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Stanford | MEDICINE

May 14, 2022

Kim Butts Pauly, PhD (PD)
Daniel Ennis, PhD (Co-PD)
1201 Welch Road, P262
Stanford, CA 94305

Re: Translational Biomedical Imaging Instrumentation (TBI^2) Training Program - T32 Submission

Dear Drs. Butts Pauly and Ennis:

I am pleased to offer enthusiastic support from the School of Medicine (SOM) for the submission of your NIH/NIBIB T32 entitled, "*Stanford's Translational Biomedical Imaging Instrumentation (TBI^2) Training Program*" for predoctoral graduate students. Your TBI^2 T32 will be an important and unique program for training the next generation of translational biomedical imaging experts. It is both exciting and unique that your TBI^2 training program bridges disciplines between the School of Medicine and the School of Engineering. This provides a remarkable opportunity for TBI^2 trainees to leverage a broad range of clinical and scientific disciplines. Trainees will be enabled to develop cutting edge and translational imaging technologies that will find their way into routine clinical practice at Stanford and beyond. The proposed group of research mentors and clinical co-mentors are world-leaders in their respective fields, have substantial track records of running high-impact research labs, and are regarded as educational innovators in biomedical imaging.

I would also like to **underscore my excitement for the recently established BMP PhD program** that represents a major evolution of the biomedical imaging research enterprise at Stanford. This world-class interdisciplinary program in medical physics, diagnostic imaging, and molecular imaging and diagnostics fills a critical need at Stanford by providing a unique training opportunity for graduate students at Stanford, particularly for physics, chemistry, bioscience, and engineering students aiming to become the next generation of innovators and leaders addressing the challenges of translational biomedical imaging.

Herein, I want to highlight and summarize the **specific institutional support** provided by the SOM and Department of Radiology for your TBI^2 training program, with further details provided after this summary:

Trainee Stipend Support: Stanford will provide funds for the "gap" between TBI^2 support and Stanford tuition+stipend+fees. The three PhD programs (BMP, Electrical Engineering, and Bioengineering) will provide "gap" support. This totals ≥$40k/year for each trainee.

Program Director and Co-Director Support: 15% and 5% effort will be covered by the Department of Radiology.

Trainee Space and Equipment: TBI^2 trainees will have access to substantial office, lab, and research space and core facilities that provide an enriching space to discuss projects, invention solutions, and test new ideas.

Trainee Mentoring: High quality T32 trainee mentoring is ensured by classes in Rigor and Reproducibility (R&R) and Responsible Conduct of Research (RCR) and by an SOM "Mentoring the Mentor" course for mentors.

Training Program Evaluation: The T32 trainee experience is further improved by a SOM program that provides training program evaluation to the program directors. This feedback evaluates strengths and weaknesses to continually improve the T32 training experience.

Trainee Staff Support: T32 trainees have substantial support in biostatistics, experimental design, grant writing, career mentoring, and wellness mentoring that provide a comprehensively supportive trainee environment.

Ensuring Diversity, Equity, Inclusion: The SOM provides a range of programs to ensure diversity, equity, and inclusion across all aspects of our training programs. This includes active recruitment before matriculation, summer programs for skill building after accepting admissions, and additional programs throughout their training.

Below we provide additional details for this institutional support available to the TBI^2 T32 trainees.

1. Developing and promoting a culture that advances the highest standards of scientific rigor and reproducibility, and exceptional training in the responsible conduct of research.

The SOM supports comprehensive training in both (**1A**) **scientific rigor and reproducibility** and (**1B**) the **responsible conduct of research**. Course faculty are directly supported to offer these courses by way of SOM and Departmental resources. In addition to courses, workshops are regularly offered to provide trainees with mentoring and training in comprehensive literature research, study design, biostatistics, and grant preparation. Some examples include the following:

1A. Scientific Rigor and Reproducibility (R&R) – The SOM aims to enhance graduate training in experimental design and data collection, organization, and analysis, and to integrate computational competence-building activities into the graduate curriculum. The University's Research Policy Handbook provides guidance and describes policies on the conduct of research, faculty responsibilities to staff and students, authorship, non-discrimination in research agreements, misconduct, and retention and access to data. SOM offerings include:

Foundations of Statistics and Reproducible Research (BIOS 217): This required mini-course for first-year TBI^2 trainees covers basic principles of experimental design, analysis, statistical reasoning, and tools to make research reproducible.

Ethics, Rigor, and Reproducibility in Medical Imaging (RAD 256) – This is a TBI^2 required course designed to engage students in both the ***responsible conduct of research*** (RCR) and ***scientific rigor and reproducibility***. The course covers topics that are relevant to trainees as they become independent researchers in biomedical imaging and is intended to provide both a refresher of responsible conduct of research topics covered in MED 225. It will also provide new content related to scientific rigor and reproducibility in biomedical imaging and topics selected to align with TBI^2 trainee research projects. *TBI^2 Faculty Participation* – The course will be directed by one of our TBI^2 mentors and the course discussions will be led by our TBI^2 mentors and co-mentors.

Software Engineering Tools for Reproducible Research: Software engineering tools useful for reproducible research in the biomedical sciences. Topics include: Unix command line, common data representations, regular expressions for pattern matching, virtual machines, use of servers, and open-source software design.

Foundations in Experimental Biology: Designed for first-year graduate students to facilitate critical first steps toward becoming independent scientists with "Rigor & Reproducibility" training incorporated.

Stanford Biosciences Grant Writing Academy: Each year this course provides instruction to >100 graduate students (2nd years and beyond) to help them create proposals as preparation for F and K fellowship applications. Emphasis is placed on Rigor & Reproducibility, Responsible Conduct of Research, Biological Variables, Inclusion Across the Lifespan, and Authentication of Key Biological and/or Chemical Resources.

The Data Studio: Workshops and office-hours provide specialized focus in biomedical rigor and reproducibility. In-depth consultations for researchers are based on research questions, data, and statistical needs.

Just Enough Software Engineering (BIOS 207): This mini-course teaches the software engineering skills that promote collaboration, reproducibility, reliability, defensive programming, unit tests, and documenting data.

The Practice of Reproducible Research (BIOS 216): This covers data management practices and computational approaches to facilitate version control, reproducible workflows, and data archiving.

Stanford Library Workshops: Workshops cover project documentation, version control, creating pre-analysis plans, and enhancing scientific workflows by using open-source tools including OpenfMRI (developed by the Stanford Center for Reproducibility in Neuroscience). Meta-Research Innovation Center at Stanford (METRICS) workshops aim to transform research practices to improve the reproducibility, efficiency and quality of scientific investigation.

Additional training grant details are provided in the TBI^2 Program Plan – **III. Plan for Instruction in Methods for Enhancing Reproducibility**.

1B. Responsible Conduct of Research (RCR) – The SOM supports a myriad of courses for our trainees to gain expertise in the responsible conduct of research. The SOM offers 22 courses related to research ethics. The

School of Education offers two courses related to ethics and the Law School offers one research ethics course. There is also a program in Bioethics and Film. Specific courses are highlighted below.

> _Responsible Conduct of Research (MED 255)_ – All Stanford graduate students are required to take this course offered by the Stanford Center for Biomedical Ethics and supported by the SOM. Topics include: (1) conflict of interest; (2) policies regarding human subjects; (3) mentor/mentee responsibilities; (4) collaborative research; (5) peer review; (6) data acquisition; (7) research misconduct; and (8) contemporary ethical issues. In addition to offering MED 255, the Center offers programs, seminars, and journal clubs in several areas including Neuroethics, Stem Cells and Society, Bioengineering, and Integration of Research on Genetics and Ethics.

> _Ethics, Rigor, and Reproducibility in Medical Imaging_ (RAD 256) – This is a TBI[2] required course designed to engage students in both the **responsible conduct of research** (RCR) and **scientific rigor and reproducibility**. This course is described in more detail above and in the R&R and RCR descriptions of the program plan.

Additional training grant details are provided in the TBI[2] Program Plan – **II. Plan for Instruction in the Responsible Conduct of Research.**

2. Ensuring sufficient start-up funding to permit early-stage faculty to participate in training, and bridge funding to ensure that training may continue if a mentor experiences a hiatus in funds.

Per SOM policy, **start-up funds are provided** and documented in offer letters. The Office of Academic Affairs and Faculty Compensation reviews offer letters to ensure start-up funds are adequate. Start-up funds cover research expenses typically for the first 3-4 years, including supplies, equipment, and personnel. In some departments, start-up also includes assistance with housing and salary (if not covered by funding). **Bridge funding is provided** in the case of a hiatus in funding. Bridge funding in clinical departments is decided at the department level. Bridge and seed funding is also available by application to SOM centers and institutes (e.g., Stanford Cancer Institute, Center for Artificial Intelligence in Medicine and Imaging (AIMI), the Institute for Human-Centered Artificial Intelligence (HAI), Maternal and Child Health Research Institute, Wu Tsai Human Performance Alliance, SPARK Translational Research Program, and many more).

3. Supporting core facilities and technology resources and how they are be used to enhance training.

As detailed in the TBI[2] application, the predoctoral trainees in this program benefit from outstanding facilities and resources provided by Stanford University and its schools. The extraordinary level of investment of the University and schools in the research environment – new buildings, centers and institutes, shared instrumentation facilities, and other research resources – has played a large role in building outstanding laboratory, translational, and clinical research environments. Several exemplary state-of-the-art facilities are central to the TBI[2] program. 1) **The Lucas Center for Imaging** is a biomedical imaging center with two 3T MRI scanners, one 3T PET/MR, one MRI with several focused ultrasound systems, MR elastography, multi-nuclear imaging capabilities, a 7T whole-body MRI scanner, a radiopharmaceutical cyclotron, a comprehensive electronics lab, and numerous wet and dry lab spaces. The Lucas Center supports human subjects research, radiopharmaceutical development, preclinical work, and imaging technology development. 2) The **James H. Clark Center** for interdisciplinary biomedical research supports preclinical research with a 7T MRI, microCT, microPET, high frequency ultrasound, SPECT, optical, and magnetic particle imaging. The Clark Center also houses the 3) **Stanford Biodesign Program** that teaches students how to solve biomedical problems with multi-disciplinary design thinking. 4) The **Falk Cardiovascular Research Center** enables human subjects and preclinical cardiac/cardiovascular magnetic resonance imaging. 5) The **Magnetic Resonance Systems Research Lab** (MRSRL) supports advanced hardware and software developments for human-subjects MRI projects. Translational research opportunities in the clinic are available through 6) the **Stanford Hospital and Clinics** and 7) **Lucile Packard Children's Hospital**. 8) The **Center for Artificial Intelligence in Medicine and Imaging** provides an incubator for translational AI and 9) the **Stanford Institute for Human-Centered Artificial Intelligence** focuses on artificial intelligence and places an emphasis on developing approaches that are socially and culturally aware.

Each of **these SOM resources enhance trainee growth** by providing them with access to world-class facilities and world-leading researchers able to help refine project scope, depth, and impact.

4. Providing adequate staff, facilities, and educational resources to the planned program.
The SOM and the Radiology Department (see Section-5 below) provide a range of staff, facilities (see Section-3 above and the Facilities section), and educational resources for the TBI^2 training program including:

School of Medicine Staff – The SOM is committed to providing academic advising in support of graduate student scholarly and professional development. The TBI^2 program director and co-director serve as the faculty advisor for all TBI^2 training grant students. In this role they will help trainees design their academic program; this role transitions to the PhD research mentor once trainees have joined a laboratory. Research mentors are expected to guide students in key areas such as selecting remaining courses, designing and conducting research, developing teaching skills, navigating policies and degree requirements, and exploring academic and professional opportunities. Additional mentorship is provided by the training program's clinical co-mentors.

The office of Dr. Sheri Krams, as Senior Associate Dean of Graduate Education and Postdoctoral Affairs, centrally tracks all Thesis Committee meetings to ensure our graduate students receive the guidance and support they deserve. The office of the Senior Associate Dean has also structured a systematic Individual Development Plan (IDP) specifically tailored to each stage of a trainee's progress through graduate school and postdoctoral training, comprehensively assess each trainee's academic, professional and career progress, and create a clear action plan toward achieving goals and milestones in those areas. Stanford has a tracking system to ensure every NIH supported PhD candidate completes an IDP and meets at least once annually with his/her advisor for discussion.

Finally, the office of Dr. Krams supports all T32 training grant directors by hosting a quarterly meeting to share best practices and discuss topics of interest, and my office carries out official program reviews, including interdepartmental, departmental, and T32 program reviews.

Facilities - TBI^2 trainees will have fluid access to the remarkable research infrastructure in the Radiological Sciences Lab (RSL), Molecular Imaging Program at Stanford (MIPS), Integrative Biomedical Imaging Informatics at Stanford (IBIIS), and the Incubator for Medical Mixed and Extended Reality at Stanford (IMMERS). These are in addition to the core facilities described in Section-3 above.
Educational Resources – Stanford provides a wealth of educational resources from coursework, to facilities, to faculty and staff. These are more fully described in the proposal and are available to all trainees.

5. Supporting the Program Directors and other key staff associated with the TBI^2 Training Program.
The SOM together with the Departments provide support to both the Program Directors, faculty, and the key staff associated with running the TBI^2 training program. The program faculty of the TBI^2 program have outstanding records of scholarship and are dedicated to research, mentoring and teaching. Nevertheless, my office gives full authority to the program directors to remediate or remove participating faculty from the program who are poorly performing mentors based on SOM guidelines and policies. The support directly provided to TBI^2 includes:

Program Director Support – The TBI^2 Program Director (Dr. Butts Pauly) and Co-Director (Dr. Ennis) will be provided with 15% and 5% salary support, respectively. This ensures protected time to oversee the TBI^2 training program, mentor trainees, and work with faculty and staff to ensure a high-quality training program.

Faculty Support – The TBI^2 research mentors and clinical co-mentors each have an academic responsibility and an allocation of effort that allows them to engage with and train the next generation of biomedical imaging scientists. Faculty effort is also provided to enable key faculty to provide courses specific to the TBI^2 program.

Staff Support – The TBI^2 training program is further supported by a team of outstanding staff. Your department provides on-going support in the way of TBI^2 administration (Ms. Bonini), student services (Mr. Kim and Ms. Gonzales), biostatistics (Dr. Rosenberg), and technical computing (Dr. Brosnan).

6. Ensuring that faculty with a role in the proposed program have time available to devote to their responsibilities to the program.

The SOM recognizes the critical importance of mentoring trainees. Each faculty member's percent effort with respect to teaching (mentoring, training, and courses), research, clinical care, and administration is articulated and reviewed annually by the department. Together we ensure that TBI[2] faculty have adequate time to direct and support the TBI[2] training program (please see Section-5 above too). Training grant research mentors and clinical co-mentors are also provided the necessary time to grow and excel as faculty mentors and are encouraged to participate in the SOM's *Mentoring the Mentor* program.

Mentoring the Mentor – TBI[2] training grant faculty are encouraged to participate in institutional mentor training workshops from the office of Dean Krams to support T32 faculty on a regular basis. Topics include Mentor/Mentee Communications; Trust, Conflict Management, Building Better Communication; Trainee Career and Professional Development; Addressing Equity and Inclusion; Culturally Sensitive Mentoring; Ethics and Responsible Research; Supporting Trainee Wellness; and Negotiation. Your T32 mentors have leveraged the resources made available by the School of Medicine to learn from other T32 mentors and program directors and to discuss best practices for overseeing and continuously improving the training experience for our trainees.

7. Considering activities integral to excellent graduate training (such as teaching and mentorship) in promotion decisions.

The purpose of the faculty appointment, reappointment, or promotion evaluation is to evaluate the candidate's standing in and impact on their scholarly discipline (broadly defined) and the candidate's quality as a teacher and mentor (and as a clinician, if applicable). Teaching is broadly defined to include: the classroom, laboratory, or clinical setting; advising; mentoring; program building; and curricular innovation. The University's review of teaching and mentoring is a pillar of the faculty evaluation during the re-appointment and/or promotion process. The appraisal includes review of teaching and mentor evaluations. We take the evaluation process very seriously and provide feedback to faculty in annual reviews all along the path to promotion. When weaknesses are identified, the resources are available to coach faculty, mentor the mentor, and discuss opportunities to make improvements year over year. Stanford's **Center for Teaching and Learning** provides another remarkable resource that supports and promotes effective teaching and learning across the Stanford community. The Department of Radiology has appointed Dr. Daniel Spielman (also a TBI[2] mentor) as the **Director of Graduate Education** and he will oversee this process and provide direct input for the TBI[2] training program.

8. Promoting diversity and inclusion at all levels of the research training environment (trainees, staff, faculty, and leadership).

Stanford is committed to fostering a diverse community in which all individuals are welcomed, respected, and supported to achieve their full potential. We value diversity because we know that interaction amongst people with unique backgrounds and life experiences allows us to reach a new level of innovation in education, scientific research, and clinical medicine. University, SOM, and Departmental diversity commitments complement each other and provide several active approaches to promoting diversity and inclusion at all levels. Some examples of programs that can foster diversity amongst TBI[2] T32 trainees include the following programs:

Inclusion, Diversity, Equity, and Access in a Learning Environment (IDEAL) (**Campus wide**) – The IDEAL initiative aims to ensure: that diversity of thought is represented; and that all members of the Stanford community feel that they belong, are supported, and have access to the opportunities and benefits of the University.
Biosciences Recruitment (**Graduate Students**) – Stanford commits substantial resources and effort toward recruiting a diverse student cohort to its Biosciences PhD programs. In the SOM the impact of this program has been a ~22-25% increase in URM enrollment since 2014.
ADVANCE (**Post-Baccalaureate**) – An eight-week intensive summer transition program, supports the success and retention of incoming graduate students from underrepresented and disadvantaged backgrounds.

Participants in the program engage in activities centered on academic development, professional development, and community building – all of which seek to prepare them for a successful graduate career. The program strives to foster community, leadership, and excellence in an interactive learning environment.

REACH Program in Research (**Post-Baccalaureate**) – REACH seeks to recruit a diverse cohort of outstanding scholars for a research-intensive program that will enhance their competitiveness for graduate school.

Stanford Summer Research Program (**Undergraduate Students**) – A fully funded residential internship program for URM undergraduates interested in pursuing PhD programs in the biomedical sciences. Since the program's inception, Stanford has trained more than 500 talented undergraduate students from diverse backgrounds, and 97% went on to pursue an advanced degree.

Stanford Preview (**Undergraduate Students**) – A three-day program, jointly sponsored by the Stanford Biosciences and the Stanford Black Bioscience Organization, designed to introduce sophomores and juniors from diverse backgrounds to Stanford and to provide guidance for the graduate school admissions process.

The Diversity Excellence Program (**Undergraduate Students**) – Led by the Biosciences Diversity Advisory Council (with eight faculty) and Latishya Steele, Associate Dean for Graduate and Career Education and Diversity, provides financial support to interview diverse students and encourages the proactive identification of diverse and high achieving candidates, employing measures beyond traditional assessments such as GPA/GRE.

The **Department of Radiology** provides additional opportunities for outreach and engagement that aim to recruit a diverse cohort of trainees into the TBI[2] training program. These programs include the following efforts:

Radiology's Research Experience for Undergraduates (REU) Summer Program (**Undergraduate**) – This summer program recruits a diverse cohort of undergraduate students for a summer of biomedical imaging research.

Science Education Enrichment for Diversity (SEED) Outreach Program (**Middle School**) – The SEED program aims to increase interest in STEM in a group of young underrepresented minority students.

These SOM and Department resources all support various pathways that promote diversity amongst our trainees.

9. Ensuring the research facilities and laboratory practices promote the safety of trainees.

Safety is a core value at Stanford, and the University is committed to the continued refinement of an institutional safety culture with strong programs of: personal safety, accident and injury prevention, wellness promotion, and compliance with applicable environmental and health and safety laws and regulations. The following outlines University and Departmental resources available to the TBI[2] training program:

University – Stanford's program for providing a safe workplace for faculty, staff, and trainees includes: facility design; hazard identification, workplace inspection, and corrective action; shutdown of dangerous activities; medical surveillance; and emergency preparedness. Stanford University makes all reasonable efforts to: (1) promote occupational and personal safety, health and wellness; (2) protect the health and safety of Stanford University faculty, staff, and trainees; (3) provide information to faculty, staff, and trainees about health and safety hazards; (4) identify and correct health hazards and encourage faculty, staff, and trainees to report potential hazards; (5) conduct activities in a manner protective of the environment, and inform the Stanford community regarding environmental impacts associated with institutional operations; and (6) maintain a risk-based emergency management program to reduce the impact of emergency events to the Stanford community.

Department – The department has an active culture of lab and personnel safety and well-being. Safety related updates and reminders are a regular part of department and division meetings. The Department also has a number of key personnel that serve important safety roles: MRI Safety (Karla Epperson), CT/X-ray Safety (Adam Wang), PET Safety (Medhi Khalighi), Lab Safety (Gary Glover), and Animal Safety (Yamil Sáenz). These personnel are available to all TBI[2] trainees during their training, as they start projects, and through project completion.

10. Ensuring accessibility of research facilities to trainees with disabilities.

Accessibility of research facilities to trainees with disabilities is central to research operations at Stanford. Both

the SOM and the Department have several programs that facilitate access for TBI[2] trainees:

School of Medicine – The SOM supports the recruitment, enrollment, and graduation of graduate students with disabilities. The **Diversity and Access Office** (DAO) ensures that the entire Stanford community has equal access to resources, facilities, and opportunities. The DAO provides technical assistance, training on assistive technology, transportation, lodging, recreation, community resources, event, and evacuation plans. The **Office of Accessible Education** (OAE) provides resources to all graduate students who have disabilities, such as classroom and housing accommodations. All of Stanford's research facilities are fully accessible to researchers with disabilities. The **Campus Access Guide** is an online system of maps detailing accessibility information for buildings on campus, including research buildings.

Department – Accessibility is an important tenet in the department. This tenet is evident in the initiation of the **Stanford Medicine Alliance for Disability Inclusion and Equity** (SMADIE) by department faculty Dr. Pete Poullos and colleagues. SMADIE aims to: _Foster_ and advocate for the equal treatment and well-being of everyone at Stanford Medicine, regardless of differences; _Promote_ collaboration between people who are passionate about disability at Stanford Medicine; _Advocate_ for accessibility, resources and disability services, above and beyond that required by law; and _Promote_ disability as a part of human diversity, inclusivity, and equity.

11. Ensuring a positive, supportive and inclusive research and training environment for individuals from all backgrounds.

The following **SOM programs** are also instrumental in enriching the research and training environment for students from all backgrounds:

The Stanford Biosciences Grant Writing Academy – Sponsored by the office of Dean Krams, this program: supports trainees in creating grant proposals and productive writing practice; teaches trainees to write and edit efficiently; empowers trainees to elicit and provide effective feedback. Proposals submitted by SOM graduate students have nearly doubled since the Academy was founded in 2014 and the applicant success rate has remained stable at almost 30%. This program focuses on being approachable and accessible to trainees that have never written a grant and come from any background.

The Wellness Matters Program – Sponsored by Dean Krams' office, the program provides curricula, peer mentoring, programs, and events targeted to the wellness needs of the SOM graduate students, and promotes self-care, resilience skills, and holistic health behaviors, helping to create an environment in which all graduate students can thrive. Popular events include _Wellness First Fridays,_ which features community building events once a month, and _Mid-Quarter Recharge_ which provides stress-relieving activities.

Vaden Health Services – For healthcare, mental health and counseling services, our graduate students have full access to Vaden Health Services on campus, and CAPS-Counseling & Psychological Services. Graduate students also have access to a Mental Health Team of therapists and a psychiatrist through the SOM.

Housing for All – Our graduate students are guaranteed housing with three options: (1) single graduate housing; (2) couples without children housing; and (3) students with children housing at Stanford. This helps ensure that trainees from all backgrounds have housing options that promote their well-being.

Student Outreach to Alumni Resources (SOAR) – The SOAR mentor program fosters mentorship opportunities across the Stanford SOM community. This comprehensive mentoring program exposes graduate students to a breadth of career options, promoting greater community and collaboration with alumni. This supports our trainees by providing a vision for traditional and non-traditional career pathways.

Solidarity, Leadership, Inclusion, Diversity (SoLID) Mentorship Program – This program connects graduate students with supportive faculty who can provide additional mentorship to guide students on issues that may be largely outside of their research, such as mental health and wellness, academic activism, microaggressions, and imposter syndrome, among others. Our multi-faceted mentoring approach allows graduate students to be matched with peer and/or professional mentors of their choosing in addition to their faculty advisor.

Within the Department, a positive, supportive and inclusive research and training environment is fostered in several ways. The following **Department of Radiology** activities and efforts highlight several ongoing initiatives:

Diversity Initiative – The *Diversity Initiative's* mission is threefold: 1) To improve diversity in the Department of Radiology; 2) To foster a culture of growth and equal opportunities for everyone; and 3) To prove that diversity makes a difference. A monthly diversity newsletter builds community by capturing personal stories of diversity within the department. Several summer research programs offer a pathway to enhance diversity within the department. Annual events highlight diversity within the department's dynamic culture.

Weekly Group Meeting – The weekly Lucas Center group meeting frequently opens with an acknowledgement of current events and a recognition that this may impact people's personal lives, which inevitably impacts their professional life. This acknowledgement opens a support discussion for trainees from all backgrounds.

Trainee Council – The Lucas Center *Trainee Council* is comprised of graduate students and will include trainees from the TBI[2] T32. This forum allows for all trainees to voice their common support and concerns for initiatives and activities within the department. Their inclusion in our weekly faculty meeting sustains a continuous dialogue the fosters a positive, supportive and inclusive research and training environment.

12. Ensuring that proper policies, procedures, and oversight are in place to prevent discriminatory harassment and other discriminatory practices and to appropriately respond to allegations of such discriminatory practices, including providing any required notifications to NIH.

Stanford has long shared NIH's concerns regarding issues of harassment and discrimination. We take pride in welcoming students, faculty, staff, and postdocs of any race, color, national or ethnic origin, sex, age, disability, religion, sexual orientation, gender identity, veteran status, or marital status. Like the NIH, Stanford prohibits unlawful harassment including sexual harassment and sexual violence. Stanford also does not tolerate unlawful discrimination based on these or any other characteristic protected by applicable law in the administration of the University's programs and activities.

Stanford's Nondiscrimination Policy states: *Stanford University prohibits discrimination and harassment and provides equal opportunities for all community members and applicants regardless of their race, color, religious creed, national origin, ancestry, physical and mental disability, medical condition, marital status, sex, age, sexual orientation, gender identity, veteran status or any other characteristic protected by law.*

Additionally, Stanford's prohibition on Sexual Harassment states: *Where sexual harassment has occurred, the University will act to stop the harassment, prevent its recurrence, and discipline and/or take other appropriate action against those responsible.*

Specifically, to provide assurances as required by NOT-OD-19-029 and NOT-OD-19-056, on behalf of the University, we assure Stanford's institutional commitment in the following areas:

1. Stanford University has proper policies, procedures, and oversight in place to prevent discriminatory harassment and other discriminatory practices;
2. Stanford responds appropriately to allegations of discriminatory practices;
3. Stanford has developed a protocol to inform NIH/the Office for Civil Rights in compliance with NOT-OD-15-152; and
4. Stanford has adopted and will follow its institutional protocol for requesting NIH prior approval of a change in the status of the Program Director/Principal Investigator (PD/PI) or other key personnel to continue their role on the NIH award described in the training grant application as described in NOT-OD-18-172.

13. Ensuring that trainees will continue to be supported when they transition from the training grant to other sources of support.

This T32 program will fund students from three of Stanford's PhD-granting programs – Electrical Engineering, Bioengineering, and Biomedical Physics – during their first and second years of PhD training. Supplementary support is provided by the departments to cover the T32 support "gap". After the two years of training program support student funding becomes the responsibility of the primary research mentor. This is made clear to each

mentor at the time they accept a student into their lab. The primary support mechanisms that ultimately provide student support for Year-3+ are a combination of departmental funds, teaching assistantships, research assistantships, advisor funding, external fellowships (NIH, NSF, AHA, etc.), and University fellowships. These funding sources are also used to raise the training grant minimum stipend to reflect the high cost of living in the Bay Area. We prioritize top students for training grant support and encourage all eligible students to apply for external fellowship support using the resources outlined above.

14. Providing resources and expertise for evaluating program training.

The Stanford School of Medicine has established a training program evaluation process to evaluate the program's strengths, weaknesses, and opportunities to improve and enhance the program year-over-year. The training program evaluation process includes input from graduate students, alumni, and faculty. An ***Internal Review Committee*** of faculty (from outside this training program) will be appointed to evaluate the program and provide recommendations for improvement based on a three-part review process – ***Part 1***: a program report and information packet; ***Part 2***: student, alumni, and faculty web-based survey findings; and ***Part 3***: a town hall meeting with students and affiliated faculty. The Associate Dean and the Internal Review Committee will then meet with the program directors to review findings and provide recommendations. More information on the review committee and the three-part evaluation is provided in the TBI^2 Program Plan.

15. Providing resources to help trainees identify optimal career opportunities.

Stanford and the SOM provide several groups that provide graduate students with career counseling. The office of the Vice Provost for Graduate Education has an extensive array of programs to support students and provide career advice including, "*Academic Chats*", "*Communicating Effectively with Your Advisor*", "*Crucial Conversations*", "*Designing the Professional*", "*Leadership Bootcamp*", and "*Preparing for Faculty Careers*". The seminar offerings provide resources to support graduate students with career mentoring and counseling, exposure to myriad career choices, and development of a range of scientific and leadership skills. An extensive range of department seminars, mini courses, and symposia provide several opportunities for trainees to meet leaders in academic, industrial, and federal research, plus world-leaders in biotech, Silicon Valley start-ups, and established industry giants.

The Department of Radiology also hosts seminars throughout the year, including *Grand Rounds.* These seminars continuously highlight research and professional opportunities for our T32 trainees. The *Lucas Center* also regularly invites biomedical imaging world-leaders for seminars and multi-day research visits. The research luminaries are also available to meet with our trainees and provide career guidance spanning a broad range of opportunities. These connections frequently lead to research internships at companies throughout the nation, and around the world, or visiting researcher opportunities at academic institutes.

All of these initiatives help support the TBI^2 T32 motivation to train the next generation of researchers and entrepreneurs in translational biomedical imaging instrumentation.

Summary of Commitment of Support – In summary, your TBI^2 training grant represents Stanford's university-wide effort to develop a cadre of highly skilled scientists and engineers with the ambition to explore and define the next generation of translational biomedical imaging solutions to characterize, diagnose, monitor, and guide the treatment of human diseases. I am very pleased to fully support your proposal and I wish you great success with this important predoctoral training program.

Sincerely,

Sheri M. Krams, PhD | Professor of Surgery
Senior Associate Dean for Graduate Education and Postdoctoral Affairs