, JOHN (PI)
Bone Properties in Hypoparathyroidism: Effects of PTH
Role: KP

R21 AR062479- 02, National Institute of Arthritis and Musculoskeletal and Skin Diseases (NIAMS) 2012/08/17-2014/06/30
LANG, THOMAS F (PI)
PET/CT of skeletal muscle amino acid kinetics
Role: PI

Completed Research Support

R01 AG029571- 04, National Institute on Aging (NIA) 2008/09/01-2013/05/31
LANG, THOMAS F (PI)
The Proximal Femoral Musculature: A new Risk Factor for Hip Fracture
Role: PI
LANG, THOMAS F (PI)
Age-related changes in proximal femoral strength in men and women
Role: PI

LANG, THOMAS F (PI)
Quantitative periprosthetic PET/CT
Role: PI

LANG, THOMAS F (PI)
Race differences in hip strength, density and geometry
Role: PI

LANG, THOMAS F (PI)
Precise 3D QCT to Monitor Osteoporosis Therapy
Role: PI
BIOGRAPHICAL SKETCH

Provide the following information for the Senior/key personnel and other significant contributors in the order listed on Form Page 2. Follow this format for each person. DO NOT EXCEED FOUR PAGES.

NAME
Lee, Jeannette Q.

POSITION TITLE
Assistant Professor

eRA COMMONS USER NAME (credential, e.g., agency login)

EDUCATION/TRAINING (Begin with baccalaureate or other initial professional education, such as nursing, include postdoctoral training and residency training if applicable.)

<table>
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<th>INSTITUTION AND LOCATION</th>
<th>DEGREE (if applicable)</th>
<th>MM/YY</th>
<th>FIELD OF STUDY</th>
</tr>
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<tr>
<td>University of Santo Tomas, Manila, Philippines</td>
<td>BS</td>
<td>1994</td>
<td>Physical Therapy</td>
</tr>
<tr>
<td>Texas Woman’s University, Houston, TX</td>
<td>MS</td>
<td>2001</td>
<td>Physical Therapy</td>
</tr>
<tr>
<td>Texas Woman’s University, Houston, TX</td>
<td>PhD</td>
<td>2006</td>
<td>Physical Therapy</td>
</tr>
</tbody>
</table>

A. Personal Statement

Dr. Lee teaches content in the evidence based practice course and content related to acute care and oncology. She received her entry-level PT degree from University of Santo Tomas, and a MS and PhD in Physical Therapy from Texas Woman’s University in 2006. She is a member of the American Physical Therapy Association (acute care, orthopedic, oncology sections); California Physical Therapy Association; and National Strengthening and Conditioning Association. Dr. Lee has participated in a number of continuing education activities, including: Management of Lower Extremity Lymphedema workshop; APTA combined sections meetings; Upper Extremity Lymphedema: the Art and Science of PT Interventions workshop; Dr. Vodder Manual Lymphatic Drainage/ Combined Decongestive Therapy certification; Acute Care: the Front Line workshop; Human Simulation: Effecting a Change in Paradigm for Acute Care Education; and End of Life Care: Issues of Living and Dying in Clinical Practice workshop.

Lee is a licensed physical therapist in the state of California since 2011 (#38298), Pennsylvania since 2007 (#PT018932), and Texas since 2001 (#1145100). Additionally, she has Certification in Manual Lymphatic Drainage/ Combined Decongestive Therapy. Most recently, Lee was a Staff Physical Therapist at UPMC Hamot Medical Center in Erie, PA (2007-2011). Additionally, she was a Staff Physical Therapist at Memorial Hermann Hospital in Houston, TX, a Senior Physical Therapist at SPRINT Sports Rehabilitation in Pasig City, Philippines and a Staff Physical Therapist at the University of Santo Tomas in Manila, Philippines.

Lee’s research interests are primarily in oncology rehabilitation, particularly in the role of exercise and activity in patients who have cancer, and/or cancer-related sequelae, such as lymphedema. She has published and presented in this area at both local and national conferences. Ongoing research activities include analysis of physical performance and self-report data collected on a cohort of patients with advanced metastatic cancer participating in different modes of exercise, and evaluating the effects of an exercise program for women during or after breast cancer treatment who are at risk for developing lymphedema.

Lee is a member of the APTA and the National Strengthening and Conditioning Association. Within the APTA, she serves the Oncology section, currently as Vice President of the Section and as Section Delegate to the House of Delegates of the APTA. In this capacity, she assisted the section with strategic planning efforts and planning national educational program offerings. She is also on the Editorial Board of the Rehabilitation Oncology Journal. Within the program, Lee serves on the Curriculum Committee and participates in the admissions process and advises pre-PT students. Within the community, she consults and works pro bono as a physical therapist educator and clinician with a number of non-profit organizations, including Clinic by the Bay and Project Medishare for Haiti. Both groups seek to provide healthcare to underserved areas locally and internationally, the former to uninsured working residents from various neighborhoods in San Francisco and Daly City; the latter to patients in Hospital Bernard Mevs, the only critical care trauma and rehabilitation hospital in Port au Prince, Haiti.
Lee incorporates firm expectations of student performance with a flexible learning approach that takes into considerations students’ different individual learning styles. Her goal is to create a safe, open learning environment, and to be open to diverse points of view. Lee uses various avenues of instruction, ranging from classroom lectures, small group discussions, projects, practical exams, clinical simulations, expert guest lecturers, and real-life patient interactions/experiences. Student evaluations of Lee’s performance have been very high. She is cited as being very helpful and available to students. She offers compelling lectures and provides effective feedback to students.

B. Positions and Honors

**Principal Positions Held**

<table>
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<tr>
<th>Dates</th>
<th>Institution and Location</th>
<th>Title</th>
<th>Faculty Rank</th>
<th>Tenure Status</th>
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<tr>
<td>2011 – present</td>
<td>San Francisco State University, San Francisco, CA</td>
<td>Assistant Professor Adjunct Assistant Professor</td>
<td>Assistant Professor</td>
<td>Tenure track</td>
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<td>2011</td>
<td>Gannon University, Physical Therapy Program, Erie, PA</td>
<td>Assistant Professor Per Diem Physical Therapist</td>
<td>Assistant Professor</td>
<td>Non-tenure track</td>
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<tr>
<td>2007-2011</td>
<td>Gannon University, Physical Therapy Program, Erie, PA</td>
<td>Assistant Professor</td>
<td>Assistant Professor</td>
<td>Non-tenure track</td>
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<tr>
<td>2007-2011</td>
<td>UPMC Hamot Medical Center, Erie, PA</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
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<tr>
<td>2006-2007</td>
<td>Memorial Hermann Hospital, Houston, TX</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>2003-2006</td>
<td>Texas Woman’s University, School of Physical Therapy, Houston, TX</td>
<td>Supplemental Physical Therapist Learning Lab Coordinator</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>1999-2002</td>
<td>Texas Woman’s University, School of Physical Therapy, Houston, TX</td>
<td>Graduate Teaching Assistant</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>2000-2001</td>
<td>Texas Woman’s University, School of Physical Therapy, Houston, TX</td>
<td>Research Assistant</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>1998-1999</td>
<td>SPRINT Sports Rehabilitation Center, Pasig City, Philippines</td>
<td>Senior physical therapist</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>1996-1998</td>
<td>University of Santo Tomas Hospital, Department of Rehabilitation, Manila, Philippines</td>
<td>Chief physical therapist</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>1994-1996</td>
<td>University of Santo Tomas Hospital, Department of Rehabilitation, Manila, Philippines</td>
<td>Staff physical therapist</td>
<td>N/A</td>
<td>N/A</td>
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</table>

**Other Positions Held Concurrently**

**Honors Awards**

Texas Woman’s University Pioneer Proud Outstanding Staff Award, 2005
TWU Staff Scholarship, 2005, 2006
Jacqueline Niehuss Scholarship, 2005
Betty Reynolds Anderson Scholarship, 2004-05
Irene Bollier Memorial Scholarship, 2004-05
Sheila Kellagher Scholarship, 2003-04
Tom and Tillie McDonald Scholarship, 2002-03
American Physical Therapy Association Oncology Section Outstanding Student Research Award, 2002
Pauline Terrell Scholarship, 2000-01
Graduated cum laude, BS in Physical Therapy, 1994

Memberships
American Physical Therapy Association
Orthopedic section member: 1999 – present
Oncology section member: 2000 – present
Vice President: 2012 – present
Secretary: 2010 – 2012
Editorial Board, Rehabilitation Oncology: 2009 – present
Programming committee member: 2009 – present
Chair, Nominating committee: 2008 – 2009
Nominating committee member: 2007 – 2008
Pennsylvania Physical Therapy Association
Secretary, Northwest chapter: 2009 – 2011
Member: 2007 – 2011
Texas Physical Therapy Association
Member: 1999 – 2007
National Strengthening and Conditioning Association
Certified Strengthening and Conditioning Specialist: 2000 – present

C. Peer-Reviewed Publications


D. Research Support
Completed Research Support
BIOGRAPHICAL SKETCH

Provide the following information for the key personnel and other significant contributors in the order listed on Form Page 2. Follow this format for each person. DO NOT EXCEED FOUR PAGES.

NAME
LEVINE, Jon David

eRA COMMONS USER NAME
jonlevine

POSITION TITLE
Professor

EDUCATION/TRAINING (Begin with baccalaureate or other initial professional education, such as nursing, and include postdoctoral training.)

<table>
<thead>
<tr>
<th>INSTITUTION AND LOCATION</th>
<th>DEGREE (if applicable)</th>
<th>YEAR(s)</th>
<th>FIELD OF STUDY</th>
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<tr>
<td>University of Michigan</td>
<td>BS</td>
<td>1966</td>
<td>Biophysics</td>
</tr>
<tr>
<td>Yale University</td>
<td>PhD</td>
<td>1972</td>
<td>Neuroscience</td>
</tr>
<tr>
<td>University of California at San Francisco</td>
<td>MD</td>
<td>1978</td>
<td>Medicine</td>
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</table>

A. Personal Statement

I have employed a multidisciplinary approach — molecular, biochemical, in vitro and in vivo electrophysiological, behavioral and clinical — to evaluate mechanisms underlying pain, analgesia and inflammatory states. I have extensive expertise in investigating signal transduction mechanisms for mechanical, neuropathic and generalized pain, thermal and chemical stimulus-induced activation of sensory neurons and mechanisms underlying sensitization of responses to these stimuli. I have described a novel transducer mechanism for thermal stimuli, and the role of a second messenger, the epsilon isoform of PKC (PKC\(_\varepsilon\)), in mediating nociceptor sensitization and the role it plays the transition from acute to chronic pain. I have employed a variety of pain models, including neuropathic pain (e.g. diabetic- and chemotherapy-induced neuropathy), as well as ergonomic musculoskeletal pain associated with vibration exposure and eccentric exercise including the role of stress in chronic musculoskeletal pain. I have also investigated neural and endocrine contributions to pain and inflammation as well as sexually dimorphic mechanisms in pain, analgesia and inflammation.

B. Positions and Honors.

<table>
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<tr>
<th>Position</th>
<th>Department/Division/Unit</th>
<th>Years</th>
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<tbody>
<tr>
<td>Vice Chair</td>
<td>Department of Oral and Maxillofacial Surgery</td>
<td>2005-present</td>
</tr>
<tr>
<td>Professor of Medicine</td>
<td>Divisions of Rheumatology and Clinical Immunology, and Experimental Therapeutics, Dept. of Anatomy and Oral and Maxillofacial Surgery, UCSF</td>
<td>1993-Present</td>
</tr>
<tr>
<td>Member</td>
<td>Program in Biomedical Sciences, UCSF</td>
<td>1992-Present</td>
</tr>
<tr>
<td>Assoc. Prof. Medicine</td>
<td>Divisions of Rheumatology and Clinical Immunology, and Experimental Therapeutics, Dept. of Anatomy and Oral and Maxillofacial Surgery, UCSF</td>
<td>1989-93</td>
</tr>
<tr>
<td>Member</td>
<td>Division of Neurobiology, UCSF</td>
<td>1987-Present</td>
</tr>
<tr>
<td>Assist. Prof. Medicine</td>
<td>Divisions of Rheumatology and Clinical Immunology, and Experimental Therapeutics, Dept. of Anatomy and Oral and Maxillofacial Surgery, UCSF</td>
<td>1983-89</td>
</tr>
<tr>
<td>Instructor in Residence</td>
<td>Department of Physiology, UCSF</td>
<td>1981-1983</td>
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</table>

Guest Investigator, ARC Muscle Mechanisms Unit, Oxford University 1968
Chancellor's Commendation for Research Excellence, University of California 1978
Hartford Foundation Fellow 1984-1987
Most Important New Research in Rheumatic Diseases, Annual NIH Report to Congress 1985
Member, American Association of Professors 2000
Rita Allen Foundation Fellow 1988-1993
Young Investigator Award, International Association for the Study of Pain 1990
Frederick J. Kerr award, American Pain Society 2002
C. Selected peer-reviewed publications (in chronological order).
(Selected from over 350 publications)


D. Research Support.

Ongoing Research Support

1 R01 AR063312 Levine (PI) 03/05/13 – 02/28/2018 $416,274/year
Acute-to-Chronic Transition in Ergonomic Muscle Pain: Nociceptor Mechanisms
This study will investigate the nociceptor as a primary site at which activation of neuroendocrine stress axes contributes to chronic pain.

R01 AR048821 Levine (PI) 07/01/02 – 08/31/2014 (will not be renewed) $203,148
Role of Subdiaphragmatic Vagus in Fibromyalgia Syndrome
The goal of the project is to characterize the vagotomy-based model of generalized hyperalgesia, and to use this model to elucidate mechanisms underlying chronic generalized pain. To provide important new insights into the pathophysiology of generalized pain conditions, including that associated with fibromyalgia.

1R01NS084545-01A1 Levine (PI)  Impact score: 17/Percentile: 3.0
Nociceptor mechanisms in the transition from acute to chronic pain
The project is focused on the understanding of acute-to-chronic pain at the level of the peripheral nociceptor, and potential prevention and reversal of such enhanced pain states.

Pending Research Support

R01 (PA-13-302)  Levine (PI) 07/01/14 – 06/30/2019 $450,134/year
Ectopic Uterine Tissue as a Pain Generator
In our proposed study, we will employing a novel model of endometriosis, to evaluate pain by direct stimulation of an endometrial lesion, the site from which the pain inducing signal is generated and record sensory neuron activity that arises from the sensory innervation of the ectopic endometrium. Base on our findings we will conduct interventions to evaluate peripheral mechanisms underlying endometriosis pain. Role: PI

*R01 (PA-13-302)  Levine (PI) 07/01/14 – 06/30/2019 $459,946/year
Vascular Pain Mechanisms
In our proposed study of the role of endothelin and the endothelium in vascular pain, we will perform behavioral, pharmacological and biochemical/molecular studies. Role: PI

Completed Research Support

1 R01AA017384 Levine (PI) 09/15/08 – 05/31/2013 $214,107
Mechanisms of Interactions of Alcohol Abuse HIV Neuropathogenesis
The goal of the project has been to investigate the cellular mechanisms by which consumed alcohol aggravates antiretroviral-induced neuropathic pain. Role: PI

R01 DE018526 Levine (PI) 08/01/07 – 07/31/2013 $360,272/year
Modeling Kappa Opioid Analgesic Mechanisms in Chronic Orofacial Pain Disorders
The goal of this project was to study the mechanisms underlying the sexual dimorphism in the analgesic effect of kappa-opioids for acute and chronic pain syndromes.

1R01 AR054635 Levine (PI) 08/01/07 – 07/31/2013 $208,593/year
Mechanisms and Risk Factors in Musculoskeletal Pain
The goal of this project was to study the mechanisms underlying acute muscle pain and its transition to chronic pain, using ergonomic models of muscle pain.

P01 NS053709 Levine (PI) 09/01/07 – 06/30/2013 $755,893/year
Receptors and Second Messengers for Pain and Analgesia
The goal of this project was to study the role of PKCε, a Ca++-independent novel protein kinase C isoform in nociceptor function, including in the transition from acute to chronic pain. These studies will be completed prior to the proposed start date of this grant application. In the current grant application, we propose to develop the next phase of our research on the role of PKCε in acute and chronic pain, in a R01 format. Thus,
the proposed research has no redundancy with any grant that will be active when the present grant application would start.

Role: Director/PI

Itzhak Perlman Grant      Div. Rheumatology 01/01/13 – 06/30/2013 $25,639/year
Stress and Musculoskeletal Ergonomic Function
Role: Co-PI

1 R01 AR052106 Levine (PI) 05/16/06 – 02/28/2012 $186,528/year
Sex dimorphism in neuroendocrine control of inflammation
The goal of this study has been to study the roles of gonadal hormones, the sympathoadrenal axis, and control of sympathoadrenal axis by stress and by vagal afferent activity in the sexually dimorphic modulation of here principal components of the inflammatory response: plasma extravasation, leukocyte accumulation, and hyperalgesia.
Role: PI

1 R01 NS053880 Levine (PI) 05/17/06 – 02/28/2011 $225,000/year
Integrin family of proteins in acute and chronic pain
The goal of this project was to study interdisciplinary approach utilizing behavioral and electrophysiological methods in concert to pharmacologically dissect apart the differential roles of individual integrin subunits in the acute and chronic hyperalgesia and nociceptor hyperexcitability that occurs in both inflammatory and neuropathic pain states.
Role: PI
NAME
Xiaojuan Li

POSITION TITLE
Associate Professor

eRA COMMONS USER NAME
XIAOJUAN

EDUCATION/TRAINING (Begin with baccalaureate or other initial professional education, such as nursing, and include postdoctoral training.)

<table>
<thead>
<tr>
<th>INSTITUTION AND LOCATION</th>
<th>DEGREE (if applicable)</th>
<th>YEAR(s)</th>
<th>FIELD OF STUDY</th>
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<tr>
<td>Tsinghua University</td>
<td>B.S.</td>
<td>1996/06</td>
<td>Biomedical Engineering</td>
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<tr>
<td>Tsinghua University</td>
<td>M.S.</td>
<td>1999/06</td>
<td>Biomedical Engineering</td>
</tr>
<tr>
<td>University of California, Berkeley and San Francisco</td>
<td>Ph.D.</td>
<td>2003/12</td>
<td>Bioengineering</td>
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</table>

A. Personal Statement
My current research program aims at developing advanced and quantitative imaging techniques, and evaluating their clinical significance for musculoskeletal diseases including arthritis and osteoporosis. I have extensive experience in developing advanced MRI and high field NMR techniques for cartilage, bone, fat and synovial fluid quantification. I have also fostered close collaborations with clinicians to apply these advanced techniques to clinical applications. I have established collaboration with various faculty in the Department of Physical Therapy and Rehabilitation Science and look forward to mentoring students in the proposed PhD program in Rehabilitation Science.

B. Positions and Honors.

Positions and Employment
2004-2006 Assistant Research Scientist, Department of Radiology, University of California at San Francisco (UCSF)
2006-2010 Assistant Professor, Musculoskeletal Quantitative Imaging Research group (MQIR) Department of Radiology and Biomedical, UCSF Department of Orthopaedic Surgery (joint faculty appointment)
2010-Present Associate Professor, Musculoskeletal Quantitative Imaging Research group (MQIR) Department of Radiology and Biomedical Imaging, UCSF Department of Orthopaedic Surgery (joint faculty appointment)
2006-Present Member, Joint Bioengineering Graduate Program, UC Berkeley and UCSF

Professional Memberships
1998-Present Institute of Electrical and Electronics Engineers (IEEE)
2000-Present International Society of Magn. Reson. in Medicine (ISMRM)
2006-Present Orthopaedic Research Society (ORS)
2006-Present Osteoarthritis Research Society International (OARSI)
2009-Present American College of Rheumatology (ACR)

Honors
1992-95, 1997 Tsinghua Outstanding Student Scholarship
1999 Tsinghua Honored Graduate Student
1999-2000 Regents Fellowship, University of California at Berkeley
2001/02/03 Student Conference Travel Award, ISMRM
2006 Orthopaedic Research Society New Investigator Recognition Award finalist
2006 NIH Mentored Quantitative Research Career Development Award
2007 Outstanding Paper Award, 2007 Inter. Osteoporosis Conference – Bone and Joint Decade, Beijing, China
2008 Young Investigator, 2008 AAOS/ORS Research Symposium (AICKH)
C. Selected peer-reviewed publications (selected from more than 80 in chronological order).


D. Research Support

**Active**

NIH/NIAMS R01 AR057819 PI: Li, X and Schwartz, A 4/1/2010-3/31/2013
Bone Marrow Adiposity, Bone and Body Composition
The goals of this study are to measure bone marrow adiposity using MR spectroscopy and to explore the relationship between marrow fat, bone parameters and other fat depots in a cohort of older adults.
**Role: Principal Investigator**

NIH/NIAMS P50AR060752 (Majumdar/Lane) 04/01/2011 – 03/31/2016
Translation of Quantitative Imaging in Osteoarthritis
The overall objective of this proposal is to integrate cutting edge, quantitative imaging technologies, link the image derived metrics to joint kinematics, kinetics, patient function, and translate the linkages found to the musculoskeletal clinic, thus affecting patient management and outcome.
Research Project 2: Quantitative MRI and Gait Analysis for ACL-injured and Reconstructed Knees (Li/Ma)
**Role: Project Leader**
Core B: Imaging and Data Analysis Core (IDAC) (Li/McCulloch)
**Role: Core Leader**

NIH/NIAMS R01AR046905-11A1 (Majumdar) 06/20/2011 – 05/31/2016
Loaded and Unloaded MR Imaging of Meniscus-Cartilage-Trabecular Bone in OA
This study will develop non invasive biomarkers for cartilage and meniscus degeneration in the knee. We will also examine differences in these tissues with loading. This will help individuals who have or are at risk for developing osteo-arthritis.
**Role: Co-investigator**

NIH/NIDDK R01DK08921601 (Schwarz, Lustig) 7/1/2010 – 6/30/2015
UCSF subcontract; PI Noworolski
Pediatric Fructose Restriction: Reducing Co-morbidity
The goals of this grant are to assess the effects on metabolism of reducing fructose intake in an obese pediatric population.
**Role: Subcontract Co-investigator**

**Completed**

NIH/NIAMS K25 AR053633 PI: Li, X 04/01/2006-03/31/2012
Early detection of cartilage degeneration using high field MRI
The goals of this project are to develop imaging techniques at 3T for detecting cartilage degeneration at early stages and to evaluate the techniques in patients with osteoarthritis and ACL-injuries.
**Role: Principal Investigator**

NIH/NIAMS R21 AR056773-01A1 PI: Li, X 9/1/2009-8/31/2012
NMR spectral markers of cartilage degeneration in osteoarthritis
The goal of this study is to evaluate biochemical changes in osteoarthritic cartilage using high-resolution magic angle spinning (HRMAS) NMR techniques.
**Role: Principal Investigator**

Roche Laboratories PICS Black, D (PI) 3/27/2008-12/31/2012
PTH and Ibandronate Combination Study (PICS)
The overall goals of PICS are to examine two different ways of combining Parathyroid Hormone (PTH) and antiresorptive therapy (ibandronate for this study) to see if we can optimize the increase in bone density and strength.
**Role: Co-investigator**
Early detection of cartilage degeneration using high field MRI

Role: Principal Investigator

Aircast Foundation #S0505R Li, X (PI) 08/01/2006-07/31/2008
Assessment of Cartilage and Subchondral Bone Injuries of the Knee Following Anterior Cruciate Ligament Tear with High Field Magnetic Resonance Imaging
The goals of this project are to evaluate cartilage and bone injuries using MRI and MR spectroscopic imaging techniques at 3T for patients with ACL tears.

Role: Principal Investigator

NIH R01 HL075675 Havel, P (PI) (UC Davis) 07/01/2005-06/30/2006
Effects of consumption of high sugar beverages with meals for 10 weeks on hormones and lipids
The goal of this subcontract is to measure intromycellular lipids using MR spectroscopic imaging method.

Role: Principal Investigator of subcontract to UC Davis

GlaxoSmithKline Link, T (PI) 12/1/2005-6/30/2007
New MRI parameters to study Cartilage Matrix in Patients with Osteoarthritis
The goal of this grant is to use new MRI parameters such as T1rho measurements, T2 relaxation time measurements and cartilage volumetric assessment to characterize cartilage matrix in patients with early and advanced osteoarthritis as well as normal volunteers.

Role: Co-investigator

UC Discovery Grant BIO07-10641 Majumdar, S (PI) 2/1/2008 – 1/31/2010
Non-Invasive Biomarkers Of Disc Degeneration
Researchers at UCSF have recently identified chemical features of painful discs that are measurable using high strength MR technology. Nocimed has licensed this technology and is developing the hardware and software to allow these chemical features to be measured painlessly in back pain patients.

Role: Co-investigator

American Orthopaedic Society for Sports Medicine Ma, B (PI) 01/01/07 - 12/31/08
Evaluation of the Treatment of Articular Cartilage Injuries using Quantitative MR Imaging
The goal of this study is to study the treatment of articular cartilage in a rabbit model.

Role: Co-investigator

UCSF REAC Li, X (PI) 11/1/2007-10/31/2009
Quantitative assessment of bone marrow edema pattern in osteoarthritic and ACL-injured knees.
The goal of this study is to quantify water and lipids changes in BMEP using 3D MRSI and to quantify perfusion using dynamic enhanced MRI.

Role: Principal Investigator
BIOGRAPHICAL SKETCH

Provide the following information for the Senior/key personnel and other significant contributors in the order listed on Form  Page 2.  Follow this format for each person.  DO NOT EXCEED FOUR PAGES.

NAME

Thomas M. Link

POSITION TITLE

Prof. in Residence; Chief, Musculoskeletal Radiology and Clinical Director, Musculoskeletal & Quantitative Imaging Research Group, Department of Radiology and Biomedical Imaging, UCSF

eRA COMMONS USER NAME (credential, e.g., agency login)

LINKTHOMAS

EDUCATION/TRAINING (Begin with baccalaureate or other initial professional education, such as nursing, include postdoctoral training and residency training if applicable.)

<table>
<thead>
<tr>
<th>INSTITUTION AND LOCATION</th>
<th>DEGREE (if applicable)</th>
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<th>FIELD OF STUDY</th>
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<tbody>
<tr>
<td>University of Mainz, Germany</td>
<td>MD</td>
<td>11/1986</td>
<td>Medicine</td>
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<tr>
<td>University of Muenster, Germany</td>
<td>PhD</td>
<td>11/1997</td>
<td>Radiology</td>
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</table>

A. Personal Statement

Over the last 20 years I have acquired extensive research and clinical experience in imaging of the musculoskeletal system in particular of bone and cartilage. Our research group aims to develop the best possible tools to diagnose and monitor osteoarthritis; a particular focus of my research work has been to identify the impact of modifiable risk factors of osteoarthritis, which include physical activity, obesity and muscle strength. I am currently the Clinical Director of the Musculoskeletal and Quantitative Imaging Research group at UCSF. In this role I mentor numerous emerging scientists, some medical students, PhD students, postdocs, and residents. Many of our research projects have included strong collaborations with faculty in the Department of Physical Therapy and Rehabilitation Science. As such, I would be delighted to continue our collaborations as the Department of Physical Therapy begins a new PhD in Rehabilitation Science program, and I am looking forward to mentor PhD students in this program.

B. Positions and Honors

Positions and Employment

1987 - 1988  Resident, Department of Radiology, Center for Rheumatic diseases of the State of Rheinland- Pfalz, Bad Keuznach, Germany
1988 – 1991  Resident, Department of Radiology, City Hospital Luedenscheid, Teaching Hospital of the University of Bonn, Germany
1991 – 1993  Resident, Department of Radiology, University of Muenster, Germany
1993 – 1995  Staff Radiologist, Department of Radiology, University of Muenster, Germany
1996  Research Fellow, Department of Radiology, UCSF, San Francisco
1997 – 2000  Attending Radiologist and Associate Professor, University of Muenster, Germany
1999 – 2001  Visiting Associate Professor, Department of Radiology, UCSF, San Francisco
2000 – 2003  Vice Chairman and Associate Professor, Technische Universitaet of Munich, Germany
2003 - present  Professor of Radiology, Technische Universitaet of Munich, Germany
2003 - 2007  Associate Professor in Residence, Department of Radiology, UCSF
2003 - present  Clinical Director Musculoskeletal and Quantitative Imaging Research, UCSF
2007 - present  Professor of Radiology, Department of Radiology, UCSF
2008 - present  Chief, Musculoskeletal Radiology

Honors and Awards

1997  Caffey Award of the Society of Pediatric Radiology
2000  Award for the best teaching course for medical students at the Medical School of the Technische Universitaet of Munich
2000-2003  Elected Member of the Editorial Board of European Radiology
2003  Award for best scientific exhibit at the European Congress of Radiology “cum laude”
2003  Professor of Radiology, Technische Universitaet of Munich, Germany, title awarded one year earlier due to outstanding research and academic qualifications

2003  Elected member, International Skeletal Society

2004-2007  Section Editor Musculoskeletal Radiology for European Radiology since 2006  Chairman of the Osteoporosis Group of the ESSR

2007  Editor's Recognition Award 2006, European Journal of Radiology

2008  Editor's Recognition Award 2007, European Journal of Radiology

2008  Editor's Recognition Award 2008 with distinction, Radiology

2008  Elected Member Editorial Board Osteoarthritis and Cartilage

2008  Editor’s Recognition Award 2006, European Journal of Radiology

2008  Editor’s Recognition Award 2007, European Journal of Radiology

2008  Editor’s Recognition Award 2008 with distinction, Radiology

2009  Elected Member Editorial Board European Radiology

2009  Top Cited Award 2006-2008 - Osteoarthritis and Cartilage

2009  The Founder's Lecturer of the International Skeletal Society, Washington

2010  Editor's Recognition Award 2010 with special distinction, Radiology

2011  Editors Award, Skeletal Radiology

2011  Editor's Recognition Award 2011 with distinction, Radiology

2011  Editorial Board Skeletal Radiology

2011  Certificate of Distinction, Skeletal Radiology

2012  Editor's Recognition Award 2012 with distinction, Radiology

2012  George J. Davies – James A. Gould, Excellence in Clinical Inquiry Award

C. Selected Peer-reviewed Publications (Selected from 300 peer-reviewed publications)


D. Research Support

Ongoing Research Support

T32EB001631-06 Link (PI) 07/01/10-06/30/15
NIH
Biomedical imaging for clinician scientists
The goal of this grant is to establish a structured intensive one year training program in Biomedical Imaging based in the Department of Radiology at UCSF. The program will be open to Radiology residents who are in or have completed training. The primary long term objective of this training program is to produce a cadre of academic radiologists who will become leaders in Biomedical Imaging, and help address the current lack of such clinical scientific investigators.
Role: Co-Investigator, Associate Director

BAA-NHLBI-AR-10-06 Nevitt (PI) 06/01/10 – 05/31/15
NHLBI
Hip Morphology and Limb-specific Risk Factors for Radiographic Hip Osteoarthritis
Research concerns the identification and validation of risk factors for knee and hip OA and the evaluation of novel and efficient tools for analysis of x-rays that can be applied to large numbers of images with high degrees of reproducibility
Role: Co-Investigator

1U01AR059507 - 01 Link (PI) 07/01/10-06/30/14
NIAMS/NIH
T2 Relaxation Relaxation Time of Knee Cartilage in the OAI Incidence Subcohort
The aim of this project is to study whether T2 relaxation time measurements of the cartilage can be used as a sensitive measure to predict degeneration of the knee joint in individuals from the osteoarthritis incidence cohort with different levels of physical activity.

P50 AR060752 Majumdar/Lane (PI) 08/01/2011- 07/31/2016
NIH/NIAMS
Translation of Quantitative Imaging in Osteoarthritis
The overall objective of this proposal is to integrate cutting edge, quantitative imaging technologies, link the image derived metrics to joint kinematics, kinetics, patient function, and translate the linkages found to the musculoskeletal clinic, thus affecting patient management and outcome.
Role: Co-Investigator and PI subproject 3, Cartilage T2 Relaxation Time in the OAI normal, incidence and progression cohorts

2R01 AR046905-11A1 Majumdar (PI) 06/20/2011 – 05/31/2016
NIH/NIAMS
Loaded and Unloaded MR Imaging of Meniscus-Cartilage-Trabecular Bone in OA
This study will develop non invasive biomarkers for cartilage and meniscus degeneration in the knee. We will also examine differences in these tissues with loading. This will help individuals who have or are at risk for developing osteoarthritis.

Completed Research Support

1RC1AR058405-01, NIH Link (PI) 09/30/09 – 08/31/12*
Cortical Bone Porosity Identifies Diabetes Subjects with Fragility Fractures
The major goal of this grant is to study cortical and trabecular bone architecture in diabetes subjects with and without osteoporotic fractures and to compare these findings to those in normal subjects and osteoporotic fracture subjects.
*NCE from 09/01/11-08/31/12

R01 AG017762, PAR-04-023, NIH Majumdar (PI) 07/01/08 - 06/30/12
Bioengineering Research Partnership: Morphological and Functional Imaging of the Musculoskeletal System
In response to PAR-04-023, participants from the University of California San Francisco (UCSF),University of California Berkeley (UCB), Massachusetts general Hospital (MGH) and industry (General Electric, GE) propose a competing renewal of a Bioengineering Research Partnership (BRP) focused on the systematic study of the morphology and function of the musculoskeletal system in disease and health. We hypothesize that high field (3 Tesla and 7 Tesla), high resolution, fast MR combined with quantitative tissue assessment, would significantly impact the clinical assessment of musculo-skeletal degeneration and reparative processes, spanning a range of scales, from the tissue to the whole organ. The long-term vision of this partnership is to understand the link between morphology, function and clinical symptoms, with a specific focus on osteoporosis, osteoarthritis and degenerative disc disease.
Role: Co-investigator

R01 AR46905-01, NIH Majumdar (PI) 04/19/06 – 01/31/12*
Cartilage Bone Interactions in Osteoarthritis
The major goals of this project are to study whether MR parameters may be used as better surrogate markers for osteoarthritis disease progression than standard conventional radiographs.
Role: Co-Investigator

1R21AR055253, NIH Lang (PI) 09/05/08-08/31/11*
Quantitative Periprosthetic PET/CT
Develop method for quantitative uptake measurements for PET/CT around prostheses by correcting CT attenuation maps for metal artifacts
Role: Co-Investigator

AO Foundation, Davos, Switzerland, Subcontract Link (PI) 04/01/2006 – 03/31/10
Fracture Fixation in Osteoporotic Bone: Project X-ray/CT based analysis of trabecular bone texture
The major goals of this project are to develop structure analysis techniques in conventional radiographs and CT images of the proximal femur to assess fracture risk and predict loosening of total hip prostheses.
Role: Principal Investigator

BIO07 – 10641, UC Discovery Grant-Biotechnology Majumdar (PI) 02/01/2008 – 01/31/2010
Non-Invasive Biomarkers Of Disc Degeneration
Researchers at UCSF have recently identified chemical features of painful discs that are measurable using high strength magnetic resonance technology. Nocimed has licensed this technology and is developing the hardware and software to allow these chemical features to be measured painlessly in back pain patients. If successful, this technology will revolutionize the way physicians diagnose and treat low back pain.
Role: Co-Investigator
BIOGRAPHICAL SKETCH

Provide the following information for the key personnel and other significant contributors in the order listed on Form Page 2. Follow this format for each person. DO NOT EXCEED FOUR PAGES.

NAME
LIU, JIALING

POSITION TITLE
Professor of Neurosurgery (UCSF)
Research Career Scientist (VA)

eRA COMMONS USER NAME
JAILING

EDUCATION/TRAINING (Begin with baccalaureate or other initial professional education, such as nursing, and include postdoctoral training.)

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<th>YEAR(s)</th>
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<tr>
<td>National Taiwan University</td>
<td>B.A.</td>
<td>1984</td>
<td>Medical Science</td>
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<tr>
<td>Boston University Medical Center</td>
<td>Ph.D.</td>
<td>1992</td>
<td>Immunology</td>
</tr>
<tr>
<td>University of California, San Francisco, CA</td>
<td>Postdoctoral fellow</td>
<td>1992-1996</td>
<td>Neurology</td>
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</table>

A. Personal statement

I have a longstanding interest in brain injury, regeneration and functional recovery for the last 12 years here at UCSF. I am the scientific director of the Neurobehavioral Core at the San Francisco VA medical center, and a member of the Brain and Spine Injury Center (BASIC) and the Cerebrovascular Research Program at UCSF. I routinely train my colleagues and their lab personnel in behavioral assays and provide consultation in study design and data analysis, as well as interpretation. The generous support from NIH, VA, AHA and DoD over the years has not only expanded my research program, but also given me an opportunity in training pre-doctoral students and postdoctoral fellows. Many of them have either continued their pursuit in medical research or even assumed faculty positions in various academic institutes. I have also participated in teaching in the Neuroscience Graduate Program and the Biomedical Graduate Program and coaching journal club presentations. In addition, I also teach in the neuroscience course and research conference of the neurosurgery residents.

Time and effort statement: Research, 80%; Teaching/mentoring, 10%; Administration, 10%

B. Positions, Honors and Professional Experience

1986-1992 Research assistant and Ph.D. student, Boston University Medical Center, Mass. 
1992-1996 Postdoctoral fellow, Neurology, UCSF 
1996-1998 Postgraduate researcher, Neurology, UCSF 
1998-1999 Assistant research neuroscientist, Neurology, UCSF 
1999-2001 Assistant Research Scientist, Neurological Surgery, UCSF and NCIRE 
2001-2005 Assistant Professor, Neurological Surgery, UCSF and NCIRE 
2005-2011 Associate Professor, Neurological Surgery, UCSF and NCIRE 
2011- p Professor, Neurological Surgery, UCSF and NCIRE 
2002-2005 Member, AHA Brain 2 study section 
2004- p Member, AHA Western Affiliate study section 
2007-p Editorial Board of Stroke 
2007-p NIH CSR ETTN-C11B (BDCN-A11) study section 
2007 Ad hoc DoD PTSD/TBI Concept Award Reviewer Panel #4 
2007 Ad hoc DoD PTSD/TBI Intramural Program Review Panel #2 
2007 Ad hoc NIH ZRG1 MDCN-B study section 
2008 Ad hoc NIH CSR NT-B study section 
2008 Ad hoc NIH CSR BINP study section 
2008 Ad hoc DoD deployment related medical research program in PTSD/TBI, Advanced Technology/Therapeutic development ATTDC panel #5 
2008 Ad hoc DoD deployment related medical research program in PTSD/TBI, Hypothesis development panel #3
C. Selected Publications

Most recent publications


Other relevant publications (brain injury, functional recovery, regeneration)


D. Research Support.

**On-going Projects**

**Title:** Neuroplasticity after experimental stroke  
**Agency:** NIH NINDS RO1 NS071050-01A1 (Liu)  
**Period:** 5/1/2011-4/30/2016  
The goal of this study is to investigate whether constraint induced movement therapy reduces hippocampal hypofunction induced by experimental stroke.

**Title:** The recovery of post stroke mild cognitive impairment: an experimental model  
**Agency:** American Heart Association (National EIA 0940065N) (Liu)  
**Period:** 4/01/09-6/30/14  
The goal of this proposal is to study the underlying mechanism for post stroke MCI and functional recovery.

**Title:** Mechanisms underlying Netrin-1-mediated functional recovery after stroke  
**Agency:** Department of Veterans Affairs RehabR&D, I01RX000655 Investigator initiated award (Liu)  
**Period:** 4/1/12-3/31/16  
The goal of this study is to investigate the beneficial effects of Netrin-1 in reducing inflammation and in enhancing plasticity during rehabilitation.

**Title:** Multimodal strategies for improving recovery from brain injury  
**Agency:** Department of Veterans Affairs, RehabR&D REAP (Swanson)  
**Role:** co-investigator  
**Period:** 7/01/09-6/30/14  
The goal of this research enhancement award is to investigate the combined effect of small molecule neurotrophin, anti-inflammatory agent and constraint-induced therapy on functional recovery of stroke and TBI.

**Title:** Role of CaSR and GABA-B-R in Neuronal Responses to Ischemic Brain  
**Agency:** Department of Veterans Affairs, BLR&D Merit Review IO1BX001960-01 (Chang)  
**Role:** co-investigator  
**Period:** 4/1/2013- 1/31/2017  
The goal of this proposal is to study the interplay of CaSR and GABA-B-R1 following ischemic brain injury.
Completed Projects.

Title: The role of microglial subsets in regulating traumatic brain injury
Agency: Department of defense, intramural program (Seaman)
Role: collaborator     Period: 12/01/08-11/30/12
The goal of this proposal is to study role of M2 microglia in mediating brain inflammation after traumatic brain injury and the treatment effect of PPARg and TREM2 agonists given post TBI.

Title: Reducing functional deficits following traumatic brain injury
Agency: Department of Veterans Affairs, BLR&D (Liu)
Period: 10/1/07-9/30/11
The goal of this proposal is to study how cognitive therapy promotes memory function and how new neurons are recruited during memory acquisition and recall.

Title: Micro-atheroemboli and small artery disease of the brain
Agency: Department of Veterans Affairs, BLR&D (Rapp)
Role: co-investigator
Period: 10/01/07-09/30/11
The goal of this proposal is to study the effect of micro-atheroemboli on brain injury and small artery disease

Title: A potential compound to protect against damage from TBI
Agency: Department of defense W81XWH-05-2 (Simpson)
Role: co-investigator     Period: 1/01/10-12/31/11
The goal of this proposal is to search compounds that will proactively protect against neurological damage caused by TBI by targeting the Alpha-1-adrenergic receptors.

Overlap: None
BIOGRAPHICAL SKETCH

Provide the following information for the Senior/key personnel and other significant contributors in the order listed on Form Page 2. Follow this format for each person. DO NOT EXCEED FOUR PAGES.

NAME
Luke, Anthony, Cho-Chak

POSITION TITLE
Professor of Clinical Orthopaedic Surgery

eRA COMMONS USER NAME (credential, e.g., agency login)
LUKEA1

EDUCATION/TRAINING (Begin with baccalaureate or other initial professional education, such as nursing, include postdoctoral training and residency training if applicable.)

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<th>DEGREE (if applicable)</th>
<th>MM/YY</th>
<th>FIELD OF STUDY</th>
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<tbody>
<tr>
<td>Univ. of Toronto, Toronto, Ontario, Canada</td>
<td>B.A.</td>
<td>06/91</td>
<td>Studies in Faculty of Arts &amp; Science</td>
</tr>
<tr>
<td>Univ. of Toronto, Toronto, Ontario, Canada</td>
<td>M.D.</td>
<td>06/95</td>
<td>Doctor of Medicine</td>
</tr>
<tr>
<td>St. Joseph's Health Care Centre</td>
<td>Resident</td>
<td>06/97</td>
<td>Family Practice</td>
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<td>Harvard University, Boston, MA</td>
<td>Fellowship</td>
<td>06/99</td>
<td>Primary Care Sports Med</td>
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<tr>
<td>Harvard University, Boston, MA</td>
<td>Program in Clinical Effectiveness</td>
<td>06/99</td>
<td></td>
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<tr>
<td>Harvard University, Boston, MA</td>
<td>Masters</td>
<td>06/00</td>
<td>Public Health</td>
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A. Personal Statement

For the Department of Orthopedic Surgery, I am Director of Primary Care Sports Medicine and the Director of the UCSF Human Performance Center (HPC). My experience in clinical sports medicine, public health, activity promotion, exercise testing, biomechanics, and clinical research have allowed me to build a cutting edge center for UCSF at the Mission Bay campus. The goal of the HPC is to promote the highest level of clinical care and research in the areas of Orthopaedics, Sports Medicine and Performing arts by focusing on preventive care and optimization of human performance. I have developed programs to complement our clinical sports medicine services and research studies with Biomechanical testing and Exercise physiology measurements. Many students are able to learn through the lab and our HPC staff assist faculty to add biomechanical or exercise physiology outcomes to their studies. From 2012 to 2013, the lab has conducted over 556 biomechanical studies. The HPC has 6 research students including 1 PhD candidate; 2 Post Doctoral staff in Physical therapy; 4 physical therapy students; 2 achelor Degree students. The HPC also is a local educational resource for the community. The goal of financial sustainability of the lab will be met through clinical services and research grants. At present the RunSafe program and exercise testing provide direct income to the Center and Department. The HPC is part of an accepted NIH core P50 grant where 2 out of 4 project involve biomechanics testing. HPC research projects include several PENDING R01 submissions.

My own research involves biomechanical assessment and have had NIH-CTSI funding. I am also working with industry start-ups who have been interested in product testing and development using our expertise and equipment. We are working with local start ups to perform product testing or preliminary validation studies with different technologies such as testing algorithms in self-monitoring devices. I have a broad background in clinical sports medicine and non-operative treatment of sports injuries. I can also help enroll patients through my busy clinical practice and the high schools we work with. My research work includes clinical evaluation of athletes in particular runners with 2D and 3D analysis. My research has included work with the Musculoskeletal and Quantitative Image Research group with several publications coming from work on knee osteoarthritis, runners and articular cartilage changes using advanced MRI techniques. This includes MRI techniques similar to this proposal on young healthy marathon runners which has been published in the American Journal of Sports Medicine. For training I have completed the Clinical Effectiveness program and Masters of Public Health at Harvard. I have successfully completed studies for
publication as well as lead position statements with groups of writers involved in large sports organizations. I have experience organizing and directing various staff to accomplish research goals and writing projects. Because of my contacts through previous work experience at University of Western Ontario and as a fellow of the American College of Sports Medicine, I have good network contacts in other large biomechanics labs. In summary, I have demonstrated a record for clinical research projects, have recruitment opportunities in my busy clinical practice and experience organizing projects. I have supervised PhD level students in the past at University of Western Ontario and peripherally at UCSF. I have supervised research and mentored many premedical, medical, residents and fellows over the years. As the Department of Physical Therapy and Rehabilitation proposes a new PhD program in Rehab Science, I offer my full support and would be happy to mentor students in this program.

B. Positions and Honors

Principals Positions Held

<table>
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<th>Year</th>
<th>Present</th>
<th>Institution</th>
<th>Position</th>
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<tr>
<td>2012</td>
<td>present</td>
<td>University of California, San Francisco</td>
<td>Professor</td>
<td>Department of Orthopaedic Orthopaedics</td>
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<tr>
<td>2012</td>
<td>present</td>
<td>University of California, San Francisco</td>
<td>Joint Appointment Professor</td>
<td>Department of Family and Community Medicine</td>
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Other Positions Held Concurrently

Honors Awards

- 2001 Alice G. Brandfonbrener Young Investigator Award
- 2002 NETWORK Research Award
- 2005 2005 Clinical Teaching Award, Awarded by UCSF Graduating Class to 5 best teachers, University of California, San Francisco
- 2006 New Investigator Research Award (NIRA), Orthopaedic Research Foundation, Quantitative Cartilage Imaging of Knee Osteoarthritis - An In Vivo Comparison between T1p and T2 mapping using 3T MRI, Li, X; Link, T M; Ma, C B; Blumenkrantz, G; Lozano J; Luke A; Majumdar S.
- 2011 SF Business Times Health Care Heroes Finalist San Francisco Business Times
- 2013 UCSF Exceptional Physician Award University of California, San Francisco

Memberships

- 1996 present Canadian Academy of Sports & Exercise Medicine (CASEM)
- 2000 present International Federation of Sports Medicine (FIMS)
- 2004 present Member, American Medical Society for Sports Medicine (AMSSM)
- 2005 present Fellow, American College of Sports Medicine

Service to Professional Organizations

- 2001 present CASM Research Committee Member
- 2006 2013 ACSM Fit Society Editorial Board Member
- 2006 present California Interscholastic Federation of High Schools, Sports Medicine Committee Member
- 2007 2010 ACSM Research Committee Member
- 2008 present ACSM Strategic Health Initiative for Youth Health and Sports (reappointed for 2nd term starting 2011) Chair
- 2013 present Current Sports Medicine Reports Reviewer

C. Selected Peer-Reviewed Publications


D. Research Support

On-going Research Support

AR060752-01 Majumdar & Lane (PI) 07/01/2011 - 06/30/2016
Centers of Research Translation (CORT)
NIH/ NIAMS – P50 Translation of Quantitative Imaging for Osteoarthritis (TOQIO)
The goal of this program grant is to advance the field of quantitative imaging of osteoarthritis. It includes 3 cores and 4 independent research studies, which involve various aims from translating knee quantitative imaging to hip OA and investigating the biomechanics of post-traumatic OA following ACL-injury.
Role:Co-Investigator
Genzyme Sanofi Aventis
Long-term Management of “Younger, Active” Patients with Pain from Early Knee Osteoarthritis with Synvisc-One (hylan G-F 20)
This is a natural history cohort study investigating the benefits of Hylan G-F 20 injections as a means of reducing pain and maintaining physical activity levels in individuals with mild knee osteoarthritis in active patients 30-50 years of age.
Role:Principal Investigator

Completed Research Support

Massachusetts's Governing Committee on Physical Activity in Sports 09/01/2000 - 06/30/2001
Walnut Hill High School for the Arts / Children’s Hospital of Boston, Natick, MA
Prospective Pilot Study: Determinants of Injuries in Young Dancers; Article published in Medical Problems of Performing Artists, 2002; 17:3: 105-112.
Role:PI

Canadian Academy of Sports Medicine
Web-based International Survey of Health and Physical Activity Levels (WISHPAL) to assess the Effects of Socioeconomic Factors on Activity in High School Students; Investigate socioeconomic factors that influence sports participation using an internet-based survey; we hope to understand how socioeconomic status, culture, ethnicity, and other competing interests affect physical activity levels in high school students in the United States, Canada, and Switzerland. Manuscript in progress
Role:PI

UL1 RR024131 Luke (PI) 05/01/2011 - 06/30/2012
CTS I T1 Catalyst Grant National Center for Research Resources (NCRRNIH/NCRR UCSF-CTSI)
Validation of the RunSafe™ 2-Dimensional gait analysis method against the gold standard, 3-Dimensional gait analysis
This project is to analyze the 2 dimensional (2D) video capture and compare the assessment to 3 dimensional (3D) running gait analysis in order to identify statistically relevant deviations in diagnosis between methods and understand biomechanical assessment of specific variables in the 2D running analysis.
Role:PI
3202V1-1000 Ma (PI)  06/15/2009 - 12/31/2013
Wyeth Pharmaceuticals
Outcomes of arthroscopic double row rotator cuff repair
The major goals of this project are to study the outcomes of rotator cuff tear repairs; I will be performing the serial musculoskeletal ultrasounds on the shoulders to follow presence re-tearing
Role:Co-Investigator
A. Personal Statement
As a clinician/scientist, I have always been interested in improving patient care with joint problems. I am currently the Chief of the Sports Medicine and Shoulder Service at UCSF. My group has been actively involved in studies that allow early detection and improve treatment in joint injuries. I have been a PI of an OREF research grant, Cartilage initiative, AOSSM grants and a number of clinical trials. We have been actively looking at early radiologic markers to identify cartilage degeneration. The current proposal will allow us to study a common clinical problem and surgical procedure on meniscus injuries. The findings will be important to allow us to better manage our patients. I am in full support of the proposed PhD in Rehabilitation Science program and would be happy to mentor students with aligned research interests.

B. Positions and Honors
Principals Positions Held

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<th>Position</th>
<th>Department</th>
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<tr>
<td>2003</td>
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<td>University of California, San Francisco</td>
<td>Assistant Professor In Residence</td>
<td>Department of Orthopaedic Surgery</td>
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<tr>
<td>2007</td>
<td>present</td>
<td>University of California, San Francisco</td>
<td>Chief</td>
<td>Sports Medicine and Shoulder Service</td>
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<tr>
<td>2009</td>
<td>present</td>
<td>University of California, San Francisco</td>
<td>Associate Professor In Residence</td>
<td>Department of Orthopaedic Surgery</td>
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Other Positions Held Concurrently

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<tr>
<td>2002</td>
<td>Best Resident of the Year, UPMC Orthopaedics</td>
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<td>2004</td>
<td>New Investigator Research Award, Orthopaedic Research Society, San Francisco</td>
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<td>2005</td>
<td>UCSF Orthopaedic Surgery Teaching Award</td>
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<td>2006</td>
<td>New Investigator Research Award Finalist, Co-investigator, Orthopaedic Research Society, Chicago</td>
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<td>2006</td>
<td>Young Investigator Initiative Workshop Participant US Bone and Joint Decade</td>
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<td>2008</td>
<td>Excellence in Teaching Award for Clinical Teaching Faculty UCSF School of Medicine, Class of 2008</td>
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<td>2008</td>
<td>UCSF Exceptional Physician Award</td>
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<tr>
<td>2009</td>
<td>New Investigator Research Award, (Choongsoo Shin) Principle investigator: Ma CB Orthopaedic Research Society, Chicago</td>
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<tr>
<td>2009</td>
<td>Excellence in Patellofemoral Research Principle investigator: Ma CBISAKOS, Osaka, Japan</td>
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<td>2011</td>
<td>Charles S Neer Award: American Shoulder and Elbow Society</td>
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<tr>
<td>2011</td>
<td>Henry Kaiser Award for Excellent in Teaching in the</td>
</tr>
</tbody>
</table>
2011
Ambulatory Care Setting, UCSF

2012  American Shoulder and Elbow Society
2013  Charles S Neer Award: American Shoulder and Elbow Society
2013  Orthopaedics Today: Top 19 US Sports Medicine Specialists
2013  Best Paper Award Shoulder Program. 12th International Congress for Shoulder and Elbow Surgery, Nagoya, Japan

Memberships

Service to Professional Organizations

C. Selected Peer-Reviewed Publications
14. Schairer WW, Haughom BD, Morse LJ, Li X, Ma CB: Magnetic Resonance Imaging Evaluation of


D. Research Support

On-going Research Support

P50AR060752 (Majumdar/Lane) Ma (PI) 08/01/2011 - 07/31/2016
NIH/NIAMS
Translation of Quantitative Imaging in Osteoarthritis

The overall objective of this proposal is to integrate cutting edge, quantitative imaging technologies, link the image derived metrics to joint kinematics, kinetics, patient function, and translate the linkages found to the musculoskeletal clinic, thus affecting patient management and outcome.
Role: Clinical Director
Co-Project Leader
Majumdar Rodeo (PI) 09/01/2013 - 08/31/2015

Arthritis Foundation
A Multi-center Feasibility Trial establishing Imaging and Biochemical Technologies as Measures of Knee Cartilage Composition Following Acute ACL Injury
A multi-center study to look at quantitative MRI on cartilage degeneration following ACL injury
Role: Site Leader
Ma (PI) 03/15/2012 - 02/28/2015

Histogenics, Inc.
Neocart versus microfracture Phase III: Randomized clinical trial on two cartilage resurfacing procedures
Role:PI

Ma (PI) 12/2012 - 12/01/2022

Moximed
Phase I clinical IDE trial for the KineSpring Knee Implant, an investigational device intended to treat pain and loss of function caused by medial compartment knee osteoarthritis
Role:P.I.

Zimmer, Inc.
Zimmer Prospective Post Market Clinical Follow-Up Study of the Zimmer® Trabecular Metal™ Reverse Shoulder System
Role:PI

P50AR060752 Majumdar/Lane (PI) 07/01/2011 - 03/31/2016
NIH/NIAMS
Translation of Quantitative Imaging in Osteoarthritis
This CORT grant investigates the possibility of quantitative imaging on evaluating the progression of osteoarthritis. In this study, we have one out of the four project on the evaluation of cartilage degeneration following ACL tear and reconstruction. This study utilizes T1rho imaging, kinematic MRI and function evaluation of ACL injured patients.
Role:Co Project Leader, Clinical Director

AOSSM/Genzyme Osteoarthritis Grant for Clinical Research Ma (PI) 01/01/2012 - 12/31/2014
AOSSM
ACLinjury, gender and cartilage degeneration
This grant explores the effect of gender on outcome following ACL reconstructive surgeries
Role:PI

Completed Research Support

2001 - 2002

Orthopaedic Research and Education Foundation
Cine Magnetic Resonance Imaging of the ACL-deficient and reconstructed knees
Role:PI

University of California, San Francisco REAC grant
Kinematic Magnetic Resonance Imaging of Cruciate Ligament Injured Knees
Role:PI
Young Investigator Grant
AOSSM
Kinematic Magnetic Resonance Imaging of the Anterior Cruciate Ligament Injured and Reconstructed Knee
Role:PI

Orthopaedic Research Education Foundation Grant
Dynamic Magnetic Resonance Imaging of the Knee - the Effect of Ligament Injury and Reconstruction
Role:PI
Aircast Foundation Research Grant 08/01/2005 - 08/01/2005
Assessment of Cartilage and Subchondral Bone Injuries of the Knee Following ACL Tear with High Field Magnetic Resonance Imaging
Role:Co-investigator, 20% effort
AOSSM Cartilage Workshop Grant
AOSSM 01/01/2007 -
Evaluation of the Treatment of Articular Cartilage Injuries using Quantitative MR Imaging
Role:PI
OREF/ASES/Rockwood Clinical Shoulder 05/01/2011 - 04/30/2012
American Orthopaedic Society for Sports Medicine (OREF)
Impact of Postoperative Management on Patient Outcomes and Healing of Rotator Cuff Repairs
Role:Co-Investigator
Arthrex Inc.
Impact of Postoperative Management on Patient Outcomes and Healing of Rotator Cuff Repairs
Role:Co-Investigator
01/01/2011 - 12/31/2012
Wyeth
A Prospective Study to Evaluate Surgical Outcomes in Subjects with Full-Thickness Rotator Cuff Tears Treated by Means of a Double-Row Arthroscopic
Role:PI
RO1 AG017762 09/15/2007 - 06/30/2012
NIH
Bioengineering Research Partnership: Morphological and Functional Imaging of the Musculoskeletal System
Role:Co-investigator, 5% effort
08/15/2007 - 08/14/2012
Histogenics, Inc.
Neocart versus microfracture Phase II clinical trial: Randomized clinical trial on two cartilage resurfacing procedures
Role:PI
RO1 AR46905-01 08/01/2006 - 08/01/2010
NIH
Cartilage Bone Interactions in Osteoarthritis
Role:Co-investigator, 5% effort
BIOGRAPHICAL SKETCH

NAME
Majumdar, Sharmila

POSITION TITLE
Professor and Vice Chair, Radiology
Director, MQIR

eRA COMMONS USER NAME (credential, e.g., agency login)
SMAJUMDAR

EDUCATION/TRAINING (Begin with baccalaureate or other initial professional education, such as nursing, include postdoctoral training and residency training if applicable.)

<table>
<thead>
<tr>
<th>INSTITUTION AND LOCATION</th>
<th>DEGREE (if applicable)</th>
<th>MM/YY</th>
<th>FIELD OF STUDY</th>
</tr>
</thead>
<tbody>
<tr>
<td>St. Stephens College, University of Delhi, India</td>
<td>B.S.</td>
<td>1983</td>
<td>Physics</td>
</tr>
<tr>
<td>Yale University, Connecticut, USA</td>
<td>M.S.</td>
<td>1984</td>
<td>Eng. &amp; Applied Physics</td>
</tr>
<tr>
<td>Yale University, Connecticut, USA</td>
<td>Ph.D.</td>
<td>1987</td>
<td>Eng. &amp; Applied Physics</td>
</tr>
<tr>
<td>Yale University, Connecticut, USA</td>
<td>Postdoctoral</td>
<td>1988</td>
<td>Radiology</td>
</tr>
</tbody>
</table>

A. Personal Statement
I have worked in the area of Musculo-skeletal Imaging for the past 20 years. My research specifically uses and develops imaging technology such as MRI, µCT, HRpQCt to quantify cartilage morphology, biochemistry, trabecular bone density and structure, to quantify the structure of the invertebral disk and to analyze the complex kinematics of the knee. These projects require 3D image processing, and computation of kinematic models, all of which require high level computational resources. I serve as the Vice Chair of Research and Professor in the Department of Radiology and Biomedical Imaging, and the director of the Musculoskeletal Quantitative Imaging Research group (MQIR); the resources from this proposal will be a benefit to the research programs not just of MQIR but for many of the departmental projects. As such, I am in full support on the proposed PhD program in Rehabilitation Science and look forward to continuing interactions with the faculty and students in the Department of Physical Therapy and Rehabilitation Science.

B. Positions and Honors

Positions and Employment
2001–present Professor, Dept. of Radiology, University of California, San Francisco, CA
2002–2009 Member, Division of Bioengineering, University of California San Francisco, CA
2002–present Professor, Dept. of Bioengineering, University of California, Berkeley, CA
2003–present Director, Musculo-skeletal and Quantitative Imaging Research Group, Dept. of Radiology, University of California, San Francisco, CA
2003–present Member, California Institute for Quantitative Biomedical Research (QB3)
2008–present Vice Chair, Dept. of Radiology, University of California, San Francisco, CA
2009–present Joint Faculty Member, Dept. of Bioengineering and Therapeutic Sciences, University of California, San Francisco, CA

Honors
2002 Celebrating Woman Faculty, Award and Recognition, Chancellor and Deans of UCSF
2004 Fellow of the American Institute of Medical and Biological Engineers (AIMBE)
2008 Fellow of the International Society of Magnetic Resonance in Medicine (ISMRM)

C. Selected Peer-reviewed Publications (Selected from 327)


D. Research Support

Ongoing Research Support

ACL Feasibility Trial (Majumdar) 08/01/2013-06/30/2015
NIH/NIA
A multicenter feasibility trial establishing imaging and biochemical technologies as measures of knee cartilage composition following acute ACL injury
The aim of this project is to establish precise, accurate quantitative measures of T1p and T2 of articular cartilage and meniscus, and to validate morphological characteristics of the joint using 3 Tesla MR imaging, both in phantoms and control subjects, across three nationally recognized sports medicine centers.

P50AR060752 (Majumdar/Lane MPI) 08/01/2011-07/31/2016
NIH/NIAMS
Translation of Quantitative Imaging in Osteoarthritis
The overall objective of this proposal is to integrate cutting edge, quantitative imaging technologies, link the image derived metrics to joint kinematics, kinetics, patient function, and translate the linkages found to the musculoskeletal clinic, thus affecting patient management and outcome. Role: PI

R01AR046905-11A1 (Majumdar) 06/20/2011- 05/31/2016
NIH/NIAMS
Loaded and Unloaded MR Imaging of Meniscus-Cartilage-Trabecular Bone in OA
This study will develop non invasive biomarkers for cartilage and meniscus degeneration in the knee. We will also examine differences in these tissues with loading. This will help individuals who have or are at risk for developing osteo-arthritis. Role: PI

R01 AR060700-01 (Lang/Burghardt) 09/01/2011-07/31/2015
NIH
Bone quality by vQCT and HR-pQCT: translation to multi-center clinical research
The major goal of this project is to develop cross-calibration techniques for bone strength and structure assessments from vQCT and HR-pQCT and to make publically available the analytic software developed by Lang’s group at UCSF. Role: Co-Investigator

MERCK & CO Contract (Majumdar) 06/01/2013-05/31/2014
Non-invasive Assessment of Bone Micro-architecture and Strength Changes in Androgen Deprivation Therapy.
The goal of this project is to study regional changes in trabecular bone, as well as changes in cortical porosity in the context of male osteoporosis, and determine how they affect bone strength and other precursors to other therapeutic trials.

Bell Biosystems Contract (Majumdar) 06/01/2013-05/31/2014
The goal of this project is to determine the longevity of Magnelles in phantom models and performing ex vivo imaging with post-mortem mice to establish optimal anatomical sites for Magnelles labeled cell implantation and imaging.

GE Contract Exhibit A-77 (Majumdar) 11/01/2012-10/31/2013
GE Healthcare
Improved Quantitative and Real Time MR imaging
The goal of this project is to develop new technology for clinical use that tracks real-time changes in tissue metabolism while focusing on developing new magnetic resonance (MR) imaging and spectroscopy techniques that are expected to enable earlier diagnosis and treatment of cancer and other diseases tailored to individual patients. The ultimate goal here is to redefine the detection, diagnosis and treatment timeline of diseases such as prostate cancer. This is a holistic and patient-focused approach where UCSF is providing computational and clinical expertise.

Completed Research Support

R01 AR057336-01 Krug (PI) 09/01/09 – 08/31/13
NIAMS/NIH
In-Vivo Assessment of Trabecular Microstructure at the Proximal Femur
The objective of this project is to conduct unprecedented high-resolution imaging of the human musculoskeletal system through the use and development of multichannel coils and novel acquisition techniques. Role: Co-Investigator

U01AR059507 Link (PI) 07/01/10-06/30/13
NIAMS/NIH
T2 Relaxation Relaxation Time of Knee Cartilage in the OAI Incidence Subcohort
The aim of this project is to study whether T2 relaxation time measurements of the cartilage can be used as a sensitive measure to predict degeneration of the knee joint in individuals from the osteoarthritis incidence cohort with different levels of physical activity. Role: Co-Investigator

5 R01 AR05449602 Recker (PI) 04/01/08 – 03/31/13
A Study of Reduced Bone Quality As A Cause of Fractures
The purpose of this human study is to use biopsy and imaging assessments to characterize defects in bone quality, independent of bone mass, that contribute to low trauma fractures in postmenopausal women. Role: Co-Investigator

RC1 AR058405 Link (PI) 09/30/09 – 08/31/12 NCE
Cortical Bone Porosity Identifies Diabetes Subjects with Fragility Fractures
The major goal of this grant is to study cortical and trabecular bone architecture in diabetes subjects with and without osteoporotic fractures and to compare these findings to those in normal subjects and osteoporotic fracture subjects.

Role: Co-Investigator

F32 AR059478 Blumenkrantz (PI) 04/01/10 – 06/30/12
MRI T2 Relaxation Time as a Predictor of Osteoarthritis
The ultimate goal of this project is to assess the relationship between cartilage biochemical composition, as quantified by novel MRI techniques (specifically T2 mapping), and longitudinal changes in cartilage morphology. Role: Sponsor

R01 AG017762 Majumdar (PI) 09/15/2007 – 06/30/2012
NIH/NIA
Bioengineering Research Partnership: Morphological And Functional Musculo-Skeletal Imaging
In this grant, participants from the University of California, San Francisco (UCSF), University of California, Berkeley (UCB), and industry (General Electric) have renewed a Bioengineering Research Partnership (BRP) focused on the systematic study of the morphology and function of the musculoskeletal system in disease and health. We hypothesize that high field (3 Tesla and 7 Tesla), high resolution, fast MR combined with quantitative tissue assessment would significantly impact the clinical assessment of musculoskeletal degeneration and reparative processes, spanning a range of scales, from the tissue to the whole organ. The long-term vision of this partnership is to understand the link between morphology, function and clinical symptoms, with a specific focus on osteoporosis, osteoarthritis, and degenerative disc disease. Role: PI

Nelson/Vigneron (Co-PIs) 06/01/10 – 05/31/12
UC Discovery Research & Training Grant (DRT)
Novel MR Technology for Monitoring Treatment Effects in Human Disease
The objective is to advance cutting edge non-invasive Magnetic Resonance (MR) imaging technologies that are being developed as part of a collaborative partnership between researchers at UCSF and GEH, to use improved hardware and software capabilities to define the improvements in diagnostic and therapy monitoring capabilities of two key technologies: (1) use of new 7T whole body scanner technology to more clearly visualize small vascular structures, increased iron deposition associated with degeneration of neuronal structures, radiation damage, abnormal metabolism and changes in cartilage thickness. (2) use of hyperpolarized C-13 metabolic imaging, to provide a very rapid readout of changes in biochemical properties associated with abnormal tissue structure and function. Role: Co-Investigator

R01AG029571-01A2 (Lang) 09/01/2008 - 05/31/2012
NIH/NIA
The Proximal Femoral Musculature: A New Risk Factor for Hip Fracture
Understand the role of muscle parameters characterized by CT as predictors of hip fracture and to develop new approaches to quantifying muscle size and density of the hip musculature from CT scans of the hip Role: Co-Investigator

R01 AR046905-09 Majumdar (PI) 04/19/06 – 01/31/12
Cartilage-Bone Interactions In Osteoarthritis
This grant focuses on using magnetic resonance (MR) imaging at 3 Tesla to study joint degeneration and the manifested changes in articular cartilage, subchondral bone, peri-articular trabecular bone and bone marrow. Role: PI
BIOGRAPHICAL SKETCH

Provide the following information for the key personnel and other significant contributors in the order listed on Form Page 2. Follow this format for each person. DO NOT EXCEED FOUR PAGES.

NAME
Maze, Mervyn

POSITION TITLE
Professor and Chair, Department of Anesthesia and Perioperative Care, UCSF

eRA COMMONS USER NAME (credential, e.g., agency login)
Mervyn

EDUCATION/TRAINING (Begin with baccalaureate or other initial professional education, such as nursing, and include postdoctoral training.)

<table>
<thead>
<tr>
<th>INSTITUTION AND LOCATION</th>
<th>DEGREE (if applicable)</th>
<th>YEAR(s)</th>
<th>FIELD OF STUDY</th>
</tr>
</thead>
<tbody>
<tr>
<td>University of Cape Town, South Africa</td>
<td>MB ChB</td>
<td>1965-1970</td>
<td>Medicine</td>
</tr>
<tr>
<td>Groote Schuur Hospital, Cape Town, South Africa</td>
<td></td>
<td>1972</td>
<td>Internship</td>
</tr>
<tr>
<td>Royal Free Hospital, London</td>
<td>Registrar</td>
<td>1973-1976</td>
<td>Medicine</td>
</tr>
<tr>
<td>Stanford University</td>
<td>Postdoc</td>
<td>1976-1979</td>
<td>Medicine</td>
</tr>
<tr>
<td>Stanford University</td>
<td>Resident</td>
<td>1979-1981</td>
<td>Anesthesia</td>
</tr>
</tbody>
</table>

A. Personal Statement

I am an experienced investigator with more than 250 peer-reviewed publications describing my original research that has also spawned the filing of 9 patents, the establishment of one company, the clinical use of two new compounds and the virtual abandonment of another. My recent research is focused on neuroinflammation, macrophage polarization and inflammation resolving mechanisms. My laboratory was the first to uncover a link between peripheral surgery and neuroinflammation. Using probes that disrupt the inflammatory cascade, such as anti-TNF antibody, clodrolip (depletion of peripheral macrophages), and genetically-modified reagents, we have established a causal relationship between surgery-induced neuroinflammation and short-lived cognitive decline. We have identified a role for resolving mechanisms to dampen the postoperative neuroinflammatory response and curtail the cognitive decline that follows and have demonstrated the consequences of disabling the cholinergic anti-inflammatory pathway in the setting of the aseptic trauma of surgery. We are now studying the influence of pre—operative exercise training on the inflammatory response to surgery in reagents with dysregulated inflammation resolving mechanism in the setting of the Metabolic Syndrome.

Regarding postgraduate training, I have supervised 10 PhD students and 22 postdoctoral fellows.

B. Positions and Honors

Positions and Employment

<table>
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<th>Year(s)</th>
<th>Position</th>
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<tbody>
<tr>
<td>1981-1987</td>
<td>Assistant Professor, Department of Anesthesia, Stanford University</td>
</tr>
<tr>
<td>1981-1999</td>
<td>Staff Physician, Veterans Affairs, Palo Alto Health Care System</td>
</tr>
<tr>
<td>1987-1999</td>
<td>Neuroscience Graduate Program, Stanford University</td>
</tr>
<tr>
<td>1995-1997</td>
<td>Director of Research, Department of Anesthesia, Stanford University</td>
</tr>
<tr>
<td>1988-1994</td>
<td>Associate Professor, Department of Anesthesia, Stanford University</td>
</tr>
<tr>
<td>1994-1999</td>
<td>Professor, Department of Anesthesia, Stanford University</td>
</tr>
<tr>
<td>1995-1997</td>
<td>Director of Research, Department of Anesthesia, Stanford University</td>
</tr>
<tr>
<td>1997-1999</td>
<td>Associate Chair for Research, Department of Anesthesia, Stanford University</td>
</tr>
<tr>
<td>1999-Present</td>
<td>Sir Ivan Magill Professor of Anaesthetics, Imperial College</td>
</tr>
<tr>
<td>2000-Present</td>
<td>Head, Department of Anaesthetics and Intensive Care, Imperial College</td>
</tr>
<tr>
<td>2000-2007</td>
<td>Deputy Head, Division of Surgery, Anaesthetics and Intensive Care, Imperial College</td>
</tr>
<tr>
<td>2001-2008</td>
<td>Director, Research and Development, Chelsea and Westminster Hospital, London, UK</td>
</tr>
<tr>
<td>2002-2006</td>
<td>Director, Multi-Disciplinary Education Training and Research, Chelsea and Westminster Hospital, London, UK</td>
</tr>
<tr>
<td>2002-2009</td>
<td>Campus Dean for the Chelsea and Westminster Hospital Site, Imperial College, London</td>
</tr>
<tr>
<td>2007-2009</td>
<td>Head of Division of Surgery, Oncology, Reproductive Biology and Anaesthetics, Imperial College, London</td>
</tr>
</tbody>
</table>
2009-Present  Chair, Department of Anesthesia and Perioperative Care, UCSF

**Other Experience and Professional Memberships**

**Certifications**
1973 (March)  Member of the Royal College of Physicians, UK, (M.R.C.P.)
1982 (April)  Certified by the American Board of Anesthesiology

**University and Hospital**
1981-1990  Resident’s Education Committee, Stanford University
1982-1999  Well-Being of Physicians, Stanford Health Services
1985-1995  Animal Care & Use Committee, Veterans Affairs Hospital
1987-1999  Appointment and Promotions Committee, Stanford University
1992-1999  Medical School Admission Committee, Stanford University
1992-1999  South African Faculty Initiative Committee, Stanford University
1995-1999  Research Committee, Stanford University
1996-1999  Laboratory Safety Committee, Stanford University
2001-2009  Chair, Finance Committee, Faculty of Medicine, Imperial College
2001-2009  HR Committee, Faculty of Medicine, Imperial College
2001-2009  NHS-Imperial College Liaison Group
2002-2009  Principal’s Advisory Group, Imperial College
2009-Present  UCSF SOM Finance Committee
2009-Present  UCSF Space Committee
2009-Present  Faculty Oversight Committee on Operational Excellence
2011-Present  Long Range Development Plan Clinical Facilities Planning Subcommittee

**National**
1988-1992  Scientific Advisory Board, Association of University Anesthesiologists
1988-1992  Associate Editor, Anesthesiology
1995-1998  Councilor, Association of University Anesthesiologists
1995-1999  Associate Editor, Anesthesiology
1999-2008  Editor, Anesthesiology
2008-2009  Chair, Specialty of Anaesthesia, UK CRN

**Honors**
1995  Fellow of Royal College of Physicians
1999  Fellow of Royal College of Anaesthetists
2002  Fellow of Academy of Medical Sciences
2003  Excellence in Research Award from the American Society of Anesthesiologists.
2009  FAER Plenary Lecturer
2010  AUA Plenary Lecturer

**C. Selected peer-reviewed publications** (selected from 259 articles, 30 chapters, 3 books)


D. Research Support

**Ongoing Research Support**

1R01 GM104194-01A1 Maze (PI) 09/01/13-08/31/17
Inflammation resolving mechanism dysregulation in postoperative cognitive decline
Purpose: To test the hypothesis that the abnormalities in inflammation-resolution are the cause for the exaggerated and persistent postoperative cognitive decline in this rat model of the Metabolic Syndrome.
Role: PI

Medical Research Council Experimental Medicine (PI) 2009-2013
Neuroprotective effects of hypothermia combined with inhaled xenon and inhaled Xenon following perinatal asphyxia
Role: Investigator

5R01 HL111111-02 Pandharipande (PI) 08/15/12-06/30/17
Altering sedation paradigms to improve brain injury and survival in severe sepsis
Purpose: To maximize the efficacy of sedation and reduce neurological dysfunction and mortality in septic patients with acute respiratory failure.
Role: Co-Investigator

**Completed Research Support**

MRC Clinical Scientist Training Fellowship Award (PI) 2009-2011
Dexmedetomidine or Midazolam sedation and immune function in the inflamed lung
Role: Co-Principal Investigator
A. Personal Statement
As a pediatric critical care clinical specialist and neuroscientist, my research program focuses on the effects of early brain injury on brain development and plasticity. In addition to a basic laboratory research program, I direct a multicenter clinical research program using advanced magnetic resonance imaging in fetuses and newborns with congenital heart disease. These research programs are fully supported by NIH grants (R01 & P01) and have involved high school students, undergraduates, medical and graduate students, pediatrics residents, clinical and postdoctoral fellows. I serve on departmental, medical school and university Academic Senate committees focused on fostering student research and fellow/faculty development. I am a member of the UCSF Biomedical Sciences and Graduate Education in Medical Sciences Training Programs, serving on thesis committees (3) and teaching (Group leader, Tissue and Organ Biology). I participate in the research training of Pediatric clinical fellows by serving as faculty for three T32 and one K12 training programs. I was a founding member of the Department of Pediatrics Professional Development Committee that created the Fellow’s College and Scholarship Oversight Committees to advise and supervise research by clinical fellows. Within my clinical division, I organize a monthly joint research conference for the divisions Pediatric Critical Care and Neonatology programs. In my own lab, I have directly supervised four undergraduate, six postgraduate, one medical student and two junior faculty over the last four years. These individuals have successfully applied for AHA (2), UCSF Dean’s Office research internships and a Doris Duke Foundation Clinical Research Scholarship. The research has led to ten first author publications by mentees. Four undergraduates mentored have successfully applied for medical school admission. Three have been admitted to graduate studies in neuroscience. Three clinical fellows have obtained academic faculty positions and one has been admitted to fellowship training in neonatology. I look forward to participating as a research mentor in this new Department of Physical Therapy and Rehabilitation Science Ph.D. program in Rehabilitation Science. I am committed to creating an atmosphere that welcomes and inspires trainees to become enthusiastic about science and medicine.

B. Positions and Honors
Principals Positions Held
2008 present University of California San Francisco Associate Professor Pediatrics in Residence
Other Positions Held Concurrently

2008 present University of California San Francisco, Graduate Research Training in Perinatal Biology (T32, Rowitch PI) Faculty

2008 present University of California San Francisco, Research Training in Pediatric Critical Care Medicine (T32, Fineman PI) Faculty

2008 present University of California San Francisco, Training in Developmental Cardiovascular Biology (T32, Srivastava PI) Faculty

2008 present University of California San Francisco, Neurological Scientist Academic Development Program (K12, Fullerton PI) Faculty

2009 present University of California San Francisco, Graduate Education in Medical Sciences (GEMS) Training Program Faculty Advisor

2009 present University of California San Francisco, Graduate Program in Biomedical Sciences (BMS) Faculty Neuroscience

2010 present University of California San Francisco, School of Medicine Pathways to Discovery in Molecular Medicine Faculty

2010 present University of California San Francisco Associate Professor in Residence Neurology

Honors Awards

1990 Howard Hughes Medical Institute Research Scholarship
1995 Pediatric Scientist Development Award
2000 NIH, NICHD Mentored Clinical Scientist Award
2004 NIH, NINDS Independent Scientist Award
2005 Society of Pediatric Research
2006 Outstanding Investigator Children's Hospital of Philadelphia, Cardiology.
2011 American Pediatric Society

Memberships

Service to Professional Organizations

C. Selected Peer-Reviewed Publications


D. Research Support

On-going Research Support

2R01 NS060896
NIH NINDS - Impact score 23, Percentile 10%
Critical Period Plasticity Following Neonatal Brain Injury.
These are studies of activity dependent brain development and repair following early hypoxia ischemia in a rodent model.
Role:PI

1 P01 NS082330
NIH NINDS - Impact score 17, Project 2 Impact score - 12
Repair after neonatal brain injury (Ferriero). Project 2: Repair in high risk newborns with congenital heart disease.
These are clinical studies of brain development, injury and repair in high risk newborns with critical congenital heart disease.
Role:Project 2 PI
Program Director/Principal Investigator: McQuillen

#6-FY2009-303 Miller (PI) 10/01/2009 - 05/30/2015
March of Dimes Birth Defects Foundation
Practice Variation Contributes to Brain Injury in Newborns with Congenital Heart Disease.
This project investigates the contribution of clinical practice pattern differences across two centers and how these differences are associated with perioperative brain injury on MRI.
Role:Site-PI

U01HL09434511A1 Moler (PI) 07/01/2011 - 06/30/2016
NIH NIHLB NICHD
Therapeutic Hypothermia After Pediatric Cardiac Arrest (THAPCA) Trials
This is a multicenter clinical trial to determine if moderate hypothermia improves one year outcome in children following cardiac arrest.
Role:Site

Completed Research Support

2 P50 NS035902-11A1 Ferriero (PI) 09/01/2007 - 01/31/2014
NIH NINDS
Mechanisms of Ischemic Neonatal Brain Injury
The goal of this project is investigate the role of ischemia in the generation of neonatal brain injury. The current projects include Project 1, White matter injury as predictor of outcome in neonatal brain injury (A. James Barkovich, PI), Project 2, The role of VEGF in recovery after ischemic neonatal brain injury (Donna Ferriero, PI), Project 3, Effect of polyphenols on neonatal HI brain injury (David Holtzman, PI). There are two cores: administration Core A and imaging (Scientific, Zena Vexler, PI) Core B.
Role:Project 2 Co-I

5R01NS060896-02 McQuillen (PI) 04/01/2008 - 03/30/2013
NIH NINDS
Critical Period Plasticity Following Early Brain Injury.
The overall goal of this grant is to understand the basic mechanisms behind impaired structural plasticity following early brain injury in a rodent model. Ocular dominance plasticity in the visual system serves as a novel outcome measure and a model for the functional regeneration of neuronal connections following injury.
Role:PI

1R01NS063876-01A2 McQuillen (PI) 09/30/2009 - 08/31/2012
NIH NINDS
White Matter Injury in Critically Ill Newborns With Congenital Heart Disease.
The goal of this study is to use perioperative advanced MR imaging in fetuses and neonates with congenital heart disease to determine if fetal and postnatal delayed brain development is a risk factor for perioperative white matter injury.
Role:PI

6-FY2008 McQuillen (PI) 05/01/2008 - 04/28/2011
March of Dimes Birth Defects Foundation
Role of gap-junction coupling in impaired cortical plasticity following neonatal brain injury.
This project investigates the specific role of gap-junction mediated subplate neuron excitotoxicity as a mechanism of selective subplate neuron vulnerability involved in impaired cortical plasticity following neonatal brain injury.
Role:PI

1 K02 NS047098-01A1 McQuillen (PI) 09/01/2004 - 08/31/2009
NIH NINDS
Selective Subplate Vulnerability and Cortical Plasticity.
The goal of this investigation is to understand the relationship between hypoxic-ischemic subplate neuron death and cortical plasticity, both anatomical and physiologic.
Role:PI
A. Personal Statement

Dr. Miaskowski is highly qualified to serve as a mentor for the doctoral program in physical therapy because of her previous experience mentoring predoctoral students, postdoctoral fellows, and junior faculty members across a variety of health care disciplines. Dr. Miaskowski’s program of research focuses on the identification of phenotypic and genotypic markers that place patients at highest risk for the development of the most deleterious symptoms that occur as a result of cancer and its treatment. Currently, she has three federally funded R01 grants that span the spectrum of descriptive correlational research to randomized clinical trials of pharmacologic and behavioral interventions to decrease cancer pain.

During the past 22 years, Dr. Miaskowski has served as the dissertation chair for 24 doctoral students, served on an additional 29 dissertation committees, has mentored 10 postdoctoral fellows, and served as the primary mentor for 16 junior faculty members. In her role as Department Chair from 1994 to 2004, Dr. Miaskowski mentored 20 faculty members to receive NIH funding. Dr. Miaskowski has published 207 peer reviewed papers with her trainees and has facilitated their obtaining extramural funding and faculty positions. In 2008, she received the Teaching Award for Excellence in Research Mentoring. She will provide trainees with research space, methodological and statistical training with members of her research team, and access to data from five federally funded R01 studies.

B. Positions and Honors

Positions and Employment

1979-81 Staff Development Instructor, Hospital of Albert Einstein College of Medicine, Bronx, NY
1981-85 Clinical Nurse Specialist in Oncology and Critical Care and Nurse Coordinator of the Pain Evaluation Group, Hospital of Albert Einstein College of Medicine, Bronx, NY
1985-88 Assistant Professor and Coordinator of the Oncology Master’s Program, School of Nursing, Department of Continuing Education, Adelphi University, Garden City, NY
1986-88 Coordinator of Clinical Practice and Quality Assurance, Hospital of Albert Einstein College of Medicine, Bronx, NY
1988-90 Robert Wood Johnson Clinical Nurse Scholar, Department of Physiological Nursing, University of California, San Francisco, CA
1990-96 Associate Professor, Department of Physiological Nursing, University of California, San Francisco, CA
1996-now Professor, Department of Physiological Nursing, University of California, San Francisco, San Francisco, CA
**Other Experiences and Professional Memberships**

1996-2000 Councilor (elected), International Association for the Study of Pain

2002-2003 President, American Pain Society

2002-now Co-Program Leader in Symptom Management, Palliative Care, and Survivorship, UCSF Comprehensive Cancer Center

2005 Chair of the Nursing Study Section, Center for Scientific Review, National Institutes of Health

**Honors**

2000 Distinguished Nurse Researcher, Oncology Nursing Society

2000 Helen Nahm Research Lecturer, School of Nursing, University of California, San Francisco

2000 Wilbert Fordyce Clinical Investigator Award, American Pain Society

2002 Distinguished Merit Award from the International Society of Nurses in Cancer Care

2005 Distinguished Service Award, American Pain Society

2006 Distinguished Researcher Award, Western Institute of Nursing Research

2008 Sharon A. Lamb Endowed Chair in Symptom Management Research

2010 American Cancer Society Clinical Research Professorship

**C. Selected peer-reviewed publications (in chronological order).** (Selected from 400 peer-reviewed publications)


**Ongoing Research Support**

**K05CA168960 (Miaskowski) 07/01/2013-06/30/2018**
NIH/NCI
Advancing the Science of Symptom Management in Oncology Patients
An evaluation of similarities and differences in the trajectories of five common symptoms that occur as a result of cancer and/or its treatments (i.e., pain, fatigue, sleep disturbance, depression, anxiety).
Role – PI

**R01DA034625 (Knight) 06/01/2013-04/30/2017**
NIH/NIDA
Pain Management in Clinic & Community
The proposed project is a qualitative study that will examine the factors that impact primary care providers’ and patients’ pain management practices in clinical settings and patients’ home communities. This study will target patients with a history of substance use (past or current) who access healthcare in low income, safety net clinic settings and their primary care providers. Study results will improve our understanding of the individual, interactive, and socio-cultural dimensions of chronic non-cancer pain management to inform future research and clinical practice.
Role – Co-Investigator

**R01 CA 134900 (Miaskowski, Multiple PI) 2009-2014**
NIH/NCI
Symptom Clusters in Oncology Patients Receiving Chemotherapy
This study will address two important aspects of symptom cluster research, namely 1) the identification of symptom clusters in oncology outpatients who are receiving chemotherapy and 2) the identification of subgroups of oncology outpatients based on their experience with four highly prevalent symptoms (i.e., pain, fatigue, sleep disturbance, and depression). Based on our previous research, we anticipate that two subgroups of patients will be identified (i.e., patients who experience high levels of all 4 symptoms (approximately 10% of the sample) and patients who experience low levels of all 4 symptoms (approximately 43.0% of the sample). A two-stage genome wide association study will be done with the DNA from these two subgroups to identify genomic markers for these two distinct groups of patients.
Role – Multiple PI

**R01 CA151692 Miaskowski (PI) 09/09/2011-8/31/2016**
NIH/NCI
Characterization of and Treatment for Chemotherapy Neuropathy
This study will be conducted in two parts. In Part 1, using a sample of patients with (n=400) and without (n=200) CIN who have completed CTX, differences in phenotypic (i.e., sensory characteristics, motor characteristics, mood, concurrent symptoms, balance, quality of life) and genotypic characteristics (i.e., candidate gene studies) will be evaluated. In Part 2, based on recent work from our group that demonstrated the efficacy of photon stimulation in improving sensation and quality of life in patients with painful diabetic peripheral neuropathy, we will conduct a pilot study to determine effect sizes for the effects of photon stimulation compared to placebo in improving light touch sensation, pain intensity, and pain qualities in oncology patients with CIN who have completed CTX. In addition, we will determine the feasibility of the treatment protocol and the safety of photon stimulation in patients with CIN.
Program Director/Principal Investigator (Last, First, Middle):

(Schumacher) 06/05/12-10/14/14
Altarum Institute (NIH subcontract)

Interprofessional development of pain education competencies
To establish a detailed roadmap of pain curriculum for each of the four UCSF professional schools (Medicine, Pharmacy, Nursing, Dentistry) followed by a coordinated effort to build on and integrate case-based pain content into existing curriculum and competency-based assessments.
Role: Co-I

Completed Research Support

R01 DA 022550 (Kushel) 09/30/07-04/30/2010
NIH/NIDA
Pain and Misuse of Prescription Opioids in a Community-Based HIV-Infected Cohort
The specific aims of this study, in a community-based sample of persons infected with HIV are to: determine the prevalence, characteristics and variability of pain in those who do and do not have a history of substance abuse; to determine whether control of pain is predicted by the site of pain treatment and the use of pain contracts; and determine predictors of aberrant opioid analgesic behaviors.
Role - Co-Investigator

5 R21 NR010600 (Miaskowski) 09/14/07-05/31/10
NIH/NINR
Symptom Clusters in Pediatric Oncology Patients
The specific aims of this project are to (1) identify the prevalence, severity, frequency, and distress of single symptoms that occur acutely, (2) identify the number and types of symptom clusters that occur acutely, (3) determine if the number and types of symptom clusters change over the course of one cycle of CTX, and (4) determine, at each time point, the association between the numbers of symptoms and symptom cluster “scores” identified in the analyses for Aims 1 and 2 with children’s reported QOL scores.
Role: PI

5 R01 CA107091 Miaskowski (PI) 09/01/03-06/30/09
NIH/NCI
Symptom Management After Breast Cancer Surgery
The major goals of this project are to evaluate the prevalence, severity, and timing of the occurrence of breast symptoms following breast cancer surgery and to determine the factors that predict the development of breast symptoms.
Role: PI

5 R01 CA118658 Miaskowski (PI) 9/01/06-07/31/11
NIH/NCI
Long-Term Arm Morbidity Following Breast Cancer Treatment
The specific aims of this study is to determine the prevalence, severity, and the timing of the lymphedema (LE); determine the prevalence and timing of occurrences of changes in shoulder mobility and changes in grip strength associated with LE; compare differences in anxiety, depressed mood, fatigue, sleep disturbance, functional status, and quality of life (QOL) in women who do and do not develop LE; and determine the factors that predict the development of LE. A secondary aim of this study is to begin to elucidate genetic markers for neuropathic pain and LE following breast cancer surgery.
Role: PI
A. Personal Statement

My training and experience as an integrative neuroscientist and biomedical engineer enables me to contribute in many ways to this grant proposal. Specifically, my research interests include study of brain plasticity since my postdoctoral fellowship in the laboratory of Dr. Michael Merzenich. Moreover, for the past several years I have been involved in the continued development and improvement of multimodal brain imaging methods such as fMRI, diffusion MRI, magnetoencephalography (MEG) and electroencephalography (EEG). I have been the Director of the Biomagnetic Imaging Laboratory at UCSF since 2002. For the past 4 years, I am also the Co-Director of the Brain Research Interest Group within the Department of Radiology and Biomedical Imaging, which spearheads and facilitates functional brain imaging projects within our department and collaborators.

I have extramural funding for my research from NIH, NSF and several private foundations. I have served as a mentor for several undergraduate students, graduate students, medical students, residents, clinical fellows and postdoctoral fellows. I currently hold membership in the joint UCSF/UCB Graduate Program in Bioengineering, and I serve on the program’s Executive Committee. I have mentored several graduate students in the Department of Physical Therapy (both DPT and DPTSci), and I look forward to mentoring many more students through my continued participation in this Ph.D. program.

B. Positions

1995-1998  Post-doctoral fellow, Keck Center for Integrative Neuroscience, UCSF
1998-1999  Research Scientist, Scientific Learning Corporation, Berkeley, California
1999-2000  Adj. Assistant Prof., Department of Otolaryngology, University of California, San Francisco
2000-2002  Assistant Professor, Dept. of Bioengineering, Radiology & Neuroscience, University of Utah
2000-2002  Director, Functional Brain Imaging Laboratory, University of Utah, Salt Lake City
2002-2004  Assistant Professor, Department of Radiology, UCSF
2002-present  Director, Biomagnetic Imaging Laboratory, UCSF
2004-2008  Associate Professor, Department of Radiology and Biomedical Imaging, UCSF
2008-present  Professor, Department of Radiology, UCSF

Study Section and Public Advisory Committee Memberships

2002,3,8,10  Member of NSF Panel on Cognitive Neuroscience
2004  Ad-Hoc Member of Special Emphasis Panels: NLM, mBIRN, IFCN
2005  Ad-Hoc Member of Study Section ZRG1 MDCN-K
2005  Ad-Hoc Member of VA Study Section
2006  Ad-Hoc Member of NIH Study Section BMIT
2007-8  Reviewer for AAAS – LSD Program
2007  Reviewer for Tinnitus Study Section (ZDC1 SRB-R)
2008-12  Member of Study Section COG/SPC
2009  Adhoc Member of Study Section ZRG-ETTN-C53
Honors/Awards
1991,93 Student Paper Finalist, IEEE-EMBS Conference
2007 Senior Member, IEEE
2009 Associate Editor for Frontiers in Human Neuroscience, Brain Imaging Methods
2010-present Editorial Board Member for Neuroimage
2011 Editors Choice award for Neuroimage Methods paper
2013 Distinguished Investigator of American Academy of Radiology Research

C. Selected Peer Reviewed Publications (from >100 published full-length papers)
D. Research Support (current)

R21 NS76171 09/1/12-08/14
**Fusion of Electromagnetic Brain Imaging and fMRI**
Role: Principal Investigator 2 calendar months
Direct costs: 150K for Year 1, 125K for Year 2
The goal of this application is to develop new algorithms for fusing of fMRI and MEG data.

BCS 1262297 07/01/2013 - 06/30/2016
**Function of Auditory Feedback Processing During Speech**
NSF Cognitive Neuroscience Program
Role: PI
The goals of this grant are to examine feature and category specificity in auditory cortical representations during speaking. There is no overlap with experiments in this NSF proposal and the current grant.

R01 DC010145 (PI: Houde) 07/01/2010-6/30/15
**Neuroimaging of speech motor control**
NIH/NIDCD $250,000/yr direct costs
Role: Co-Investigator 3 calendar months
The goal of this grant is to develop and test a new model of speech motor control using MEG and ECoG. Although this grant is in the same research topic, no experiment proposed in this grant overlaps with those proposed in the current application.

R01 NS067962-01 12/1/2009-11/30/2014
**Multimodal Connectivity for Surgical Mapping**
NIH/NINDS $215,000/yr
Role: Co-investigator (PI: Roland Henry) 1 calendar month
The goals of this grant are to improve preoperative delineation of cortical and white matter regions that are vital to motor function, and to use functional and structural connectivity to predict those cortical and subserving white matter pathways at risk for postoperative clinical deficits.

Simons Foundation (PI: Sherr) 08/01/10-07/31/13
**Simons Variation in Individuals Project**
The project will intensively study hundreds of patients and their families with 16p11.2 deletions and duplications. Patients will come to UCSF for comprehensive imaging and psychometric investigation.
Role: Co-Investigator

DOD/CDMRP 07/01/2013 - 06/30/2015
**Tinnitus Multimodal Imaging**
Role: Co-Investigator (PI: Dr. Steven Cheung)
The goals of this project are to examine multimodal imaging data in patients with tinnitus.

Completed

R01 DC006435 12/01/2004-11/30/12
**Neural mechanisms of auditory feedback during speaking**
NIH/NIDCD $250,000/yr direct costs
Role: PI
The goal of this grant was to develop and test a novel state-feedback network control model on processing of feedback during speech.

R01DC004855 6/1/2001-5/31/2013
**Cortical Spatiotemporal Plasticity in humans**
NIH/NIDCD $215,000/yr direct cost
Role: PI
The goals of this grant were to use MEG based imaging to document cortical plasticity associated with auditory perceptual learning.

NSF BCS0926196 10/1/2009-4/30/2013
Using Neuroimaging to test models of speech motor control
NSF Cognitive Neuroscience Program $150,000/yr direct costs
Role: Co-PI (PI: Dr. John Houde)

The goals of this research were to conduct speech feedback perturbation experiments using MEG and ECoG to test models of speech motor control. This grant was focused on pitch perturbation studies.
BIOGRAPHICAL SKETCH

Provide the following information for the Senior/key personnel and other significant contributors in the order listed on Form Page 2.
Follow this format for each person. **DO NOT EXCEED FOUR PAGES.**

<table>
<thead>
<tr>
<th>NAME</th>
<th>POSITION TITLE</th>
</tr>
</thead>
<tbody>
<tr>
<td>LINDA J NOBLE, Ph.D.</td>
<td>PROFESSOR</td>
</tr>
</tbody>
</table>

**eRA COMMONS USER NAME (credential, e.g., agency login)**

Inoble

**EDUCATION/TRAINING** *(Begin with baccalaureate or other initial professional education, such as nursing, include postdoctoral training and residency training if applicable.)*

<table>
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<tr>
<th>INSTITUTION AND LOCATION</th>
<th>DEGREE (if applicable)</th>
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<th>FIELD OF STUDY</th>
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<td>University of Nevada, Reno, Nevada</td>
<td>B.S.</td>
<td>06/75</td>
<td>Prephysical Therapy</td>
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<tr>
<td>University of Utah, Salt Lake City, Utah</td>
<td>B.S.</td>
<td>06/75</td>
<td>Physical Therapy</td>
</tr>
<tr>
<td>University of California, Los Angeles, California</td>
<td>Ph.D.</td>
<td>05/82</td>
<td>Anatomy</td>
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A. Personal Statement

I have studied brain and spinal cord injury for well over 2 decades with funding provided by NINDS, private foundations and the Department of Defense. This research has supported medical students, graduate students and postdoctoral fellows. I currently hold memberships in the Neuroscience Graduate Program and the Biomedical Graduate Program where I have participated in journal club presentations, oral examinations, and rotations of graduate students through my laboratory. In addition, I direct research for all graduate students in the Department of Physical Therapy and Rehabilitation Science and serve as a research mentor for on average 6 of these graduate students annually. I am co-director of the Neurobehavioral Core, which provides the necessary infrastructure to conduct a wide range of behavioral assays in mice. An objective of this Core is to educate about behavioral paradigms and as such, I oversee a “boot camp” class for the incoming neuroscience graduate students. The Core also provides small group tutorials that attract the remainder of the research community including graduate and postdoctoral students and faculty. Finally, I initiated a new mini course this past fall on Brain Injury that was open to graduate students, postdoctoral fellows, residents, and technicians. Representatives from each of these groups attended this 2-week course that offered an intensive overview of brain injury from the perspective of pathobiology to preclinical design to successful translation to the clinic.

B. Positions and Honors

**Positions and Employment**

1975-1976  Physical Therapist, Cedars-Sinai Medical Center, Los Angeles
1977-1978  Physical Therapist, University of California, Los Angeles
1977-1982  Predoctoral Fellow, Department of Anatomy, University of California, Los Angeles
1982-1983  Instructor, Department of Anatomy, University of Maryland, Baltimore
1983-1985  Research Associate, Department of Anatomy, Georgetown University, Washington, D.C.
1985-1990  Assistant Research Neuroanatomist, Department of Neurology, UCSF
1990-1993  Assistant Professor, Department of Neurosurgery, UCSF
1994-1999  Associate Professor, Department of Neurosurgery, UCSF
2000-2003  Professor and Vice Chair, Department of Neurosurgery, UCSF
2003-2007  Professor and Alvera Kan Endowed Chair, Department of Neurosurgery, UCSF

**Other Experience and Professional Memberships**

1980- Member, Society for Neuroscience
1980- Member, National Neurotrauma Society
1993-1997 Member NINDS Neurology B1 Study Section
1996-1997 Chair NINDS Neurology B1 Study Section
1998-2007 Ad hoc reviewer, NINDS
2007-2008 Member, Committee on Gulf War and Health: Brain Injury in Veterans and Long-Term Health Outcomes, Institute of Medicine of the National Academies

2010-11 Member, Committee on Nutrition, Trauma, and the Brain, Institute of Medicine of the National Academies

2009 NINDS, NSDA study section

2010 Chair, NINDS, NSDA study section

2012-13 Member, Committee on Gulf War and Health: Long-term effects of blast exposures, Institute of Medicine of the National Academies

Peer-reviewed Publications


D. Research Support

ONGOING SUPPORT

R01 NS050159 (PI)  03/31/2011 - 03/31/2014

NIH/NINDS

Trauma To Developing Brain-Injury And Repair Mechanisms
This grant explores the biologic basis for the unique vulnerability of the
developing brain to traumatic brain injury.
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<th>Grant ID/Description</th>
<th>Start Date - End Date</th>
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<td><strong>DOD</strong> Matrix metalloproteinases as a therapeutic target to improve neurologic recovery after spinal cord injury</td>
<td>09/01/2011 - 06/30/2014</td>
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<td><strong>NIH/NINDS</strong> Determinants of vulnerability and recovery after trauma to the developing brain</td>
<td>07/01/2011 - 06/30/2013</td>
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<td><strong>DOD</strong> Targeting L-selectin to improve neurologic and urologic function after spinal cord injury</td>
<td>09/30/2012 - 09/29/2015</td>
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<td><strong>CIRM</strong> Human ES cell-derived MGE inhibitory interneuron transplantation for spinal cord injury</td>
<td>12/01/2012 - 11/30/2015</td>
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<td><strong>NIH/NINDS</strong> Matrix metalloproteinases and spinal cord injury</td>
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**COMPLETED RESEARCH**

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<td>05/08/2009 - 07/31/2012</td>
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<tr>
<td><strong>NIH/NINDS</strong> Spinal cord injury: Targeting local inhibition to improve outcome</td>
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</tr>
<tr>
<td><strong>R01 NS039728 (PI)</strong></td>
<td>07/27/2009 - 06/30/2012</td>
</tr>
<tr>
<td><strong>NIH/NINDS</strong> Matrix metalloproteinases and spinal cord injury</td>
<td></td>
</tr>
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</table>
Trauma to developing brain: Model refinement and therapeutic intervention
BIOGRAPHICAL SKETCH
Provide the following information for the key personnel and other significant contributors. Follow this format for each person. DO NOT EXCEED FOUR PAGES.

NAME
Sandra Radtka, PT, PhD

POSITION TITLE
Professor, San Francisco State University (SFSU), Department of Physical Therapy; Clinical Professor, UCSF, Department of Physical Therapy & Rehabilitation Sciences

eRA COMMONS USER NAME

EDUCATION/TRAINING (Begin with baccalaureate or other initial professional education, such as nursing, and include postdoctoral training.)

<table>
<thead>
<tr>
<th>INSTITUTION AND LOCATION</th>
<th>DEGREE (if applicable)</th>
<th>YEAR(s)</th>
<th>FIELD OF STUDY</th>
</tr>
</thead>
<tbody>
<tr>
<td>University of Michigan, Ann Arbor, MI</td>
<td>BS</td>
<td>1974</td>
<td>Physical Therapy</td>
</tr>
<tr>
<td>University of North Carolina, Chapel Hill, NC</td>
<td>MA</td>
<td>1977</td>
<td>Physical Therapy (Pediatrics &amp; Clinical Education)</td>
</tr>
<tr>
<td>University of California, Berkeley, CA</td>
<td>PhD</td>
<td>1985</td>
<td>Higher Education</td>
</tr>
<tr>
<td>Shriner's Hospital for Children, Orthopedic Biomechanics Lab, San Francisco, CA</td>
<td>Post-doctoral training</td>
<td>1991-1993</td>
<td>Research Fellow</td>
</tr>
</tbody>
</table>

A. Personal Statement

Dr. Radtka is Professor in the joint UCSF/SFSU Graduate Program in Physical Therapy where she currently teaches PT management of children with neurologic disorders and human growth and development across the lifespan. She previously taught PT management of adults with neurologic disorders. She is the Director of SFSU's PT Movement Research Laboratory where she conducts biomechanics research using motion analysis, force plates, and electromyography. Her biomechanics research has examined the: 1. kinetics, kinematics and muscle activity during gait with and without lower extremity orthotics in cerebral palsy; 2. effects of neurodevelopment treatment interventions on sitting balance in cerebral palsy; and 3. kinetics and kinematics during sitting balance in healthy children and adults, children with cerebral palsy and hemiplegia from stroke and traumatic brain injury. These research studies have been supported by funding from the Eva Benson Buck Trust. She has also served as a consultant for a NIH funded grant examining the effects of balanced-based torso-weighting in multiple sclerosis in this lab and for a NIH funded grant on a computer-based video game therapy for gait and balance in cerebral palsy.

B. Positions and Employment (Academic)

1979-1981 Instructor, School of Physical Therapy, Texas Woman's University, Denton, Texas
1984 Lecturer, Graduate Program in Physical Therapy, Stanford University, Palo Alto, California
1986-1993 Assistant Clinical Professor, Graduate Program in Physical Therapy, University of California at San Francisco
1993-1999 Associate Clinical Professor, Graduate Program in Physical Therapy, University of California at San Francisco
1999-2005 Associate Professor, Graduate Program in Physical Therapy, San Francisco State University
1999-2006 Associate Clinical Professor (without salary), Dept. of Physical Therapy and Rehabilitation Sciences, University of California at San Francisco
2007-2014 Clinical Professor (without salary), Dept. of Physical Therapy and Rehabilitation Sciences, University of California at San Francisco
2006-2014 Professor, Graduate Program in Physical Therapy, San Francisco State University
Other Experiences and Professional Memberships

1973-2014  Member, American Physical Therapy Association
1992-2014  Fellow, American Academy for Cerebral Palsy and Developmental Medicine
1997-2014  Member, North American Society of Gait and Clinical Movement Analysis

Honors

1983  Physical Therapy Foundation Graduate Award
1991  Shriner's Research Fellowship Award
1997  Faculty Publication Award, California Chapter, American Physical Therapy Association
2004  Presidential Award for Professional Development, San Francisco State University

C. Peer-reviewed Publications


D. Research Support

1. Shriner's Research Fellowship Grant for two projects. 1. Effects of Solid Versus Inhibitive Ankle-Foot Orthoses on Ambulation in Children with Spastic Cerebral Palsy; 2. Effects of Neurodevelopmental Therapy on Sitting and Kneeling Equilibrium Reactions in Children with Spastic Cerebral Palsy June 1991 to June 1993, Principal Investigator
3. Eva Benson Buck Trust. Motion Analysis and Electromyography Equipment for Physical Therapy Pathokinesiology Lab at San Francisco State University. December 1997 to December 1998, Co-Investigator with Marsha Melnick
4. Research and Professional Development Mini-Grant, San Francisco State University. The Effects of Solid, Hinged, and No Ankle Foot Orthoses on Stair Climbing in Children with Spastic Hemiplegic Cerebral Palsy, August 1999 to May 2000, Principal Investigator
5. Research and Professional Development Mini-Grant, San Francisco State University. The Effects of Solid, Hinged, and No Ankle Foot Orthoses on Lower Extremity Muscle Activity During Stair Climbing in Normal Adults, August 2000 to May 2001, Principal Investigator
6. Research and Professional Development Mini-Grant, San Francisco State University. Effectiveness of the Neuro-developmental Treatment Approach in Improving Gait and Sitting Balance in Children with Cerebral
Palsy. August 2001 to May 2002, Principal Investigator
8. Presidential Award for Professional Development of Probationary Faculty, San Francisco State University. Physical Therapy Treatment for Children with Spastic Cerebral Palsy, August 2004 to May 2005, Principal Investigator
9. Consultant for NIH Grant #1R41HD061155-01. Principal Investigator(s): Glenna Dowling, RN, PhD, UCSF School of Nursing and Robert Hone, Red Hill Studios. Project Title: Computer-based Video Game Therapy for Gait and Balance in Cerebral Palsy, 2009-2010
10. Consultant for NIH Grant #1R15HD066397-01. Principal Investigator(s): Diane Allen, PT, PhD, Gail Widener, PT, PhD, San Francisco State University/Samuel Merritt University. Project Title: Changes in Movement Ability Changes with Balance Based Torso Weighting in Patients with Multiple Sclerosis, 2010-2013
SPH 398/2590 (Rev. 06/09) Page 1

BIOGRAPHICAL SKETCH

Provide the following information for the Senior/key personnel and other significant contributors in the order listed on Form Page 2.
Follow this format for each person. DO NOT EXCEED FOUR PAGES.

NAME
Susanna Rosi

POSITION TITLE
Associate Professor
Director of Neurocognitive Research, Brain and Spinal Injury Center, BASIC

eRA COMMONS USER NAME (credential, e.g., agency login)
SusRosi

EDUCATION/TRAINING (Begin with baccalaureate or other initial professional education, such as nursing, include postdoctoral training and residency training if applicable.)

<table>
<thead>
<tr>
<th>INSTITUTION AND LOCATION</th>
<th>DEGREE (if applicable)</th>
<th>MM/YY</th>
<th>FIELD OF STUDY</th>
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<tbody>
<tr>
<td>University of Florence, Italy</td>
<td>B.S.</td>
<td>06/1995</td>
<td>Science</td>
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<tr>
<td>University of Florence, Italy</td>
<td>Ph.D.</td>
<td>06/2000</td>
<td>Biological Sciences</td>
</tr>
<tr>
<td>University of Florence, Italy</td>
<td>Postdoctoral</td>
<td>2000-2001</td>
<td>Pharmacology</td>
</tr>
<tr>
<td>University of Arizona, Tucson, Arizona</td>
<td>Postdoctoral</td>
<td>2002-2006</td>
<td>Psychology</td>
</tr>
</tbody>
</table>

B. Personal Statement

One of the great honors and pleasures of being a faculty member at a research university is the opportunity to work with graduate students pursuing doctoral degree. I can think of nothing that keeps a researcher more intellectually active that having eager, interested graduate students with which to interact. It has therefore been my extremely good fortune to be part of the graduate program in Neuroscience and Biomedical Science and have had the opportunity to teach, mentor and supervise a number of students. I regularly participated in journal club presentations, oral examinations, and rotations of graduate students through my laboratory. I currently have a Neuroscience graduate student in thesis in my laboratory. I am the director and instructor of the Neuroscience course for the Doctor in Physical Therapy Students. I am also the director and instructor of a minicourse on Neuroinflammation for Neuroscience and BMS graduate students. My goal as mentor and PI in my lab is to prepare graduate students and postdoctoral to be an independent researcher.

My research is focused on analyzing in detail how the innate immune system affects information processing and cognition from a cellular and network prospective. Currently in my laboratory in the Brain and Spinal Injury Center (BASIC) at UCSF I use different animal models of brain injury to study the molecular mechanism of altered neuronal function that lead to impaired cognition. My long term goal is to identify diagnostic tools for treatment of cognitive dysfunctions associated with brain injury. As director of Neurocognitive research at BASIC I develop and oversee behavioral tests for animals that are comparable to the cognitive tests used in the clinic. I have a demonstrated record of successful and productive research projects in an area of high relevance for chronic inflammatory disease and plasticity. My achievements have also been recognized by an accelerated promotion to Associate Professor and promotion to Director of Neurocognitive Research at the Brain and Spinal Injury Center.

B. Positions and Honors

Positions and Employment

2000-2001 Postdoctoral Fellow, University of Florence, Italy
2002-2006 Postdoctoral Research Associate, University of Arizona, Tucson, AZ
2006-2011 Assistant Professor, Departments of Physical Therapy Rehabilitation Science and Neurological Surgery, University of California, San Francisco, San Francisco, CA
2011-present Associate Professor (1 year Accelerated), Departments of Physical Therapy Rehabilitation Science and Neurological Surgery, University of California, San Francisco, San Francisco. 
2011-present Director of Neurocognitive Research, Brain and Spinal Injury Center, University of California, San Francisco, San Francisco, CA

Honors and Awards:

1996-2000 Graduate Fellowship, University of Florence, Italy
2000 Graduated with Distinction, University of Florence, Italy
2001 Postdoctoral Fellowship Award, Department of Pharmacology, University of Florence, Italy
2004 Travel Award, Winter Conference on Brain Research
2006 Special Award for Research and Career, “Vel l’Etrusco”, Castiglion Fiorentino, Arezzo, Italy
2007 UCSF, Academic Senate Committee on Research - Individual Investigator Award: seed funding
2007 UCSF, Research Evaluation and Allocation Committee Award: seed funding
2007 Tuscany Special Award “Young Talents and Magnificent Excellences”, Arezzo, Italy
2008 New Investigator Research Grant, Alzheimer’s Association
2012 UCSF, Department of Radiology and Biomedical Imaging, Seed Grant

Other Experience and Professional Memberships:
2008-present Grant reviewer, Alzheimer’s Association, International Research Grant Program
2008-present Grant reviewer, Canada Foundation for Innovation
2008-present Grant reviewer, Ontario Mental Health Foundation
2011-present Grant reviewer, American Federation for Aging Research’s National Scientific Advisory Council
2011-present Grant reviewer, National Science Center, Poland
2011-present Board of Directors, Winter Conference on Brain Research
2011-present Program Committee, Winter Conference on Brain Research
2012-present Fellowship Committee Chair, Winter Conference on Brain Research
2014-present Ad hoc study section member, NIH NDPR Neural Differentiation, Plasticity, and Regeneration


C. Peer-review publications
10. Rosi S, Pert CB, McGann-Gramling and Wenk GL. CCR5 Chemokine Receptor Antagonist regulates microglia and astrocytes activation within the hippocampus in a neuroinflammatory rat model of Alzheimer's


29. Belarbi K, Jopson T, Arellano C, Rosi S. CCR2 deficiency prevents neuronal dysfunction and cognitive


38. Acharya MM#, **Rosi S**#, Jopson T, Limoli C. Human neural stem cell transplantation provides long-term restoration of neuronal plasticity in the irradiated hippocampus. Stem Cells, under review#equal first author contribution


D. Research Support

Ongoing Research Support

NIH/R01 CA133216-01  Rosi (PI)  06/1/09-05/30/14

Brain irradiation affects neuronal function

The goal of this study is to use immediate-early gene imaging and neuroinflammation markers to assess the effects of brain irradiation on neuronal functioning with the long term goal of identifying how the evolution of radiation-induced neuronal deficits.

NIH/R21 R21AG042016-01A1  Rosi (PI)  06/01/13-05/31/15

Effects of traumatic brain injury on hippocampal network activity: age difference

The proposed studies are aimed to test the long term effect of traumatic brain injury on hippocampal network stability in young and old animals.
The Role of Oxidative Stress and Inflammation on Synaptic Functions After Exposure to Space Radiation

The relation between cognitive injury, network stability, and epigenetic change following exposure to space radiation.
The proposed studies will test the effect of space radiation on hippocampal networks stability.

Charged particle radiation and resultant oxidative stress elicit deleterious functional changes in the Central Nervous System.
The goal of this proposal is to study the consequences of charged particle radiation on the central nervous system using in vitro and in vivo models and different markers or oxidative stress.

Rescuing radiation-induced cognitive deficits through cranial transplantation of stem cells.
The goal of this proposal is to investigate the translational potential and mechanistic basis underlying the capability of intrahippocampal transplantation of human neural stem cells to restore cognition.

The goal of this proposal is to optimize dose and timing of single and combination therapies to maximize six week recovery after unilateral cervical spinal cord injury.

The goal of this proposal is to characterize in vivo the regional distribution of inflammation after TBI and validate the use of $^{19}$F MRI as a possible biomarker for predicting cognitive dysfunction and sub-regional changes after TBI in rats.

Completed Research Support

Altered neuronal-microglia communication impacts neuronal functions
Role: PI

Neuroinflammation and neuronal networks activation involved in learning and memory
Role: PI

Mapping neural-circuits associated with learning and memory during chronic neuroinflammation
Role: PI

Radiation and oxidative stress: effects on neurogenesis
Role: Co-PI
Role: Co-I

NIH/R21/R33 AI080531 (Co-I) 7/01/08 – 6/30/13
Combined Effects of Traumatic Brain Injury and Ionizing Irradiation on Cellular and Molecular Determinates of Cognitive Functions.
Role: Co-I

NASA/NN X08BA07G (Co-I) 10/1/08-06/30/13
Use of a molecular marker of learning and memory to assess effects of 56Fe irradiation on hippocampus dependent cognition and neurogenesis
Role: Co-I
BIOGRAPHICAL SKETCH

NAME
Schumacher, Mark A.

POSITION TITLE
Professor

eRA COMMONS USER NAME (credential, e.g., agency login)
Schumacm

EDUCATION/TRAINING
(Begin with baccalaureate or other initial professional education, such as nursing, include postdoctoral training and residency training if applicable.)

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<td>04/87</td>
<td>Physiology-Pharmacology</td>
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<td>Cedars-Sinai Medical Center, Los Angeles</td>
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<td>06/91</td>
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<td>University of California, San Francisco</td>
<td>Residency</td>
<td>06/94</td>
<td>Anesthesia</td>
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<td>Post-Doc (D. Julius, J. Levine)</td>
<td>UCSF</td>
<td>06/95</td>
<td>Pain Research</td>
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<tr>
<td>Imperial College London, UK</td>
<td>Sabbatical</td>
<td>07/04</td>
<td>Biophysics</td>
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A. Personal Statement

I am a clinician-scientist within the Department of Anesthesia and Perioperative Care, UCSF. In addition to serving as Chief of the Division of Pain Medicine, I serve a broad educational role in the clinical and scientific training domains. This includes being the project manager of the UCSF, NIH Center of Excellence in Pain Education, a member of the Molecular Medicine Training program, a faculty within our own Departmental T32 research-training program and directing my own research laboratory. Being part of the proposed Graduate Program in Rehabilitation Science will be a natural fit given my clinical duties in pain management and overall research emphasis in the regulation of peripheral pain transduction. My research group has forged a challenging path to define what controls the expression of TRPV1 (Capsaicin Receptor) at the transcriptional level and that TRPV1 activation can also be negatively regulated by splice variants. Moreover, because TRPV1 has been shown to play a central role in pain and nociceptive signaling, it is likely that the specialized factors that regulate TRPV1 expression also play a key role in regulating other nociceptive genes. We are currently focused on understanding a family of transcription factors that we believe regulate a nociceptive transcriptome in sensory neurons. This is being investigated through the use of a wide range of techniques integrating nociceptive behavior in mice to molecular genetics and large-scale deep sequencing of genes regulated by transcription factors in sensory neurons. Ongoing investigations have now unveiled a network of nociceptive – related genes that function together to mediate the transition from acute to persistent thermal and mechanical hyperalgesia. We have also recently reported (in press) that the anticancer antibiotic mithramycin-A, inhibits TRPV1 expression in sensory neurons. Taken together, we propose that a class of small molecules that down regulate Sp1-like transcription factors in turn will inhibit transitions from acute to chronic pain. We are confident that this line of investigation will provide stimulating questions for developing graduate students to pursue that will be relevant to the clinically challenges of limiting the progression of painful conditions and to restore function.
B. Positions and Honors

Professional Experience:
1989-1990  Post Doc, Pain Research, University of California, San Diego
1990-1991  Internship, Internal Medicine, Cedars-Sinai Medical Center, California
1991-1994  Residency, Anesthesia, University of California, San Francisco,
1993-1994  Chief Resident, Dept. of Anesthesia, Moffitt/Long Hospitals
University of California, San Francisco
1994-1995  Fellow, Pain Research, University of California, San Francisco
(Julius & Levine laboratories)
1994-1995  Clinical Instructor, Dept. of Anesthesia, Moffitt/Long Hospitals, UCSF
1995 -2001  Assistant Professor in Residence, Dept. of Anesthesia, UCSF
1995 -2001  Assistant Professor in Residence, Dept. of Oral & Maxillofacial Surgery, UCSF
1995 -present  Attending Anesthesiologist Dept. of Anesthesia and Perioperative Care, UCSF
2001-2003  Associate Professor in Residence, Department of Anesthesia, UCSF
2001-2003  Associate Professor in Residence, Dept. of Oral & Maxillofacial Surgery, UCSF
2003-2012  Associate Professor, Department of Anesthesia, UCSF
2003-2012  Associate Professor, Dept. of Oral & Maxillofacial Surgery, UCSF
2003-2004  Visiting Reader, Dept. of Anaesthetics and Intensive Care, Imperial College London, UK
2010-present  Chief, Division of Pain Medicine, Dept. of Anesthesia and Perioperative Care, UCSF
2010-present  Medical Director Pain Services, UCSF Medical Center
2013-present  Professor - Department of Anesthesia, UCSF
2013-present  Professor - Dept. of Oral & Maxillofacial Surgery, UCSF

Honors:
1997-1999  Radiometer/John Severinghaus Fellow in Anesthesia Research, Dept. of Anesthesia, UCSF
1998 - 2000  Foundation for Anesthesia Education Research, New Investigator Award
2000  Sessler Family Anesthesia Research Award, UCSF
2001  International Anesthesia Research Society (IARS), Frontiers in Anesthesia Research Award

Patents:
Application: UCSF-435WO, “Methods and Compositions for the Treatment of Pain”

C. Selected Peer-reviewed Publications

Most relevant to the current application
Additional recent publications (in chronological order) – selected (10 of 31)


D. Research Support

**Ongoing Research Support**

NIH R01 NS38737-11 Schumacher (PI) 7/2009 – 6/2013
Capsaicin Receptor Subtypes in Pain Transduction
Investigate the regulation of the rTRPV1 gene by Sp1-like transcription factors; determine the physiologic role of TRPV1 splice variants in nociceptive neurons.
Role: PI

NIH (CoEPE)
Center of Excellence in Pain Education Schumacher (PI) 5/2012 – 8/2014
NIH Pain Consortium Initiative; Develop pain management training resources for health care professionals to advance the assessment, diagnosis, and treatment of pain across all four health professional schools at UCSF.
Role: PI – Project Manager (salary support effort = 6%)

NIH T32 GM08440 Young (PI) 7/2012 – 6/2017
Basic Science Anesthesia Research Training Grant
Provide oversight and research training opportunities in the area of peripheral pain transduction.
Role: Faculty, Mentor; Pain and Addiction Program Administrator

Pending Funding

R01 NS38737-08 (Principal Investigator) 2014-2018
Capsaicin Receptor subtypes in Pain Transduction
Completed Research Support

NIH R01 DK046285-09 Kirkwood (PI) 7/2008 – 6/2013
Neural Regulation of Pancreatic Function
Investigate the role of nociceptive channels TRPV1, TRPA1 and the PAR 2 receptor in inflammatory pancreatitis.
Role: Co-investigator

NIH 3R01NS038737-09S1 Schumacher (PI) 7/2010 – 6/2011
Supplement: Optogenetics
Utilize TRPV1 promoter elements to direct expression of light-triggered inhibitory chloride channels in nociceptive neurons.
Role: PI

Pain Management by an Endogenous Antihyperalgesic
Subcontract to determine if halogenated amino acids function as activators / inhibitors of TRPV1 and/or TRPA1.
Role: PI

National Headache Foundation Schumacher (PI) 2008-2009
Research Grant
Role: PI

UCSF Springer H. Mem. Foundation 2007-2008
Capsaicin Receptor Subtypes in Pain Transduction
Role: PI

FAER 2008 summer
Medical Student Anesthesia research Fellowship
Student Stipend
Role: Mentor

NIH T32 - PACCTR 2006-2007
Fellow’s salary
Pathways to Careers in Clinical and Translational Research
Role: Co-mentor

IARS Frontiers in Anesthesia Research Award 2001-2006
Stretch-Inactivated Channels in Pain Transduction
Role: PI
A. Personal Statement

My research encompasses two related areas: 1) Assessment and treatment of physical impairments that result from breast cancer treatment and 2) clinical diagnosis of breast cancer-related lymphedema. I am co-investigator on the Breast Symptoms Study (Miaskowski, PI), a prospective, longitudinal study to evaluate neuropathic pain and lymphedema following breast cancer surgery. This dataset includes a variety of lymphedema and other upper extremity outcomes in a longitudinal dataset that evaluated women prior to, during, and following breast cancer treatment. In 2013, I was awarded a UCSF- Kaiser/DOR Building Interdisciplinary Research Careers in Women’s Health Program (BIRCWH) K12 mentored career award. I am enrolled in the UCSF Master’s of Advanced Studies in Clinical Research program and will learn the methods necessary to analyze the longitudinal data from the Breast Symptoms Study to answer the Specific Aims of my BIRCWH proposal. I will identify subgroups of women based on volume changes over time and analyze predictors of group membership. In addition, I will evaluate the ability of bioimpedance to detect early limb volume changes, and evaluate other treatment-related upper extremity impairments. Analysis from the Breast Symptoms Study also includes evaluation for differences in phenotypic and genotypic characteristics in women who did and did not develop lymphedema following breast cancer treatment. This will provide me with additional research training and expertise. My 2 to 3-year research goal is to transition from the BIRCWH K12 to a NIH NCI K23 or K07 to continue my mentored career development to conduct a pilot study on implementation of risk stratified screening in women at risk for lymphedema after breast cancer treatment, informed by the results of the analysis proposed during the BIRCWH award period. My 5-7 year goal is to become an independent investigator in the field of diagnosis and management of cancer-related LE, and to expose graduate physical therapy students to oncology rehabilitation research.

As part of their doctoral training the Doctor of Physical Therapy (DPT) students participate in research. From 2007-2009, I mentored 3 students in data collection and data analysis. The students prepared and presented the results from a small observational study at the Graduate Research Day at San Francisco State University. From 2011-2012, I mentored 2 DPT students in 2 research projects, one of which resulted in a publication in a peer-reviewed journal. I currently supervise 2 DPT students in their research requirement, which includes participation in data collection, data analysis, and CHR document preparation. I am the course director for PT 251, Research Design, in which students have the opportunity to develop a research question, and become skilled at critical appraisal of published literature. I am also faculty/reader in PT 209/910, Evidence Based Practice, and encourage students to submit abstracts for regional and national conferences, as well as to follow their manuscripts through to publication. Additionally, I am advisor for 10 DPT students. We schedule meetings quarterly on a formal basis; and meet more often as need arises.
B. Positions and Honors

PRINCIPLE POSITIONS

1986 – 1987   Readicare Industrial Medicine Clinic, Burlingame/Emeryville, CA; Lead Physical Therapist
1987 – 1988   METS/ Kentfield Hospital, Kentfield CA, Physical Therapist
1988 – 2010   Sonoma Valley Hospital, Sonoma, CA, Lead Physical Therapist
2009 – 2010   University of California, San Francisco, San Francisco, CA, Dept. of Physical Therapy and Rehabilitation Science, Instructor
2010 – present  University of California, San Francisco, San Francisco, CA, Dept. of Physical Therapy and Rehabilitation Science, Assistant Adjunct Professor (Primary Appointment)
2010 – present  University of California, San Francisco, San Francisco, CA Dept. of Anatomy, Assistant Adjunct Professor (Secondary Appointment)

OTHER POSITIONS HELD CONCURENTLY

2007 – 2008   Sonoma State University, Dept of Kinesiology, Lecturer
2008 – 2008   University of California, San Francisco, Dept. of Physical Therapy and Rehabilitation Science, Teaching Assistant
2006 – 2009   University of California, San Francisco, Dept. of Physiological Nursing, Research Assistant
2008 – 2009   University of California, San Francisco, Dept. of Anatomy, Teaching Assistant
2009 – 2009   University of California, San Francisco, Dept. of Physical Therapy and Rehabilitation Science, Visiting Asst. Professor
2009 – 2010   San Francisco State University, Graduate Program in Physical Therapy, Lecturer
2010 – present  San Francisco State University, Graduate Program in Physical Therapy, Asst. Professor Physical Therapy (Volunteer appointment)

HONORS AND AWARDS

2006       Burditt Memorial Mathematics Scholarship, Napa Valley College
2006       Kean Graduate Fellowship Award, University of California, San Francisco
2008       University of California, San Francisco Graduate Student Research Award
2008       California Physical Therapy Association Research Award
2009       UCSF Graduate Division-earle C. Anthony Travel Award
2009       Graduate Student Distinguished Achievement Award, San Francisco State University
2010       Norton School of Lymphedema, Medi Certified Lymphedema Therapist Scholarship
2010       American Association of Anatomist Training Program Scholarship
2011       California Physical Therapy Association Research Publication Award
2011       Nominee, Outstanding Faculty Mentorship Award, UCSF Graduate Student's Association
2012       Haile T. Debas Academy of Medical Educators Excellence in Teaching Award
2012       Nominee, Distinction in Teaching Award, Under 5 years category; UCSF Academic Senate
2012       Nominee, Outstanding Faculty Mentorship Award, UCSF Graduate Student’s Association
2012       Nominee, Kaiser Award for Excellent in Teaching
2013       Essential Core Teaching Award Commitment to Teaching
2013       UCSF-Kaiser Building Interdisciplinary Research Careers in Women’s Health Scholar
C. Selected Peer-reviewed Publications


SELECTED ABSTRACTS


D. Research Support

Ongoing Research Support

K12HD052163 (Scholar) 05/01/2013 - 05/31/2015
NICHD/NIH

UCSF-Kaiser/DOR Building Interdisciplinary Research Careers in Women’s Health Program (BIRCHW)

R01CA151692 Miaskowski (PI) 09/09/2011 - 08/31/2016
NIH

Characterization of and Treatment for Chemotherapy Neuropathy (CIN)
In Part 1 of this study, patients who have finished chemotherapy and did or did not develop CIN will be evaluated to determine why some patients do and other patients do not develop CIN. Part 2 of this study will test the effects of a new treatment called photon stimulation (also called infrared light therapy) compared to placebo treatment to improve sensations in the feet of oncology patients with CIN.
Role: Co-investigator

R01 CA118658-04 Miaskowski (PI) 09/01/2006 - 07/31/2011
NIH/NCI

Long-Term Arm Morbidity Following Breast Cancer Treatment
The aims of this study are to determine the prevalence, severity, and the timing of the lymphedema (LE); determine the prevalence and timing of occurrences of changes in shoulder mobility and grip strength associated with LE; compare differences in anxiety, depressed mood, fatigue, sleep disturbance, functional status, and quality of life (QOL) in women who do and do not develop LE; and determine the factors that predict the development of LE.
Role: Other Investigator

UCSF Mount Zion Health Fund Sbitany (PI) 02/19//2013 - 02/01/2016
A Pilot Study of Ashtanga Yoga in Prevention of Breast Cancer-Related Lymphedema
The goals of this pilot study are to assess the feasibility of incorporating a yoga program into post-operative care for patients at high risk for BCRL and to collect pilot data regarding the efficacy of this intervention in preventing lymphedema.
Role: Other investigator

Completed Research Support

University of California San Francisco 09/01/2008 - 07/01/2008
Graduate Student Research Award

Interlimb differences in function and fluid volume in upper extremities of healthy adult women
BIOGRAPHICAL SKETCH

Provide the following information for the Senior/key personnel and other significant contributors in the order listed on Form Page 2.
Follow this format for each person. DO NOT EXCEED FOUR PAGES.

<table>
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<tr>
<td>Richard B. Souza</td>
<td>Associate Professor</td>
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| eRA COMMONS USER NAME | rbsouza |

EDUCATION/TRAINING (Begin with baccalaureate or other initial professional education, such as nursing, include postdoctoral training and residency training if applicable.)

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<td>A.T.C.</td>
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<td>Athletic Training</td>
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<td>Samuel Merritt College, Oakland, CA</td>
<td>M.P.T.</td>
<td>02/02</td>
<td>Physical Therapy</td>
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<td>University of Southern California</td>
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<td>05/08</td>
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<td>University of California, San Francisco</td>
<td>Post-doc</td>
<td>01/10</td>
<td>Biomedical Imaging</td>
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A. Professional Qualifications

Through a combination of clinical and research experiences, I have the expertise to serve as a research mentor in a PhD program in Rehabilitation Science here at UCSF. My clinical experiences as a physical therapist allowed me to see first-hand the effects of disability, and the improved quality of life observed during and after rehabilitation. I have extensive research experience in biomechanics based investigations of the lower extremity. I completed a postdoctoral fellowship in Radiology and Biomedical Imaging focusing on quantitative imaging of cartilage and bone in health and disease. I am currently an Associate Professor with joint appointments in the Departments of Physical Therapy and Rehabilitation Science, Radiology and Biomedical Imaging, and Orthopaedic Surgery. This unique appointment positions me ideally to use cutting edge quantitative imaging to investigate orthopaedic pathology. Over the past 10 years, I have performed numerous studies investigating the influence knee joint contact mechanics on cartilage and bone health, and am proficient in the acquisition, processing and interpretation of kinematic and quantitative MRI of cartilage and bone. In summary, I am ideally suited to serve as a PhD adviser and mentor for students interested in a PhD in Rehabilitation Science with specific focus on Musculoskeletal Biomechanics.

B. Positions and Honors

Positions and Employment

2002-2003  
Staff Physical Therapist, Physiotherapy Associates, Kentfield, CA

2002-2003  
Per Diem Physical Therapist, Care Center of Rossmoor, Walnut Creek, CA.

2003-2008  
Teaching/Research Assistant, Department of Biokinesiology and Physical Therapy, University of Southern California, Los Angeles, CA.

2008-2009  
Post-doctoral Scholar, Musculoskeletal Quantitative Imaging Research laboratory, Department of Radiology & Biomedical Imaging, University of California, San Francisco.

2008-2009  
Assistant Clinical Professor, University of California, San Francisco, Department of Physical Therapy and Rehabilitation Sciences.

2010-       
Assistant Professor, University of California, San Francisco, Department of Physical Therapy and Rehabilitation Sciences.

Honors

2001  
Physical Therapists Professional Education Scholarship; California Physical Therapy Association

2002  
Outstanding Student Award, Samuel Merritt College, Department of Physical Therapy

2005  
Outstanding Presentation Award, Southern California Conference of Biomechanics

2006  
Jacqueline Perry Scholarship Award – USC, Dept of Biokinesiology and Physical Therapy

2006  
Outstanding Mentorship Award – USC, Dept of Biokinesiology and Physical Therapy
2007  Promotion of Doctoral Students (PODS II) Scholarship - Foundation for Physical Therapy
2007  University of Southern California Outstanding Teaching Award
2008  Student Research Award - American College of Sports Medicine, Biomechanics Interest Group
2008  The Dean’s Research Award – Best overall outstanding presentation at USC Research Day
2009  Student Research Publication Award; California Physical Therapy Association
2010  Outstanding Poster Award; California Physical Therapy Association Annual Meeting
2010  NIH/NIAMS P30 American Recovery and Reinvestment Act Faculty Hire
2011  Faculty Publication Award; California Physical Therapy Association

Memberships of Professional Societies
1997-present  National Athletic Training Association member
1999-present  American Physical Therapy Association member
2001-present  American College of Sports Medicine member
2008-present  Orthopaedic Research Society member
2008-present  International Society for Magnetic Resonance in Medicine member

C. Peer-reviewed Publications


36. Li X, Schooler J, Liang F, Shet K, Han E, Chen W, Souza RB, Majumdar S. Simultaneous Acquisition of T1ρ and T2 Quantification in Cartilage - Reproducibility and Diurnal Variation. [paper in review].


**D. Research Support**

**Ongoing Research Support**

1 R01 AR062370-01 (PI: Souza) 9/1/11-8/31/15

NIH/NIAMS

Contact Mechanics, Neuromuscular Control, and Cartilage Composition in Knee OA

This project will enable the compilation of a comprehensive database of articular contact mechanics using kinematic-MRI, neuromuscular control during walking, metrics of functional performance, and quantitative MRI for cartilage and meniscus composition over 3 years in subjects with and without knee OA. Role: PI

OREF/Goldberg Arthritis Research Grant (Co-PI) 7/1/12-6/30/14 (NCE)

Orthopaedic Research & Education Foundation

Quantitative MRI Evaluation of Articular Cartilage and Kinematic changes in the knee after Meniscectomy

The objective of this project is to evaluate the early changes in cartilage health following partial meniscectomy of the posterior horn of the medial meniscus.

P50 AR060752 (Co-PIs: Majumdar & Lane) 4/1/2011–3/31/2016

NIH/NIAMS

Translation of Quantitative Imaging in Osteoarthritis

The overall objective of this proposal is to integrate cutting edge, quantitative imaging technologies, link the image derived metrics to joint kinematics, kinetics, patient function, and translate the linkages found to the musculoskeletal clinic, thus affecting patient management and outcome. Role: Co-investigator, Project Co-PI, Core Director


NIH/NIAMS

Loaded and Unloaded MR Imaging of Meniscus-Cartilage-Trabecular Bone in OA
The goal of this study is to determine the predictive capability of cartilage biomechanics, assessed though loaded MRI, of determining disease onset and progression in persons with and without knee osteoarthritis.

Role: Co-investigator

Radiology Seed Grant #13-23 (PI: Souza) 09/10/2013 - 09/09/2014
UCSF Department of Radiology and Biomedical Imaging
Gait Retraining to Reduce Progression of Knee OA
The goal of this seed grant is to determine the effects gait retraining on cartilage composition, muscle and joint morphology, pain, function, and kinematics and kinetics during functional tasks in persons with symptomatic knee OA.

Completed Support (past 2 years)

Mobile Health Research Grant (PI: S Roy) 3/1/12-2/28/13
UCSF Resource Allocation Program (RAP)
Universal Bluetooth 4.0 Module and Data Transfer Protocol Framework for Clinical Device Studies
The goal of this project is to use Bluetooth technology to optimize data transfer to secure networks for devices such as the wireless Physical Activity Monitor (wi-PAM) and others.
Role: Co-investigator

Center for Translational Science Institute (CTSI) - University of California, San Francisco
Bringing Muscle Performance Assessment to UCSF’s Mission Bay Campus
The goal of this project is to equip the UCSF Mission Bay campus with the latest technology in muscle performance assessment through multi-modal dynamometry. Through isometric, isokinetic, and isotonic testing, comprehensive muscle performance testing is now a reality at UCSF’s Mission Bay campus.
Role: PI

REAC Award (PI: Souza) 6/1/2010-5/31/2012
University of California, San Francisco
Bone and Cartilage Adaptation to Load
The goal is to perform a comprehensive analysis of foot and ankle structural properties in three distinct activity populations – long-distance runners, pointe ballet dancers, and sedentary controls. Using HRpqCt to evaluate metatarsal structural properties, and MRI to quantify cartilage composition, this study will determine how different habitual loading strategies influence bone and cartilage structure.
Role: PI
BIOGRAPHICAL SKETCH

NAME
Raymond A. Swanson, M.D

eRA COMMONS USER NAME
SWANSON

POSITION TITLE
Professor and Vice-Chair, Dept. of Neurology, UCSF
Chief, Neurology and Rehab. Service, VAMC San Francisco

EDUCATION/TRAINING (Begin with baccalaureate or other initial professional education, and include postdoctoral training.)

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<td>Stanford University</td>
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<td>Post-doc (Neuroscience)</td>
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A. Personal Statement

I have 25 years experience in clinical neurology and in basic science of neurological disorders. My primary research aim is to identify interventions that can improve outcomes after stroke and other neurological disorders. My work focuses on oxidative stress as a product of both excitotoxicity and post-injury inflammation, and I am particularly interested in bioenergetic and metabolic factors that can modulate these factors after injury. I have recently served as PI on a program project-type grant, funded by the Dept. of Veterans Affairs Rehabilitation Research and Development division, evaluating multimodal therapeutic interventions in animal models of CNS injury. I have served as a mentor for 32 post-doctoral fellows, several of whom have established independent funding and laboratories.

Time and effort statement: Research 60%; Teaching/mentoring 25%; Administration 15%

B. Positions

01/01/94-06/15/01 Staff Physician and Assistant Chief of Neurology and Rehabilitation, VAMC San Francisco
11/15/00-05/15/01 Visiting Professor, Buck Institute for Age Research, Novato, CA
07/01/02 - present Professor and Vice-Chair, Dept. of Neurology, UCSF
07/01/02- present Chief, Neurology and Rehabilitation Service, VAMC San Francisco

Other Positions, Honors, and Professional Memberships

1998 – 2002, 2008 American Heart Association (Stroke) Grant Review Committee
1998 - 2000 Amyotrophic Lateral Sclerosis Association Grant Review Committee
1999 - 2002 NIH BDCN-3 study section
1999 - present Editorial Board, Glia
2001, 2006 NIH Stroke Progress Review Group
2002 - 2010 Handling Editor, Journal of Neurochemistry
2003 - present Board of Directors, Northern California Institute for Research and Education.
2005 Study section chair, “Neurodegeneration, Neuroinflammation, and Mitochondria” (NDBG)
2006- present ad hoc reviewer for Neural Oxidative Metabolism and Death Study Section (NOMD)
2012-present Editorial Board (Associate Reviewer), Journal of Neuroscience

C. Peer-Reviewed Publications (last 3 years and selected others from 130)


1999 Swanson RA: Intravenous heparin for acute ischemic stroke: What can we learn from the megatrials? *Neurology* 52:1746-1750

1999 Duan S, Farrell K, Guenza JK, Stein BA, Swanson RA: Glutamate induces a rapid upregulation of astrocyte glutamate transport and redistribution of GLAST. *J Neuroscience* 19:10193-10200


2012 Swanson RA: One cell’s poison is another cell’s cure. *Nature Neuroscience*, 15:505-6 [invited commentary]


2013 Brennan-Minella AM, Shen Y, Swanson RA. Phosphoinositide 3-kinase couples NMDA receptors to superoxide release in excitotoxic neuronal death. *Cell Death and Disease*, 4:e580


D. Research Support

Current Research support

1) DoD (W81XWH-13-1-0091) 09/25/13 – 09/24/16
Mechanistic Links Between PARP, NAD, and Brain Inflammation after TBI  Role: PI
Aims: To determine whether additive or synergistic effects can be obtained on recovery after injury using physical therapy, a neurotrophin agonist, and an anti-inflammatory agent

2) National Institutes of Health (R01 NS081149) 09/01/12 - 05/31/17
“Regulatory Control of Glutamate-induced Superoxide Production”  Role: PI
Aims: To identify the physiological mechanisms regulating NMDA-induced neuronal superoxide production

3) National Institutes of Health (2R01 NS041421) 07/01/10 - 06/30/15
“PARP and PARG – mediated neuronal death”  Role: PI
Aims: To elucidate how PARP and PARG influence the inflammatory response in the CNS

4) Department of Veterans Affairs (REAP Award; similar to NIH PPG) 07/01/09 – 06/30/14
Multimodal strategies for improving recovery from brain injury  Role: PI
Aims: To determine whether additive or synergistic effects can be obtained on recovery after injury using physical therapy, a neurotrophin agonist, and an anti-inflammatory agent

Prior support (last 3 years)

National Institutes of Health (R13 NS59367)  Role: PI 07/01/11 – 06/30/12
“10th International Conference on Brain Energy Metabolism Bioenergetics of neurological disease and aging”  Role: PI

National Institutes of Health P50 NS14543- CNS Injury and Research Center Project #2  Role: project PI 07/01/07 - 06/30/12
“Glucose, oxidative stress, and reperfusion hemorrhage”

Department of Veterans Affairs (Merit Review Award)  Role: PI 07/01/07 – 06/30/11
A novel mouse model of Parkinson’s disease

Michael J Fox Research Foundation  Role: PI 01/01/10 – 12/31/10
N-acetyl cysteine CSF levels and biomarkers in a mouse model of PD

NCIRE (DoD cooperative award)  Role: PI 10/01/08 – 09/31/10
Promoting recovery from traumatic brain injury by suppressing Inflammation
A. Personal Statement

In my 20 years at UCSF, I have mentored physical therapy students in the MS and DPT professional programs, and doctoral students in the Doctor of Physical Therapy Science (DPTSc) program. I have also guided doctoral students outside of UCSF. I directed Meredith Wampler, a DPTSc student, in an evaluation of the extent of sub-clinical and overt sensorimotor neuropathy in subjects with breast cancer treated with taxanes. Dr. Wampler documented the sensory neuropathy and measured the correlation between severity of neuropathy and quality of life, level of pain, and balance impairments. Another DPTSc student, Betty Smoot, worked in collaboration with Marylin Dodd in the School of Nursing, on a large dataset from the oncology population to quantify lymphedema and its functional consequences in patients treated with surgery and chemotherapy. Dr. Smoot subsequently received funding through a BIRCWH K award, and has been productive in her early faculty position. We continue to collaborate with Dr. Christine Miaskowski in the School of Nursing to extend the studies and better predict who is most likely to develop severe chemotherapy-induced neuropathy. I have a strong interest in peripheral nerve biomechanics, and mentored DPTSc student, Benjamin Boyd, in his studies quantifying nerve motion during limb motion. Lastly, I was a mentor to DPTSc student, Amber Fitzsimmons, in her qualitative and quantitative study of interprofessional experiences in physical therapy clinical clerkships. Dr. Fitzsimmons is continuing her work as a Faculty Lead in Interprofessional Education at UCSF. All four of these DPTSc graduates moved into faculty positions, and continue to publish in their fields. As Department Chair, I oversee our Outpatient Physical Therapy Faculty Practice and our Physical Therapy Health and Wellness Center, which is well equipped for aerobic training. I also direct the anatomy curriculum for the School of Medicine, teach courses in anatomy, nerve biomechanics and medical screening.

B. Positions and Honors

Principal Positions Held

<table>
<thead>
<tr>
<th>Year</th>
<th>Institution and Location</th>
<th>Position Title</th>
<th>Field of Study</th>
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<tbody>
<tr>
<td>1993-1994</td>
<td>University of California, San Francisco</td>
<td>Assistant Adjunct Professor</td>
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<td>1994-2000</td>
<td>University of California, San Francisco</td>
<td>Assistant Professor</td>
<td>Physical Therapy</td>
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<tr>
<td>2000-2003</td>
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<td>Associate Adjunct Professor</td>
<td>Anatomy</td>
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<td>2003-2006</td>
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<td>Associate Professor</td>
<td>Anatomy</td>
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<td>2000-2006</td>
<td>University of California, San Francisco</td>
<td>Associate Professor</td>
<td>Physical Therapy</td>
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<td>2006-present</td>
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<td>Professor</td>
<td>Physical Therapy</td>
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<td>2006-present</td>
<td>University of California, San Francisco</td>
<td>Professor</td>
<td>Anatomy</td>
</tr>
<tr>
<td>2007-present</td>
<td>University of California, San Francisco</td>
<td>Interim Chair</td>
<td>Physical Therapy</td>
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<tr>
<td>2009-present</td>
<td>University of California, San Francisco</td>
<td>Chair</td>
<td>Physical Therapy</td>
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</table>
Other Positions Held Concurrently

1996-present  UCB/UCSF Program in Bioengineering  Affiliate Member
           2003-present  UCSF  Discipline leader, Department of Anatomy
                        Anatomy Curriculum, Medical School
                        Essential Core
           2009-present  UCSF/SFSU Graduate Program in Physical Therapy  Director, UCSF

Honors Awards

2000  Faculty Mentorship Award  Graduate Student Association and Graduate Division Alumni Association, UCSF

2002  Steven J. Rose Lecturer  School of Medicine, Washington University, St. Louis, MO

2004  Outstanding Lecture Series Award  School of Medicine, UCSF
2004  Elected member, Academy of Medical Educators  Academy of Medical Educators, UCSF
2005  Innovative Teaching Award  School of Medicine, UCSF
2006  Henry J. Kaiser Award for Excellence in Teaching  School of Medicine, UCSF
2006  Commitment to Teaching Award  School of Medicine, UCSF
2006  Outstanding Service Award  Academy of Medical Educators, School of Medicine, UCSF
2010  Fellow of the American Association of Anatomists  American Association of Anatomists
2010  Essential Core Teaching Award, Class of 2013, Outstanding Lecture Series  School of Medicine, UCSF
2011  Essential Core Teaching Award, Class of 2014, Outstanding Lecture Series  School of Medicine, UCSF

Memberships

1981-present  American Physical Therapy Association
1990-present  Research, Orthopedic, Education, Oncology Sections, American Physical Therapy Association
1981-present  California Physical Therapy Association
1985-present  American Society for Cell Biology
1990-present  Society for Neuroscience
1994-present  American Association of Anatomists
2004-present  American Association of Clinical Anatomists
2013-present  Society of Ultrasound in Medical Education

C. Peer-Reviewed Publications


D. Research Support

On-going Research Support

R01CA151692 Miaskowski (PI) 09/09/2011 - 08/31/2016

NIH

Characterization of and Treatment for Chemotherapy Neuropathy

This study will be conducted in two parts. In Part 1, patients who have finished chemotherapy and did or did not develop CIN will be evaluated to determine why some patients do and other patients do not develop CIN. Part 2 of this study will test the effects of a new treatment called photon stimulation (also called infrared light therapy) compared to placebo treatment to improve sensations in the feet of oncology patients with CIN.

Role:Co-investigator
NIH PCORI  Allen (PI)  06/01/2012 - 05/30/2014
NIH
Minding the Gap: Targeting Differences Between Patients' Current and Perceived Abilities
This study develops the 6-dimensional Movement Assessment Measure into a web-based platform, and uses the assessment in the UCSF Physical Therapy Faculty Practice and Health and Wellness Center. The study will apply principles of patient preferences and goals to facilitate physical therapists' patient care and improve health outcomes.
Role: Co-Investigator

Completed Research Support

**R01 NS039278**  Noble-Haeusslein (PI)  07/01/2004 - 04/30/2009
NIH, NINDS
Role of matrix metalloproteinases in spinal cord injury
Role: Co-investigator

**R01 NR008286**  11/01/2003 - 10/31/2007
NIH/NIDDK
Comparison of exercise responses in four end-stage renal disease treatments
Role: Co-investigator, (Painter

**Individual Investigator Grant**  11/01/2001 - 10/31/2002
UCSF Academic Senate
Contribution of neuronal intermediate filaments to vincristine-induced peripheral neuropathy
Role: Principal investigator

**K01 HD01162**  11/01/1997 - 10/31/2002
NIH/NICHD
Role of axonal transport in peripheral nerve function
Role: Principal investigator
BIOGRAPHICAL SKETCH

Provide the following information for the key personnel and other significant contributors in the order listed on Form Page 2.
Follow this format for each person. DO NOT EXCEED FOUR PAGES.

NAME: Zinaida S. Vexler, Ph.D.

POSITION TITLE: Professor In Residence

eRA COMMONS USER NAME: Vexler

EDUCATION/TRAINING (Begin with baccalaureate or other initial professional education, such as nursing, and include postdoctoral training.)

<table>
<thead>
<tr>
<th>INSTITUTION AND LOCATION</th>
<th>DEGREE (if applicable)</th>
<th>YEAR(s)</th>
<th>FIELD OF STUDY</th>
</tr>
</thead>
<tbody>
<tr>
<td>Moscow State University, Dept. of Chemistry</td>
<td>M.S.</td>
<td>1979</td>
<td>Chemistry</td>
</tr>
<tr>
<td>Institute of Biophysics, Ministry of Health</td>
<td>Ph.D.</td>
<td>1990</td>
<td>Biochemistry &amp; Radiobiology</td>
</tr>
<tr>
<td>University of California, San Francisco, CA</td>
<td>Postdoc</td>
<td>1990-1995</td>
<td>Neuropharmacology</td>
</tr>
<tr>
<td>University of California, San Francisco, CA</td>
<td>Postdoc</td>
<td>1995-1996</td>
<td>Signal Transduction</td>
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</table>

A. Personal Statement

Over the last twenty years, my research has been centered on the mechanisms of experimental stroke with the long-term goal of developing effective therapies. I have contributed to the fields of brain vascular and cellular injury after experimental stroke first in the adult and, over more than fifteen years, in the neonate. I have multi-disciplinary training in chemistry, biochemistry, pharmacology, and physiology. I have served as Director of MRI Core on PPG since 2002, and as the Director of Research of Neonatal Brain Disorders Center at UCSF since 2003.

My lab was the first to establish and characterize the in vivo model of neonatal focal stroke in rats, and ours is the only laboratory that can produce focal arterial stroke in neonatal mice. With these age-appropriate models, we have recently shown that depletion of microglia before neonatal stroke does not limit neuroinflammation or protect and that in fact microglial cells contribute to endogenous defense mechanisms. We discovered that, strikingly, the blood-brain barrier (BBB) is markedly more intact after acute neonatal stroke than after adult stroke and that, based on the endothelial transcriptosome, the “signature” of genes that regulate BBB permeability is vastly different in acutely injured adult and neonatal brain. Also, we were one of the first to show that neuronal progenitor cells differentiate into a region-appropriate neuronal phenotype, but only a limited number of progenitor cells migrate to the injured cortex. We showed that angiogenesis is diminished and delayed after neonatal stroke and were able to modulate angiogenesis and neurogenesis and repair after neonatal stroke by enhancing it with erythropoietin and reducing angiogenesis and repair by inhibiting VEGFR2 signaling.

Currently we are testing several hypotheses on how interactions between microglial cells and various components of the neurovascular unit affect short- and long-term injury outcome. To address some of the concepts we are developing in vivo imaging tools to longitudinal tracking of immune cells. With the use of novel concepts, experimental models and imaging modalities we are uniquely positioned to advance the field of neonatal stroke.

B. Positions and Honors.

Professional Positions

| 1979-1981 | Fellow | Institute of Biophysics, Ministry of Health, USSR |
| 1981-1990 | Research Scientist | Institute of Biophysics, Ministry of Health, USSR |
| 1990-1995 | Postgraduate Researcher | University of California, San Francisco, CA |
| 1995-1996 | Postgraduate Researcher | University of California, San Francisco, CA |
| 1996-1999 | Assistant Researcher Neurobiologist | University of California, San Francisco, CA |
| 1999-2002 | Assistant Professor | University of California, San Francisco, CA |
| 2002-2010 | Associate Professor | University of California, San Francisco, CA |
| 2010-     | Professor       | University of California, San Francisco, CA |
| 2003-present | Director of Research, Neonatal Brain Disorders Center | University of California, San Francisco, CA |
| 2008-     | Member, Biomedical Sciences Graduate Program | University of California, San Francisco, CA |
Honors and Service


C. Selected Peer-reviewed Publications (from a total of 53)

Most relevant 15 publications to the current application


5. Denker, Ji S, Lee SY, Dingman A., Derugin N, Wendland MF, Vexler ZS. "Macrophages are comprised of resident brain microglia not infiltrating peripheral monocytes acutely after neonatal stroke". J Neurochem. 2007, 100: 893-904. PMID: 17212701


Review Articles and Recent Abstracts Directly Relevant to the Submission:


D. Research Support

Ongoing Research Support

RO1NS044025-10 Vexler (PI) 9/01/02-2/28/18
Agency: NIH/NINDS
Title of the Project: Neonatal Stroke: the role microglia.
The goal of this grant is to determine if ablation of microglial cells, change in redox metabolism in these cells or depletion of the CD36 receptor on microglial cells exacerbate acute ischemia-reperfusion injury to the neonatal brain by limiting clearance of apoptotic neurons.
Role: Principal Investigator

R01 NS076726-01 Vexler (PI) 7/1/12-6/30/17
Agency: NIH/NINDS
Title of the Project: Macrophages as modulators of repair after neonatal stroke.
The major goal of this project is to delineate the mechanisms of galectin-3 produced in microglia/macrophages on angiogenesis and repair after neonatal stroke.
Role: Principal Investigator

1R21NS080015-01 Vexler (PI) 7/1/12-6/30/14
Agency: NIH/NINDS
Title: Blood-brain barrier function after neonatal and pediatric experimental stroke
The goal of this grant is to understand the role of brain maturation on the blood-brain barrier integrity in pediatric compared to neonatal stroke.
Role: Principal Investigator

NS35902 (Ferriero PI; Vexler - Project Leader, Core B) 4/1/97-1/31/14 (no cost extension)
Agency: NIH/NINDS
Title of the Program Project: Mechanisms of Ischemic Neonatal Brain Injury. Core B: Magnetic Resonance Imaging Core.
Role: Project Leader

P50 NS35902 Ferriero (PI) 4/1/97-1/31/14 (no cost extension)
Agency: NIH/NINDS
Title of the Program Project: Mechanisms of Ischemic Neonatal Brain Injury. Project 2: Role of vascular derived growth factor in neonatal brain injury.
The major goal of this project is to determine the role of the VEGF in regulating neurogenesis after hypoxic-ischemic injury in neonatal rats.

**Role:** Co-Investigator

**Completed Research Support (last 3 years)**

R01NS055915-01A2 Vexler (PI) 8/5/09-7/30/12
Agency: NIH/NINDS
Title of the Project: CINC-1 as a modulator of blood-brain barrier integrity after neonatal stroke.
The goal of this grant is to determine relationships between circulating CINC-1, neutrophil transmigration and blood-brain barrier integrity after neonatal stroke.

**Role:** Principal Investigator

Grant-in-Aid Vexler (PI) 7/1/08-6/30/10
AHA Western Affiliates
Title of the Project: "Macrophages as modulators of brain repair after neonatal stroke".
The goal of this grant was to identify the effect of monocyte deletion during an acute injury phase on long-term injury outcome after neonatal stroke.

**Role:** Principal Investigator
**NAME**
Wanek, Linda

**POSITION TITLE**
Professor

**eRA COMMONS USER NAME (credential, e.g., agency login)**

**EDUCATION/TRAINING** *(Begin with baccalaureate or other initial professional education, such as nursing, include postdoctoral training and residency training if applicable.)*

<table>
<thead>
<tr>
<th>INSTITUTION AND LOCATION</th>
<th>DEGREE (if applicable)</th>
<th>MM/YY</th>
<th>FIELD OF STUDY</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kansas University, Lawrence KS</td>
<td>BS</td>
<td>1976</td>
<td>Physical Therapy</td>
</tr>
<tr>
<td>University of North Carolina, Chapel Hill, N.C.</td>
<td>MS</td>
<td>1980</td>
<td>Physical Therapy</td>
</tr>
<tr>
<td>University of Southern California, Los Angeles</td>
<td>PhD</td>
<td>1993</td>
<td>Anatomy/Cell Biology</td>
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</table>

**A. Personal Statement**

Dr. Wanek teaches content related to pathokinesiological and musculoskeletal principles applied to physical therapy assessment and intervention for patients with musculoskeletal movement dysfunctions of the spine and lower quarter. She also teaches content related to the preparation of case reports as evidence to document best practice and clinical decision making. Wanek received her BS in Physical Therapy from the University of Kansas in 1976, her advanced MS in Physical Therapy with an emphasis in Sports Medicine and Biomechanics from the University of North Carolina, Chapel Hill in 1980 and her PhD in Anatomy and Cell Biology from the University of Southern California in 1993.

Wanek is a licensed physical therapist in California (#12880) and Nebraska (#357) and also held NATA certification until 2008. She participates in a number of continuing education activities related to her teaching area including attending the California APTA annual conferences, Orthopaedic Section of the APTA independent study courses on Orthopedic interventions for pediatric patients, current concepts for orthopedic physical therapy and conservative management of the foot, along with courses on Ethics and Best practice and law tutorials. Over 30 years as a physical therapist, Wanek has worked extensively in the clinic with patients having musculoskeletal movement dysfunctions. At SFSU she has provided services to the SFSU student population through the Student Health Service. Since becoming Chair of the SFSU PT program in 2002, Dr. Wanek has reduced her hours in the clinic but continues to provide consultations to students, faculty, and staff.

Dr. Wanek’s research interests have stemmed from her experience as a physical therapy clinician. Her pursuit of a PhD in Anatomy and Cell Biology from the University of Southern California was directly related to an interest in muscle atrophy post-injury and the lack of full muscle girth recovery that is often seen post-rehabilitation. Her doctoral work and early research activity at SFSU were in the areas of muscle regeneration. Her clinical work along with her teaching expertise in musculoskeletal movement dysfunctions in the lower quarter led to work in the area of low back pain in young adults, adolescents, and children. Dr. Wanek has presented a number of posters on the issue of low back pain. Most recently poster presentations addressing the issues of musculoskeletal risk factors and impact of low back pain on quality of life in young adults were presented at California APTA annual conferences. Wanek also has an interest in the use of case reports as evidence to document best practices and clinical decision making and has worked with several 3rd year students to develop their case reports into presentations or publications.

Wanek has participated in a number of consultation and service activities related to her teaching areas, including participating in the TRUST San Quentin Health Fair, Physical Therapy Services at Valencia Health Services, and Physical Therapy Clinic at Mission High School Health Center. She is also a member of the APTA, CPTA, and Golden Gate District along with membership in the Orthopaedic, Sports PT, and Education sections. At the University she is an elected member of the Academic Senate representing the College of Health and Social Sciences. She also sits on the Academic Policy Committee of the Senate. Dr. Wanek has also served on University-wide strategic planning and search committees. As a past member of Graduate Council, Wanek played a lead role in revising the Paired Course Policy and establishing a SFSU Graduate Fellowship program to provide scholarships to graduate students demonstrating excellence in their academic work. In the College of Health and Social Sciences she is a member of Chairs Council and in the Program she works closely with Dr. Galvan to provide pre-PT advising to undergraduate and high school students. She also works with campus and high school health fairs to provide educational information and musculoskeletal health screenings.
Wanek has been a PT educator for 20 years. She teaches first-year, second year, and third year students and received the Sarlo Award for Excellence in Teaching at SFSU in 2009. Wanek utilizes teaching methods including lecture, large and small group discussions, self-directed learning, hands-on laboratory experiences, and online lecture style videos. Student evaluations of her primary teaching content areas have always been high and have exceeded the average core faculty teaching means. Peer evaluations of her teaching have also been excellent.

B. Positions and Honors

Principal Positions Held

<table>
<thead>
<tr>
<th>Dates</th>
<th>Institution and Location</th>
<th>Title</th>
<th>Faculty Rank</th>
<th>Tenure Status</th>
</tr>
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<tbody>
<tr>
<td>2007-present</td>
<td>San Francisco State University, Physical Therapy</td>
<td>Professor</td>
<td>Professor</td>
<td>Tenure</td>
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<td>2003-present</td>
<td>San Francisco State University, Physical Therapy</td>
<td>Chair</td>
<td>Associate Professor</td>
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<tr>
<td>2002-2003</td>
<td>San Francisco State University, Physical Therapy</td>
<td>Interim Chair</td>
<td>Associate Professor</td>
<td>Tenure track</td>
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<tr>
<td>1999-2007</td>
<td>San Francisco State University, Physical Therapy</td>
<td>Associate Professor</td>
<td>Associate Professor</td>
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<tr>
<td>1993-1999</td>
<td>San Francisco State University, Physical Therapy</td>
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<td>Assistant Professor</td>
<td>Tenure track</td>
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Other Positions Held Concurrently

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<th>Dates</th>
<th>Institution and Location</th>
<th>Title</th>
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<th>Tenure Status</th>
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<tr>
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<td>Univ. of California San Francisco</td>
<td>Assoc. Clin. Prof.</td>
<td>Associate Professor</td>
<td>Non-tenure track</td>
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<td>Univ. of California San Francisco</td>
<td>Assistant Clin. Prof.</td>
<td>Assistant Professor</td>
<td>Non-tenure track</td>
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</table>

Honors Awards

2009 San Francisco State Univ. Sarlo Excellence in Teaching Award

Memberships

1975-present American Physical Therapy Association
1993-present APTA Sports Medicine Section
1993-present APTA Orthopedics Section
2002-present APTA Education Section
1993-present California Chapter, APTA
1993-2008 American College of Sports Medicine
1978-2008 National Athletic Trainers Association

C. Peer-Reviewed Publications

1. Geriatric Rehabilitation and Resilience from a Cultural Perspective by Darlene Yee-Melichar, Andrea Renwanz Boyle, Linda J. Wanek, and Sarah B. Pawlowsky
2. Submitted to *Topics in Geriatric Rehabilitation* in Fall 2013 Boyd BS, Gray AT, Dilley A, Wanek L, Topp KS. The pattern of tibial nerve excursion with active ankle dorsiflexion is different in older people with diabetes mellitus. *Clinical Biomechanics* (in press 2012).


**D. Research Support**

**Completed Research Support**

<table>
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<tr>
<th>Project Description</th>
<th>Start Date - End Date</th>
<th>Direct Costs</th>
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<td>Expanding CSU Allied Health Program</td>
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<td>$143,132 direct</td>
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<td>CLS; Employment Development Dept.</td>
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<tr>
<td>State of California</td>
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<tr>
<td>Clinical Laboratory Science Training Grant</td>
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<td>SFSU Research and Development Grant</td>
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<tr>
<td>Therapeutic US and skeletal muscle regeneration</td>
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<td>Early peripheral nerve and muscle changes post injury</td>
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<tr>
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<tr>
<td>US and skeletal muscle healing</td>
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<td>$5000 direct</td>
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<tr>
<td>SFSU Research and Development Grant</td>
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<tr>
<td>Reduced muscle activity and muscle regeneration</td>
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</table>
NAME: Midori A. Yenari, MD  
POSITION TITLE: Professor

Era commons user name: yenari.midori

Education/training: (Begin with baccalaureate or other initial professional education, such as nursing, include postdoctoral training and residency training if applicable.)

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<th>Field of Study</th>
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<td>SB</td>
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<tr>
<td>Tulane University School of Medicine</td>
<td>MD</td>
<td>1989</td>
<td>Medicine</td>
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<tr>
<td>Hospital of St. Raphael</td>
<td>Internship</td>
<td>1990</td>
<td>Internal Medicine</td>
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<td>Stanford University School of Medicine</td>
<td>Residency</td>
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<tr>
<td>Stanford University School of Medicine</td>
<td>Fellowship</td>
<td>1995</td>
<td>Cerebrovascular Fellow</td>
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</tbody>
</table>

A. Personal Statement: I am a neurologist and physician scientist with laboratory training in neuroscience and stroke. I have over 15 years of experience in brain injury models, both in vitro and in vivo. A focus of my research has been to understand the pathomechanisms of stroke and neuroprotection as it pertains to inflammation. More recently, this work has expanded into the area of recovery and repair following stroke and TBI. I have mentored many undergraduate, graduate and medical students, as well as post docs at UCSF, UC Berkeley, MIT and Stanford. I have held appointments in the Biomedical Sciences Program at UCSF, and in the Neurosciences Program at Stanford. I have participated in journal club presentations, oral examinations, and rotations of graduate students through my laboratory. In addition, I serve as neurology ward attending for the student neurology rotation at the San Francisco VAMC. I have also participated in a new mini course this past fall on Brain Injury that was open to graduate students, postdoctoral fellows, residents, and technicians, and have served as faculty facilitator for the Dept of Neurology’s Brain, Mind & Behavior Course.

B. Positions & Honors

1993 Sandoz Award for Superior Academic Achievement and Contribution to Health Care
1994-1995 National Stroke Association Research Fellowship Award, “Thrombolytics and Antithrombins in a Rabbit Stroke Model”
1995-1997 Acting Assistant Professor, Departments of Neurology & Neurological Sciences, Stanford University School of Medicine, Stanford, CA
1998-2003 Assistant Professor (Research), Departments of Neurosurgery, Neurology & Neurological Sciences, Stanford University School of Medicine, Stanford, CA
1999 American Heart Association Bugher Foundation Award Review Committee
2001 NIH/NINDS, Clinical Trials Review Committee (ZNS1 SRB-K) (2001)
2001-2003 American Heart Association National Peer Review: Brain Study Group
2002-06, 11-15 NIH/NINDS, Neurological Sciences and Disorders A (NSD-A) Review Committee
2002 Women’s International Scientific Cooperation (WISC) travel grant award, American Association for the Advancement of Science
2003-06,10-13 Editorial Board, Section editor for Translational Research, Stroke
2003 Member, American Neurological Association
2004 Associate Professor (Research), Departments of Neurosurgery, Neurology & Neurological Sciences, Stanford University School of Medicine, Stanford, CA
2004-2010 Associate Professor, Department of Neurology, University of California, San Francisco, CA
2005-2009 Editorial Board, Neurobiology of Disease
2007-2011 NIH/CSR, Brain Injury and Neurovascular Pathologies Study Section (BINP), charter member
2009 Fellow, American Academy of Neurology
2009 Editorial Board, Translational Stroke Research
2009-2013 Editorial Board, World Journal of Cardiology
2010 Editorial Board, Therapeutic Hypothermia
C. PEER-REVIEWED ARTICLES (selected from over 100 peer reviewed publications)


Deng H, Han HS, Cheng D, Sun GH, Yenari MA, Mild Hypothermia Inhibits Inflammation Following Experimental Stroke and Brain Inflammation, Stroke (2003) 34:2495-2501


Kelly S, Cheng D, Steinberg GK, Yenari MA, Mild Hypothermia Alters GSK3β Expression Following Global Cerebral Ischemia, Neurocritical Care (2005) 2(2):212-7


Webster CM, Kelly S, Koike M, Chock V, Giffard RG, Yenari MA, Inflammation and NFκB activation is decreased by hypothermia following global cerebral ischemia Neurobio Dis (2009) 33:301-12


Shah MP, Zimmerman L, Bullard J, Yenari MA, Therapeutic hypothermia after cardiac arrest: Experience at an academically-affiliated community-based Veterans Affairs Medical Center, Stroke Research and Treatment (2011)

Won SJ, Tang XN, Suh SW, Yenari MA, Swanson RA, Hyperglycemia promotes tissue plasminogen activator-induced brain hemorrhage by increasing superoxide production, Ann Neurol (2011) 70:583-590


Kim JY, Kim N, Yenari MA, Chang W, Mild hypothermia suppresses calcium sensing receptor (CaSR) induction following forebrain ischemia while increasing GABA-B receptor1 (GABA-B-R1) expression, Translational Stroke Research (2011) 2:195-201


Tang XN, Liu L, Koike MA, Yenari MA, Mild hypothermia reduces tissue plasminogen activator-related hemorrhage and BBB disruption after experimental stroke, Therapeutic Hypothermia and Temperature Management (2013) 3(2):74-83

D. RESEARCH SUPPORT (past 3 years)

Ongoing Research Support

R01 NS40516 (Yenari, PI) 8/15/01-5/31/15
NIH NINDS
Inflammatory Mechanisms in Cerebral Ischemia.
The major goals of this project are to study the inflammatory mechanisms of TREM-2 in vitro and in vivo following experimental stroke.

VA REAP (Swanson, PI) 07/01/09-06/30/14
“Multimodel strategies for improving recovery from brain injury” (Yenari, participating investigator)
This is a multi-PI project to study potential rehabilitative therapies plus pharmacological therapies to improve outcome from experimental stroke.

I01 BX000589 (Yenari, PI) 1/01/11-09/30/15
VA Merit
“Heat shock proteins in brain ischemia and stroke”
The major goals of this project are to explore the roles played by HSP70 in brain ischemia as it pertains to blood brain barrier integrity.

Completed Research Support

P50 NS014543 (P.H. Chan, PI) 9/27/02-6/30/12
NIH/NINDS
“CNS Injury and Edema Research Center” (Projects 2 & 3, Yenari, collaborator)
This project will examine the contribution of inflammation to blood brain barrier damage in stroke models.

DOD DAMD17-03-1-0532 (Yenari, PI) 5/01/09-4/30/11
DOD
“Regulation of matrix metalloproteinases by heat shock proteins in TBI”
This project will examine the role of HSP70 in suppressing matrix metalloproteinases in experimental brain trauma.

0540066N (Yenari) 1/1/05-12/31/09
American Heart Association Established Investigator Award
Mechanisms of heat shock protein protection
The major goals of this project are to study the mechanism by which heat shock proteins interact with the inflammatory transcription factor nuclear factor kappa B.

P01 NS37520 (G. K. Steinberg) 3/1/04-2/28/09
NIH/NINDS
"Center for Cerebrovascular Disease" (Project 1, Yenari, collaborator)
The goals of this project are to understand the molecular mechanisms underlying the pathogenesis of cerebral ischemia.
Appendix E: Letters of Support from Schools, Departments and Programs

Enclosed Letters of Support Include:

Program Directors
- Jason Cyster, PhD, Program Director of PhD in Biomedical Sciences
- Tejal Desai, PhD, Program Director of Master in Translational Medicine
- Chris Diederich, PhD, co-Chair of UCSF/UCB Graduate Program in Bioengineering
- Maria Glymour, PhD, Program Director of PhD in Epidemiology and Translational Science
- Roger Nicoll, PhD, Program Director of PhD in Neuroscience
- Mitul Kapadia, MD, Clinical Director, Physical Medicine and Rehabilitation Program

Deans
- Elizabeth Watkins, PhD, Dean, Graduate Division
- Sam Hawgood, MBBS, Dean, School of Medicine
- John Featherstone, MSc, PhD, Dean, School of Dentistry
- Joseph Guglielmo, PharmD, Dean, School of Pharmacy
- David Vlahov, RN, PhD, FAAN, Dean, School of Nursing

Department Chairs
- Ronald Arenson, MD, Chair, Department of Radiology and Biomedical Imaging
- Mitchell Berger, MD, Chair, Department of Neurological Surgery
- Stephen Hauser, MD, Chair, Department of Neurology
- Thomas Vail, MD, Chair, Department of Orthopaedic Surgery

San Francisco State University
- Linda Wanek, PT, PhD, Chair, Department of Physical Therapy at SFSU and Ann Hallum, PT, PhD, Dean, Graduate Studies at SFSU

Notes of Support from Basic Science Department Chairs and Basic Science Program Directors
January 22, 2014

UCSF Graduate Council
Academic Senate Office
UCSF Box 0764, MUE Room 253
San Francisco, CA 94143

Dear Council Members,

I write as Director of the PhD Program in Biomedical Sciences (BMS) at UCSF to enthusiastically support this proposal for the new degree, Doctor of Philosophy (PhD) in Rehabilitation Science within the Department of Physical Therapy and Rehabilitation Science at the University of California, San Francisco. Having discussed the proposal with Dr. Topp and her colleagues, I have learnt that this degree is an interdisciplinary endeavor that will offer new coursework in musculoskeletal biomechanics and clinically informed neuroscience, while also providing students access to coursework and professional colleagues in a variety of graduate programs, such as Epidemiology, Neuroscience, and Bioengineering. I am happy to add the BMS graduate program to this list. I was also pleased to hear that the PhD in Rehabilitation Science program will draw on the existing partnership between UCSF and San Francisco State University, and will provide students with the necessary skills to become leaders and researchers in rehabilitation within the dynamic new American health care system.

The BMS program seeks to equip students with the training and research tools to study the function of tissue and organ systems in development, physiology, and disease. The goals of our programs are in many ways complementary, and I see a range of opportunities for collaboration in our training efforts.

I am particularly enthusiastic about the benefits and opportunities generated by identifying coursework that can be shared across our graduate programs. Many of our PhD students have an interest in anatomy, neuroscience, and biomechanics, and the proposed program provides educational opportunities for our students and others at UCSF who are interested in enrolling in courses in these subject areas. I believe this PhD will further advance our working relationships across programs and help us embrace interprofessional collaboration and educational activities.

The development of the PhD in Rehabilitation Science program is timely and helps UCSF address the growing need for qualified faculty in Physical Therapy programs and investigators who can contribute to the body of research related to rehabilitation.

I sincerely hope this proposal for the PhD in Rehabilitation Science degree will be favorably reviewed and I offer my enthusiastic support for the development of this program. I look forward to continued collaboration with this degree program in the future.

Sincerely,

Jason Cyster, PhD
Program Director, PhD in Biomedical Sciences
Professor, Department of Microbiology & Immunology
January 31, 2014

UCSF Graduate Council
Academic Senate Office
UCSF Box 0764, MUE Room 253
San Francisco, CA 94143

Dear Council Members,

I enthusiastically write to support this proposal for the new degree, Doctor of Philosophy (PhD) in Rehabilitation Science within the Department of Physical Therapy and Rehabilitation Science at the University of California, San Francisco. This degree is an interdisciplinary endeavor that will offer new coursework in musculoskeletal biomechanics and clinically informed neuroscience, while also providing students access to coursework and professional colleagues in a variety of graduate programs, such as Epidemiology, Biomedical Sciences, Neuroscience, and Bioengineering. The PhD in Rehabilitation Science program draws on the existing partnership between UCSF and San Francisco State University, and will provide students with the necessary skills to become leaders and researchers in rehabilitation within the dynamic new American health care system.

I serve as Program Director of the UCSF Master of Translational Medicine Program, which is a multidisciplinary program focusing on technology and building the skills to navigate the challenges inherent in translating research from bench to bedside. Additionally, I am a core faculty member of the PhD Program in Bioengineering, which provides opportunities for basic and applied bioengineering research in a wide variety of related fields which reflect the strengths and breadth of program faculty. The goals of the PhD in Rehabilitation Science are in line with the MTM and PhD in Bioengineering programs, and this new program offers opportunity for collaboration between our graduate programs and the PhD Rehabilitation Science.

I am particularly enthusiastic about the benefits and opportunities generated by identifying coursework that can be shared across our graduate programs. Many of our students have an interest in anatomy, neuroscience, and biomechanics, and the proposed program provides educational opportunities for our students and others at UCSF who are interested in enrolling in courses in these subject areas. I believe this PhD will further advance our working relationships across programs and help us embrace interprofessional collaboration and educational activities.

The development of the PhD in Rehabilitation Science program is timely and helps UCSF address the growing need for qualified faculty in Physical Therapy programs and investigators who can contribute to the body of research related to rehabilitation.

I sincerely hope this proposal for the PhD in Rehabilitation Science degree will be favorably reviewed and I offer my enthusiastic support for the development of this program. I look forward to continued collaboration with this degree program in the future.

Sincerely,

Tejal Desai, PhD
Program Director, Master in Translational Medicine Program
Core Member, UCB/UCSF Graduate Group in Bioengineering
Professor, Bioengineering & Therapeutic Sciences
January 22, 2014

UCSF Graduate Council
Academic Senate Office
UCSF Box 0764, MUE Room 253
San Francisco, CA 94143

Dear Council Members,

The purpose of this letter is to enthusiastically state my support toward this proposal for the new degree program, Doctor of Philosophy (PhD) in Rehabilitation Science within the Department of Physical Therapy and Rehabilitation Science at the University of California, San Francisco. This degree is an interdisciplinary endeavor that will offer new coursework in musculoskeletal biomechanics and clinically informed neuroscience, while also providing students access to coursework and professional colleagues in a variety of graduate programs, such as Bioengineering, Biomedical Sciences, Neuroscience, and Epidemiology. This PhD in Rehabilitation Science program would build on the existing partnership between UCSF and San Francisco State University, and will provide students with the necessary skills to become leaders and scientific research experts in the field of rehabilitation within the ever dynamic new American health care system.

I am co-Chair of the UCB-UCSF Bioengineering Graduate Group for the joint PhD Program in Bioengineering at UCSF and UCB. This program provides opportunities for basic and applied bioengineering research in a wide variety of related fields, with close to 100 core faculty members, which reflect the strengths and breadth of program faculty across both campuses. The stated goals of the PhD in Rehabilitation Science are well in line with the PhD program in Bioengineering, and this new program offers opportunity for collaboration between our graduate program and the PhD Rehabilitation Science program.

I am particularly enthusiastic about the benefits and opportunities generated by identifying coursework that can be shared across our graduate programs. Many of our PhD students have an interest in anatomy, neuroscience, and musculoskeletal biomechanics, and the proposed program provides additional and complementary educational opportunities directly applicable for our students and others at UCSF who are interested in courses within these subject areas. I believe this PhD will further advance our working relationships and integration across programs, and facilitate inter-professional collaboration and educational activities.

The development of the PhD in Rehabilitation Science program at UCSF will address the growing need for qualified faculty in Physical Therapy programs and investigators who can contribute to the body of research related to rehabilitation.

I sincerely hope this proposal for the PhD in Rehabilitation Science degree will be favorably reviewed and I offer my enthusiastic support for the development of this program. I look forward to continued collaboration with this degree program in the future.

Sincerely,

Chris Diederich, PhD
Co-Chair, UCB-UCSF Joint Graduate Program in Bioengineering
Core Member, UCB/UCSF Graduate Group in Bioengineering
Professor, Radiation Oncology
Dear Council Members,

I enthusiastically write to support this proposal for the new degree, Doctor of Philosophy (PhD) in Rehabilitation Science within the Department of Physical Therapy and Rehabilitation Science at the University of California, San Francisco. This degree is an interdisciplinary endeavor that will offer new coursework in musculoskeletal biomechanics and clinically informed neuroscience, while also providing students access to coursework and professional colleagues in a variety of graduate programs, such as Epidemiology, Biomedical Sciences, Neuroscience, and Bioengineering, by allowing them to choose a curriculum tailored to their needs. The PhD in Rehabilitation Science program draws on the existing partnership between UCSF and San Francisco State University, and will provide students with the necessary skills to become leaders and researchers in rehabilitation within the dynamic new American health care system.

I direct the PhD Program in Epidemiology and Translational Science at UCSF, in which doctoral students receive high caliber training in core skills of epidemiologic and biostatistical methods along with opportunities for practical experience in applied research and public health translational activities. The goals of the PhD in Rehabilitation Science are in line with the PhD in Epidemiology and Translational Science, and this new program offers opportunity for collaboration between our graduate program in Epidemiology and the PhD Rehabilitation Science.

I am particularly enthusiastic about the benefits and opportunities generated by identifying coursework that can be shared across our graduate programs. Many of our PhD students have an interest in anatomy, neuroscience, and biomechanics, and the proposed program provides educational opportunities for our students and others at UCSF who are interested in enrolling in courses in these subject areas. I believe this PhD will further advance our working relationships across programs and help us embrace interprofessional collaboration and educational activities.

The development of the PhD in Rehabilitation Science program is timely and helps UCSF address the growing need for qualified faculty in Physical Therapy programs and investigators who can contribute to the body of research related to rehabilitation.

I sincerely hope this proposal for the PhD in Rehabilitation Science degree will be favorably reviewed and I offer my enthusiastic support for the development of this program. I look forward to continued collaboration with the PhD in Rehabilitation Science program in the future.

Sincerely,

Maria Glymour, ScD
Program Director, PhD in Epidemiology and Translational Science
Associate Professor
Department of Epidemiology and Biostatistics
Dear Council Members,

I enthusiastically write to support this proposal for the new degree, Doctor of Philosophy (PhD) in Rehabilitation Science within the Department of Physical Therapy and Rehabilitation Science at the University of California, San Francisco. This degree is an interdisciplinary endeavor that will offer new coursework in musculoskeletal biomechanics and clinically informed neuroscience, while also providing students access to coursework and professional colleagues in a variety of graduate programs, such as Epidemiology, Biomedical Sciences, Neuroscience, and Bioengineering, by allowing them to choose a curriculum tailored to their needs. The PhD in Rehabilitation Science program draws on the existing partnership between UCSF and San Francisco State University, and will provide students with the necessary skills to become leaders and researchers in rehabilitation within the dynamic new American health care system.

I direct the PhD Program in Neuroscience at UCSF, in which doctoral students are trained to be experts in one particular approach to neuroscientific research, while also having a strong general background in other areas of neuroscience and related disciplines. The goals of the PhD in Rehabilitation Science are in line with the PhD in Neuroscience, and this new program offers opportunity for collaboration between our graduate program in Neuroscience and the PhD Rehabilitation Science.

I am particularly enthusiastic about the benefits and opportunities generated by identifying coursework that can be shared across our graduate programs. Many of our PhD students have an interest in anatomy, neuroscience, and biomechanics, and the proposed program provides educational opportunities for our students and others at UCSF who are interested in enrolling in courses in these subject areas. I believe this PhD will further advance our working relationships across programs and help us embrace interprofessional collaboration and educational activities.

The development of the PhD in Rehabilitation Science program is timely and helps UCSF address the growing need for qualified faculty in Physical Therapy programs and investigators who can contribute to the body of research related to rehabilitation.

I sincerely hope this proposal for the PhD in Rehabilitation Science degree will be favorably reviewed and I offer my enthusiastic support for the development of this program. I look forward to continued collaboration with this degree program in the future.

Sincerely,

Roger Nicoll, MD
Program Director, Graduate Program in Neuroscience
Professor
Department of Cellular and Molecular Pharmacology
January 31, 2014

UCSF Graduate Council
Academic Senate Office
UCSF Box 0764, MUE Room 253
San Francisco, CA 94143

Dear Council Members,

I enthusiastically write to support this proposal for the new degree, Doctor of Philosophy (PhD) in Rehabilitation Science within the Department of Physical Therapy and Rehabilitation Science at the University of California, San Francisco. This degree is an interdisciplinary endeavor that will offer new coursework in musculoskeletal biomechanics and clinically informed neuroscience, while also providing students access to coursework and professional colleagues in a variety of graduate programs, such as Epidemiology, Biomedical Sciences, Neuroscience, and Bioengineering. The PhD in Rehabilitation Science program draws on the existing partnership between UCSF and San Francisco State University, and will provide students with the necessary skills to become leaders and researchers in rehabilitation within the dynamic new American health care system.

I am an Assistant Clinical Professor of Pediatrics and the Clinical Director of Pediatric Rehabilitation at the UCSF Benioff Children’s Hospital. I am a pediatric physiatrist, specializing in physical medicine and rehabilitation for infants, children and adolescents and treating disabling conditions, such as brain and spinal cord injuries, rheumatologic disorders, amputations or limb deficiencies, cancer, neurologic conditions, and orthopedic and musculoskeletal conditions. In this role, I work closely with the Physical Therapy department in the UCSF Medical Center and I can see the opportunities for collaboration with PhD students in the clinically-informed neuroscience track of the proposed PhD in Rehabilitation Science.

I am particularly enthusiastic about the benefits and opportunities generated by requiring students to participate in laboratory rotations in labs across the university. The proposed program provides educational opportunities for students to learn from a number of researchers across the University. I believe this PhD will further advance my working relationship with the Department of Physical Therapy and Rehabilitation Science and help us embrace interprofessional collaboration and educational activities.

The development of the PhD in Rehabilitation Science program is timely and helps UCSF address the growing need for qualified faculty in Physical Therapy programs and investigators who can contribute to the body of research related to rehabilitation.

I sincerely hope this proposal for the PhD in Rehabilitation Science degree will be favorably reviewed and I offer my enthusiastic support for the development of this program. I look forward to continued collaboration with this degree program in the future.

Sincerely,

Mitul Kapadia, MD
Assistant Clinical Professor
Department of Pediatrics
Clinical Director, Physical Medicine and Rehabilitation Program
UCSF Benioff Children’s Hospital
January 30, 2014

UCSF Graduate Council
Academic Senate Office
UCSF Box 0764, MUE Room 253
San Francisco, CA 94143

Dear Council Members,

I am writing to support this proposal for the new degree, Doctor of Philosophy (PhD) in Rehabilitation Science, within the Department of Physical Therapy and Rehabilitation Science at the University of California, San Francisco. This degree is an interdisciplinary endeavor that will offer new coursework in musculoskeletal biomechanics and clinically-informed neuroscience, while also providing students access to coursework and professional colleagues in a variety of graduate programs, such as Epidemiology and Translational Science, Biomedical Sciences, Neuroscience, and Bioengineering. The PhD in Rehabilitation Science program draws on the existing partnership between UCSF and San Francisco State University, while building on the strengths of basic science programs across UCSF and facilitating connections between the basic and clinical sciences. The PhD program will help address the growing need for research faculty in Physical Therapy programs and investigators who can contribute to the body of research in the interdisciplinary field of rehabilitation.

The goals of this program are in line with the vision and mission of UCSF, and this new program offers opportunity for collaboration across the University. The four professional schools and the Graduate Division have worked closely together to meet the needs of our students and the populations we serve, and this program will continue to strengthen those relationships. I believe this PhD will further advance our working relationships across programs and help us embrace interprofessional collaboration and educational activities.

I sincerely hope this proposal for the PhD in Rehabilitation Science degree will be favorably reviewed, and I offer my enthusiastic support for the development of this program. I look forward to watching this degree program grow through strong collaborations among schools, programs, faculty, and students.

Sincerely,

Elizabeth Watkins, PhD
Dean, Graduate Division
Vice Chancellor, Student Academic Affairs
Professor, History of Health Sciences
January 29, 2014

UCSF Graduate Council
Academic Senate Office
UCSF Box 0764, MUE Room 253
San Francisco, CA 94143

Dear Council Members,

I am writing to extend my support for the proposed new degree, Doctor of Philosophy (PhD) in Rehabilitation Science, within the Department of Physical Therapy and Rehabilitation Science at the University of California, San Francisco (UCSF). This degree is an interdisciplinary endeavor that will offer new coursework in musculoskeletal biomechanics and clinically-informed neuroscience, while also providing students access to coursework and professional colleagues in a variety of graduate programs, such as Epidemiology, Biomedical Sciences, Neuroscience, and Bioengineering.

The PhD in Rehabilitation Science program will draw on the existing partnership between UCSF and San Francisco State University, build on the strengths of basic science programs across UCSF, and facilitate connections between the basic and clinical sciences. The PhD program will help address the growing need for research faculty in Physical Therapy programs and investigators who can contribute to the body of research in the interdisciplinary field of rehabilitation.

The goals of this program are in line with the vision and mission of UCSF, and this new PhD program offers opportunity for collaboration across the University. The four professional schools and the Graduate Division have worked closely together to meet the needs of our students and the populations we serve, and this program will continue to strengthen those relationships. I believe this PhD program will further advance our working relationships across departments and schools and help us embrace interprofessional collaboration and educational activities.

I offer my enthusiastic support for the proposed program, and look forward to watching its development.

Thank you for your consideration.

Sincerely,

Sam Hawgood, MBBS
January 30, 2014

UCSF Graduate Council
Academic Senate Office
UCSF Box 0764, MUE Room 253
San Francisco, CA 94143

Dear Council Members,

I am writing to support the proposal for the new degree, Doctor of Philosophy (PhD) in Rehabilitation Science within the Department of Physical Therapy and Rehabilitation Science at the University of California, San Francisco. This degree is an interdisciplinary endeavor that will offer new coursework in musculoskeletal biomechanics and clinically-informed neuroscience, while also providing students access to coursework and professional colleagues in a variety of graduate programs, such as Epidemiology, Biomedical Sciences, Neuroscience, and Bioengineering. I am pleased to see that the PhD in Rehabilitation Science program draws on the existing partnership between UCSF and San Francisco State University, while building on the strengths of basic science programs across UCSF, and facilitating connections between the basic and clinical sciences. The PhD program will help address the growing need for research faculty in Physical Therapy programs and investigators who can contribute to the body of research in the interdisciplinary field of rehabilitation.

The goals of this program are in line with the vision and mission of UCSF, and this new program offers opportunity for collaboration across the University. The four professional schools and the Graduate Division have worked closely together to meet the needs of our students and the populations we serve, and this program will continue to strengthen those relationships. I believe this PhD will further advance our working relationships across programs and help us embrace interprofessional collaboration and educational activities.

I sincerely hope this proposal for the PhD in Rehabilitation Science degree will be favorably reviewed and I offer my enthusiastic support for the development of this program. I look forward to watching this degree program grow through strong collaborations across schools and programs.

Yours Sincerely,

John D. B. Featherstone, M.Sc., Ph.D.
Dean and Distinguished Professor
UCSF School of Dentistry
January 29, 2014

UCSF Graduate Council
Academic Senate Office
UCSF Box 0764, MUE Room 253
San Francisco, CA 94143

Dear Council Members,

I am writing in strong support of this proposal for the new degree, Doctor of Philosophy (PhD) in Rehabilitation Science within the Department of Physical Therapy and Rehabilitation Science at the University of California, San Francisco. This unique interdisciplinary endeavor will offer new coursework in musculoskeletal biomechanics and clinically-informed neuroscience, while also providing students access to coursework and professional colleagues in other graduate programs, including Epidemiology, Biomedical Sciences, Neuroscience, and Bioengineering.

The PhD in Rehabilitation Science program draws on the existing partnership between UCSF and San Francisco State University, while building on the strengths of core science programs across UCSF, and facilitating connections between the basic and clinical sciences. The PhD program will help address the growing need for research faculty in Physical Therapy programs and investigators who can contribute to the body of research in the interdisciplinary field of rehabilitation.

The goals of this program are in line with the vision and mission of UCSF, and this new program offers opportunity for collaboration across the University. The four professional schools and the Graduate Division have worked together to meet the needs of our students and the populations we serve, and this program will continue to strengthen those relationships. This PhD will further advance relationships across programs toward optimal interprofessional collaboration and educational activities.

I offer my enthusiastic support for the development of this novel program, and I look forward to its development.

Sincerely,

B. Joseph Guglielmo, PharmD
Dean
Troy C. Daniels Distinguished Professor in Pharmaceutical Sciences
January 30, 2014

UCSF Graduate Council
Academic Senate Office
UCSF Box 0764, MUE Room 253
San Francisco, CA 94143

Dear Council Members,

I am writing to support this proposal for the new degree, Doctor of Philosophy (PhD) in Rehabilitation Science within the Department of Physical Therapy and Rehabilitation Science at the University of California, San Francisco. This degree is an interdisciplinary endeavor that will offer new coursework in musculoskeletal biomechanics and clinically-informed neuroscience, while also providing students access to coursework and professional colleagues in a variety of graduate programs, such as Epidemiology, Biomedical Sciences, Neuroscience, and Bioengineering. The PhD in Rehabilitation Science program draws on the existing partnership between UCSF and San Francisco State University, while building on the strengths of basic science programs across UCSF, and facilitating connections between the basic and clinical sciences. The PhD program will help address the growing need for research faculty in Physical Therapy programs and investigators who can contribute to the body of research in the interdisciplinary field of rehabilitation.

The goals of this program are in line with the vision and mission of UCSF, and this new program offers opportunity for collaboration across the University. The four professional schools and the Graduate Division have worked closely together to meet the needs of our students and the populations we serve, and this program will continue to strengthen those relationships. I believe this PhD will further advance our working relationships across programs and help us embrace interprofessional collaboration and educational activities.

I sincerely hope this proposal for the PhD in Rehabilitation Science degree will be favorably reviewed, and I offer my enthusiastic support for the development of this program. I look forward to watching this degree program grow through strong collaborations across schools and programs.

Sincerely,

[Signature]

David Vlahov, RN, PhD, FAAN
Dean, School of Nursing
Professor, Department of Community Health Systems
Professor, Department of Epidemiology and Biostatistics
January 22, 2014

UCSF Graduate Council
Academic Senate Office
UCSF Box 0764, MUE Room 253
San Francisco, CA 94143

Dear Council Members,

We enthusiastically write to support this proposal for the new degree, Doctor of Philosophy (PhD) in Rehabilitation Science within the Department of Physical Therapy and Rehabilitation Science at the University of California, San Francisco. This degree is an interdisciplinary endeavor that will offer new coursework in musculoskeletal biomechanics and clinically informed neuroscience, while also providing students access to coursework and professional colleagues in a variety of graduate programs, such as Epidemiology, Biomedical Sciences, Neuroscience, Radiology and Biomedical Imaging and Bioengineering. The PhD in Rehabilitation Science program draws on the existing partnership between UCSF and San Francisco State University, and will provide students with the necessary skills to become leaders and researchers in rehabilitation within the dynamic new American health care system.

Dr. Arenson is the Chair and Dr. Majumdar is the Vice Chair for Research in the Department of Radiology and Biomedical Imaging at UCSF, which provides opportunities for basic and clinical research in a wide variety of related fields that reflect the strengths and breadth of program faculty. The goals of the PhD in Rehabilitation Science are in line with the Department of Radiology and Biomedical Imaging, and this new program offers opportunity for collaboration between our graduate program and the PhD in Rehabilitation Science.

We are particularly enthusiastic about the benefits and opportunities generated by identifying coursework that can be shared across our graduate programs. Many of our students have an interest in anatomy, neuroscience, and biomechanics, and the proposed program provides educational opportunities for our students and others at UCSF who are interested in enrolling in courses in these subject areas. We believe this PhD will further advance our working relationships across programs and help us embrace interprofessional collaboration and educational activities.

The development of the PhD in Rehabilitation Science program is timely and helps UCSF address the growing need for qualified faculty in Physical Therapy programs and investigators who can contribute to the body of research related to rehabilitation.
We sincerely hope this proposal for the PhD in Rehabilitation Science degree will be favorably reviewed and offer our enthusiastic support for the development of this program. We look forward to continued collaboration with this degree program in the future.

Sincerely,

Ronald L. Arenson, MD
Alexander R. Margulis Distinguished Professor
Chair, Department of Radiology and Biomedical Imaging

Sharmila Majumdar, Ph.D.
Vice Chair for Research, Professor, and
Director Musculoskeletal and Quantitative Imaging Research Group (MQIR),
Department of Radiology and Biomedical Imaging, UCSF
Professor Dept. of Orthopedic Surgery, UCSF
and Professor, Dept. of Bioengineering, UC Berkeley
January 28, 2014

UCSF Graduate Council
Academic Senate Office
UCSF Box 0764, MUE Room 253
San Francisco, CA 94143

Dear Council Members,

I enthusiastically write to support this proposal for the new degree, Doctor of Philosophy (PhD) in Rehabilitation Science within the Department of Physical Therapy and Rehabilitation Science at the University of California, San Francisco. This degree is an interdisciplinary endeavor that will offer new coursework in musculoskeletal biomechanics and clinically-informed neuroscience, while also providing students access to coursework and professional colleagues in a variety of graduate programs, such as Epidemiology, Biomedical Sciences, Neuroscience, and Bioengineering, by allowing them to choose a curriculum tailored to their needs. The PhD in Rehabilitation Science program draws on the existing partnership between UCSF and San Francisco State University, and will provide students with the necessary skills to become leaders and researchers in rehabilitation within the dynamic new American health care system.

As the Chair of the Department of Neurological Surgery, I see the potential for collaboration between our faculty and the proposed PhD in Rehabilitation Science. The goals of this program are in line with the vision and mission of UCSF, and this new program offers opportunity for collaboration across the University.

I am particularly enthusiastic about the benefits and opportunities generated by identifying coursework that can be shared across graduate programs. I believe this PhD will further advance our working relationships across programs and help us embrace interprofessional collaboration and educational activities.

The development of the PhD in Rehabilitation Science program is timely and helps UCSF address the growing need for qualified faculty in Physical Therapy programs and investigators who can contribute to the body of research related to rehabilitation.
I sincerely hope this proposal for the PhD in Rehabilitation Science degree will be favorably reviewed and I offer my enthusiastic support for the development of this program. I look forward to continued collaboration with this degree program in the future.

Sincerely,

Mitchei S. Berger, MD, FACS, FAANS
Berthold and Belle N. Guggenheim Professor
Chairman, Department of Neurological Surgery
Director, Brain Tumor Research Center
University of California, San Francisco
Dear Council Members,

I write with great enthusiasm, and no reservations whatsoever, in support of this proposal for the new degree, Doctor of Philosophy (PhD) in Rehabilitation Science within the Department of Physical Therapy and Rehabilitation Science at the University of California, San Francisco. This degree is an interdisciplinary endeavor that will offer new coursework in musculoskeletal biomechanics and clinically-informed neuroscience, while also providing students access to coursework and professional colleagues in a variety of graduate programs, such as Epidemiology, Biomedical Sciences, Neuroscience, and Bioengineering, by allowing them to choose a curriculum tailored to their needs. The PhD in Rehabilitation Science program draws on the existing partnership between UCSF and San Francisco State University, and will provide students with the necessary skills to become leaders and researchers in rehabilitation within the dynamic new American health care system.

As the Chair of the Department of Neurology, I see extraordinary potential for tight-knit collaboration between our faculty and the proposed PhD in Rehabilitation Science. Developing effective ways to protect residual function, and restore lost capabilities for terrible brain diseases, is the next frontier for the clinical neurosciences. Advances in imaging, bioengineering, stem cell biology, as well as experimental therapeutics set the stage for truly dramatic advances in our lifetimes. We have many outstanding faculty who will be natural partners and mentors for the new program; they include Gary Abrams, Karunesh Ganguly, Wade Smith, Bruce Miller, and Adam Gazzaley, among others. Thus, the goals of this program are absolutely in line with the vision and mission of our department, and this new program offers opportunity for collaboration across the University.

I’m particularly enthusiastic about the benefits and opportunities generated by identifying coursework that can be shared across graduate programs. I believe this PhD will further advance our working relationships across programs and help us embrace interprofessional collaboration and educational activities.

The development of the PhD in Rehabilitation Science program is timely and helps UCSF address the growing need for qualified faculty in Physical Therapy programs and investigators who can contribute to the body of research related to rehabilitation.

I hope that this proposal for the PhD in Rehabilitation Science degree will be favorably reviewed and I offer my enthusiastic support for its development.

Sincerely,

Stephen L. Hauser, M.D.
Robert A. Fishman Distinguished Professor and Chair
Dear Council Members,

I enthusiastically write to support this proposal for the new degree, Doctor of Philosophy (PhD) in Rehabilitation Science within the Department of Physical Therapy and Rehabilitation Science at the University of California, San Francisco. This degree is an interdisciplinary endeavor that will offer new coursework in musculoskeletal biomechanics and clinically-informed neuroscience, while also providing students access to coursework and professional colleagues in a variety of graduate programs, such as Epidemiology, Biomedical Sciences, Neuroscience, and Bioengineering, by allowing them to choose a curriculum tailored to their needs. The PhD in Rehabilitation Science program draws on the existing partnership between UCSF and San Francisco State University, and will provide students with the necessary skills to become leaders and researchers in rehabilitation within the dynamic new American health care system.

As the Chair of the Department of Orthopaedic Surgery, I see the potential for collaboration between our faculty and the proposed PhD in Rehabilitation Science. The goals of this program are in line with the vision and mission of UCSF, and this new program offers opportunity for collaboration across the University.

I am particularly enthusiastic about the benefits and opportunities generated by identifying coursework that can be shared across graduate programs. I believe this PhD will further advance our working relationships across programs and help us embrace interprofessional collaboration and educational activities.

The development of the PhD in Rehabilitation Science program is timely and helps UCSF address the growing need for qualified faculty in Physical Therapy programs and investigators who can contribute to the body of research related to rehabilitation.

I sincerely hope this proposal for the PhD in Rehabilitation Science degree will be favorably reviewed and I offer my enthusiastic support for the development of this program. I look forward to continued collaboration with this degree program in the future.

Sincerely,

Thomas P. Vail, MD
Professor and Chairman
Department of Orthopaedic Surgery
Dear Council Members,

We are writing to support the proposal for the new degree, Doctor of Philosophy (PhD) in Rehabilitation Science housed within the Department of Physical Therapy and Rehabilitation Science at the University of California, San Francisco. The Ph.D. in Rehabilitation Science, offered in collaboration with faculty from the Department of Physical Therapy and Clinical Laboratory Science at San Francisco State University, will address the growing need for research faculty in physical therapy programs and increase the number of investigators who can contribute to the body of research in the interdisciplinary field of rehabilitation.

Drawing on the strengths of both universities, this bold step to offer a doctorate in Rehabilitation Science will increase the opportunity for extramural support gained by faculty at both universities. PhD students will also be able to participate in laboratory rotations and mentoring with faculty at SFSU in addition to UCSF. Therefore, we support the PhD proposal and continued collaboration between SFSU and UCSF.

Sincerely,

Linda Wanek, PT, PhD
Professor and Chair
Department of Physical Therapy and Clinical Laboratory Science
San Francisco State University

Ann Hallum, PT, PhD
Dean, Graduate Studies
San Francisco State University
Letters of Support from Basic Science Department Chairs and Basic Science Program Directors

**Basic Science Department Chairs**

From:  David Julius, PhD <David.Julius@ucsf.edu>
Professor and Chair, Department of Physiology
Date:  January 26, 2014 1:35 PM

Hello Kim,

Yes, I am in support of your plans for this new graduate program in Rehabilitation Science.

Very best,
DJ

From:  Grae Davis, PhD <Graeme.Davis@ucsf.edu>
Professor and Chair, Department of Biochemistry and Biophysics
Date:  January 26, 2014 6:40 PM

Hi Kim-

I am supportive. Best of luck with this.

Cheers
Grae

From:  Kathy Giacomini, PhD <Kathy.Giacomini@ucsf.edu>
Professor and Chair, Department of Bioengineering and Therapeutic Sciences
Date:  January 27, 2014 7:21 AM

Hi Kim,

I also support your proposed PhD in Rehabilitation Science and see potential synergies with our joint UC Berkeley-UCSF Bioengineering PhD program.

Kathy

From:  Allan Basbaum, PhD <Allan.Basbaum@ucsf.edu>
Professor and Chair, Department of Anatomy
Date:  January 26, 2014, 10:03 PM

Dear Kim,

I am very happy to support the proposal. Seems to me that greater reference to the strength of UCSF in preclinical and clinical studies of pain might be valuable. I noted that there was only one reference to pain (in the context of arthritis). Given that the proposed program indicates that fundamental studies (molecular, etc.) are envisioned, perhaps the pain faculty hear (in addition to Christine Miaskowski) can be helpful.

Good look with the proposal.

Regards,
Allan
From: Lewis Lanier, PhD <Lewis.Lanier@ucsf.edu>
Professor and Chair, Department of Microbiology and Immunology
Date: January 27, 2014 9:39 AM
Sounds like a great program - happy to support.
Lewis

From: Kevan Shokat, PhD <Kevan.Shokat@ucsf.edu>
Professor and Chair, Department of Cellular and Molecular Pharmacology
Date: January 27, 2014 9:25 AM
Dear Kim,
Great work on getting the program off the ground. I'm in support also.
Best,
Kevan

Basic Science Graduate Program Directors

From: Matt Jacobson, PhD <Matt.Jacobson@ucsf.edu>
Professor and Vice Chair, Pharmaceutical Chemistry; Director, Biophysics Graduate Program
Date: January 25, 2014 8:40 PM
I am happy to provide my support, but it would be good, at some point, to discuss a little more your vision for this program, including opportunities to connect to the basic sciences.
-- Matt

From: Charles Craik, PhD <Charles.Craik@ucsf.edu>
Professor, Pharmaceutical Chemistry; Director, Chemistry and Chemical Biology Graduate Program
Date: January 26, 2014 12:26 AM
Hi Kim,
I am more than happy to provide my support. I like the proposal you outline. At some point it would be good to see the faculty that you will have in the program, how you choose them and how you plan to support the students in their labs. We have one quarter of teaching until they pass their qualifying exam in their second year and then they can do more teaching after that if they are interested. I expect these will be questions you get asked at graduate council. Hope it goes well.
Best,
Charly

From: Patricia Babbitt, PhD <babbitt@cgl.ucsf.edu>
Professor, Bioengineering and Therapeutic Sciences; Director, Biological and Medical Informatics Program
Date: January 26, 2014 12:08 PM
Hi Kim,
I also am happy to provide my support. If you want to talk at some point about how Bioinformatics might fit into your program, I'd be happy to meet with you. I second Charly's points as well.
Patsy
Hi Kim:

I am also happy to provide my support, and I look forward to hearing more about the program.

All the best,
Dave

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Hi Kim,

Likewise, I'm happy to support your new program and eager to learn more. While stem cell therapies remain, outside of blood and skin, largely a fantasy, there might be some synergy between DSCB and Rehabilitation Science in years to come.

Best,
Jeremy

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Hi Kim,

Sorry, was out when this came and still playing catch up. PSPG is in support of this new program and I hope we can find ways to interact.

Best,
Deanna