



May 6, 2021

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Dear Colleagues,

I write to convey my enthusiastic support for Stanford's Medical Scientist Training Program (MSTP) and its NIGMS T32 application. For over 50 years, Stanford MSTP has been the “crown jewel” of our School of Medicine (SoM). It is integral to Stanford’s mission to train scholarly leaders with the skills to bridge the diverse and rapidly evolving areas of biomedical research and clinical medicine to improve human health. I am deeply and personally committed to continuing Stanford’s investment in the growth and innovation of the already exemplary MSTP and to promoting our trainees’ success. Here, I highlight thirteen areas of extensive institutional support that will ensure the continued success of the MSTP and its trainees. This includes our substantial financial and administrative support for the MSTP itself, reflected in an expansion of the directorate, staff, and program initiatives, as well as my office’s deep financial investment in the program, which has increased by over \$1.75 million dollars (a 50% increase) in the last decade. Our MSTP is the bedrock on which our new 5-year MD-only “Discovery Curriculum” and 6-year Berg Scholars programs are built. These 2 new programs will add ~35 physician scientist (PS) trainees per year, more than doubling the steady state number of Stanford PS trainees (~110 MSTP + ~150 5-year MD-only + ~24 Berg Scholars) by 2023. Here, I will elaborate on the vast institutional resources and commitments at the School of Medicine (SoM) and our partner Schools of Engineering (SoE) and Humanities & Sciences (H&S) that enable the success of the graduate programs and faculty who train our MSTP students.

1. Developing and promoting a culture that advances the highest standards of scientific rigor, reproducibility and responsible conduct of research. The MSTP’s innovative curriculum integrates training in scientific rigor and responsibility throughout its students’ MD and PhD training. This occurs during the program’s Physician Scientist Hour (PhySH) course, Journal Club, and annual program retreat, and it supplements the substantial formal training programs provided by the SoM and home PhD programs. Below, I highlight resources and activities at Stanford SoM and across the University that ensure a culture of the highest standards of rigor and responsible research.

Rigor and Reproducibility (R&R): Stanford University and SoM are deeply committed to ensure graduate training in rigorous experimental design, and proper data collection, organization, and analysis. The University’s Research Policy Handbook 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. Across the Schools, Rigor and Reproducibility (R&R) coursework and workshops on research integrity are offered through 58 graduate-level courses on experimentation, correct use of techniques and model systems, and statistics.

- **Foundations in Experimental Biology:** course for first-year PhD students in the SoM, focuses on developing skills in conducting rigorous independent research, experimental design, data analysis, and how uncertainty can impact data considerations.

- Foundations of Statistics and Reproducible Research: a new course customized for first year PhD students, covering principles of experimental design, analysis, and statistical reasoning as well as tools and practices for reproducible research. Examples are drawn from multiple areas of experimental biology and clinical research.
- Introduction to R for Data Analysis: teaches R, an open-source programming language for statistical analysis, computational aspects of research, and transparency in publication.
- Modern Statistics for Modern Biology: teaches visualization and statistical data analysis methods with examples drawn from the fields of immunology, microbiology, cancer research, and ecology.
- Computational Methods for the Modern Biologist: teaches proper use of large biology data sets with an emphasis on genomic sequences and integrating the scientific method into programming.
- Problem Choice and Decision Trees in Science and Engineering teaches students to develop frameworks for choosing research problems and navigating project decision trees using stepwise analysis of assumptions.
- Stanford Biosciences Grant Writing Academy: supports >100 PhD and MSTP students and postdocs annually in creating proposals and productive writing practice as preparation for F and K fellowship applications. Training in R&R is a significant component of these applications and preparation.

Further highlighting our deep institutional commitment to rigor and reproducibility, in 2020, Stanford launched the Data Science Institute Center for Open and REproducible Science (DSI-CORES). This multi-school center aims to nurture transparency and reproducibility in data collection, analysis, and dissemination, to meet the challenges of research that increasingly involves large datasets and computational approaches. The Center's core objectives are to support activities and develop resources and methodological innovations that promote adoption of Open Science practices. DSI-CORES partners with the Stanford Medical Library to offer workshops on data management, project documentation, version control, creating pre-analysis plans, and enhancing scientific workflows using open-source tools. Additional University initiatives include the OpenfMRI tools and data-sharing platforms of the Center for Reproducibility in Neuroscience, and the Meta-Research Innovation Center at Stanford (METRICS), which offers courses and webinars on methods, evaluation, reporting, and reproducibility. These offerings are enhanced by NIH training modules on R&R, which are made known to all trainees on T32 and other training grants.

Responsible Conduct of Research: Instruction in the responsible conduct of research is required of all Stanford medical and graduate students and postdocs. For MSTP students, this instruction is integrated through multiple stages of training. All first-year medical students take the online course "Ethical Conduct of Biomedical Research", which introduces topics including informed consent, conflict of interest, IRB regulations, research with protected and vulnerable populations, and HIPAA and human subjects. When MSTP students begin their PhDs, formal RCR training continues through the Stanford Center for Biomedical Ethics with MED255 (The Responsible Conduct of Research), an 8-hour course taught by the Center's professional staff. Topics covered include conflict of interest, human subjects research, mentor/mentee responsibilities, collaborative research, peer review, data acquisition, research misconduct, and social / ethical issues. MSTP students also have the opportunity to enroll in other (19) graduate level ethics-related courses offered throughout the University, which span a broad array of topics such as quality control and safety assurance, scientific management, physician social responsibilities, and data privacy. Access to research ethics courses ensures that MSTP students are broadly trained to think critically about research practices in an interdisciplinary context and to understand social responsibility associated with scientific research.

2. Providing adequate staff, facilities, and educational resources to the planned program. As Dean of the SoM, I am committed to ensure that the MSTP and its partner PhD programs are fully supported to implement their training programs and ensure student success. For the MSTP, the SoM's extensive commitment of resources is reflected in our financial investment in the program. In 2020-21, the total cost of the MSTP is projected to be \$8,928,000, of which the T32 grant funds 16%. A majority of remaining costs come from the SoM's dedicated MSTP budget and support for Biosciences students, with smaller portions from individual grants and fellowships

awarded to our talented students and faculty mentors. The SoM's current contribution this year (\$5.25 million) represents a 26% increase since 2016. I remain committed to continue this high level of institutional support to our MSTP. Of note, for every dollar provided by our NIH T32, the SoM, faculty, departments, and student fellowships provide 5.2 dollars more in funding.

The success of the MSTP is strongly supported by the outstanding graduate education curricula and professional training resources of our PhD programs, which aim to empower students academically and professionally. A recent expansion of the MSTP directorate (see below) provides a key resource to ensure students' success through an individualized longitudinal 1-1 mentoring system. Each incoming student is assigned to an MSTP faculty director who meets formally with the student at key decision points and milestones in the training path, such as choosing rotations and the PhD thesis lab, passing the PhD qualification exam, scheduling the thesis defense, and return to clinical rotations. Once students join a thesis lab, the PhD advisor provides direct mentoring for the research project and skills and career development. Faculty advisors guide students in key areas such as designing and conducting rigorous research, developing inclusive teaching and mentoring skills, navigating policies and degree requirements, and exploring academic and professional opportunities.

The Office of the Vice Provost for Student Affairs supports career services, campus community centers, student engagement, academic services, and the campus health center. The PhD programs provide additional tailored support to students with dedicated Student Services Managers, and supplement scientific training with professional development. The SoM centrally tracks all Thesis Committee meetings to ensure students receive the guidance and support they deserve. We have a systematic Individual Development Plan (IDP) program for all Biosciences MSTP and PhD candidates with yearly tracking. IDP forms tailored to each stage of a trainee's progress comprehensively assess each trainee's progress and create clear action plans to achieve goals and milestones. Through BioSci Careers, we support graduate students with individualized counseling, curriculum, career mentoring, and connections, including BioSci Connect, an online, alumni mentoring platform to connect our PhD students to alumni as resources for professional mentoring. Finally, the office of the Senior Associate Dean for Graduate Education, Dr. Sheri Krams, supports all T32 training grant directors by hosting quarterly meetings to share best practices and to carry out formal T32 program reviews (see below). Dr. Krams is in frequent contact with students in all Biosciences PhD programs to address any concerns or suggestions, and she meets with MSTP director Dr. Chua quarterly to review and advise on MSTP developments.

3. Supporting the PDs/PIs and other key staff associated with the planned training program. I strongly believe that meeting the biomedical challenges of our time requires training a diverse group of physician scientists with the skills to lead the nation in an increasingly complex and interdisciplinary biomedical arena. This belief underlies the high priority I place on the MSTP and my investment in the program since I became Dean nearly a decade ago. The MSTP is strongly supported by advising on its strategic evolution from multiple sources of senior leadership including myself. Moreover, I have supported an expansion of the program's Directorate and staff, which I believe is essential to empower the MSTP to implement innovative new initiatives for the highest quality of training in research that is rigorous, professionally and societally responsible, and inclusive.

First, the MSTP is exceptionally well-run by the MSTP Directorate and honestly needs very little oversight. Nonetheless, the Program, Directors and Staff are closely and strategically advised by myself, the Senior Associate Deans of Medical and Graduate Education, and an MSTP Advisory Committee comprising senior leaders in the School of Medicine including 4 Nobel laureates. I meet formally with the MSTP Directorate annually to review the program's accomplishments, challenges, and plans. This meeting generally follows an annual presentation by the MSTP to its Advisory Committee and includes a discussion of the Committee's recommendations. The MSTP Director meets one-on-one with the Senior Associate Deans at least once a quarter. Importantly, in 2018, we

created a new office of the Associate Dean for Medical Student Research, which directly supports and advises the MSTP together with the new MD-masters Berg Scholars Program (for a Master of Science in Biomedical Investigation). This office is led by Associate Dean PJ Utz, who until 2018 was director of the MSTP and has thus worked closely with the MSTP directorate for many years. Dr. Utz meets with Director Chua every 2 weeks to discuss program initiatives and outcomes, curricular reform, fund-raising opportunities, and long-term program goals. He meets with all MSTP Directors monthly.

In 2020, we committed to increase support for the MSTP Directorate faculty to 0.8 FTE, which covers the efforts of the Program Director, as well as a team of Associate Directors. Since 2018, Katrin Chua, MD, PhD, Associate Professor in Medicine, has served as Director of the MSTP after four years as Associate Director, providing essential continuity. The Associate Directors represent diverse clinical specialties, research areas, career path histories, and career stages. Two senior Associate Directors have worked closely in the Directorate with Dr. Chua for over six years: Matt Porteus, MD, PhD, Professor of Pediatrics (Stem Cell Transplantation) and Catherine Blish, MD, PhD, Professor of Medicine (Infectious Diseases). Since 2018, Dean Felsher, MD, PhD, Professor of Medicine and Pathology, has served as Associate Director of Admissions. This year, two junior Associate Directors were recruited to help support the need for expanded programming and more intense mentoring of the ~110 MSTP students. These are Ellen Yeh, MD, PhD, Associate Professor of Pathology and of Microbiology & Immunology, and Taia Wang, MD, PhD, Assistant Professor of Medicine and of Microbiology & Immunology. This distributed Directorate structure is a key strength of our MSTP, ensuring that the program leadership represents a diversity of expertise and life experiences that can match the needs of our increasingly diverse MSTP student body.

We have also increased the MSTP's administrative staff to 2.5 FTE (up from 1.75 FTE in 2017), with an ultimate target of 2.75 FTE. The MSTP staff perform essential duties to support student needs, admissions, efforts for outreach to historically underrepresented groups, maintain alumni networking and mentoring, and implement program evaluation modules. The expansion in MSTP staff is critical to support the MSTP's new initiatives in Diversity, Equity and Inclusion; wellness; curricular integration of training in Responsible and Rigorous research; and increasing coordination with the Berg Scholars MD-master's program, among other innovations. MSTP Administrative Director Vanessa Sutter has extensive experience in academic advising, and personal and professional counseling, and is leading an expansion of the MSTPs mental health initiatives. Student Services Officer Tony Tieu has over 15 years of experience in graduate student affairs including admissions, recruitment, outreach, and monitoring student progress and wellness. Student Services Specialist Dr. Dennis Bua specializes in the MSTPs diversity programs, and as a LatinX with a Stanford PhD in Biology, he is ideally prepared to support the needs of the diverse MSTP students. Thus, both the time commitment by senior leadership and the financial commitment for FTE support for the Directors and Staff ensures that the MSTP is well-resourced to monitor and mentor effectively all ~110 MSTP students. Key outcomes, attrition and time to dual degrees, have both decreased substantially since oversight and administrative resources were increased.

4. Supporting core facilities and technology resources that can be used to enhance training. MSTP trainees 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 research training environments. We highlight the following institutes, centers, and state-of-the-art research buildings that provide core facilities and technological resources that enhance MSTP students' training:

- Li Ka Shing Center for Learning and Knowledge (LKSC) brings together cutting-edge education and advanced technology. The fourth floor is dedicated to medical and graduate student study, reflection, and social spaces.
- Lokey Stem Cell Research Building supports stem cell research with dedicated core technologies and services.

- Center for Clinical Sciences Research (CCSR) promotes translational research and a bench-to-bedside approach to medical research, housing both basic science and clinical science faculty with an open floor plan and a shared equipment philosophy.
- Clark Center is an interdisciplinary research center that brings together biology, medicine, chemistry, physics, and engineering, with an open floor plan and shared equipment resources.
- The new Biomedical Innovation Building (BMI), steps from the new Stanford Hospital, houses laboratories and support space for nearly 1,000 faculty, students and staff. It fosters multidisciplinary collaborations among engineers, basic scientists, and physician-researchers in a technologically advanced facility.
- The Wu Tsai Neurosciences Institute and ChEM-H (Chemistry, Engineering & Medicine for Human Health) are interdisciplinary research institutes that bring together faculty and students from many disciplines. They are housed in a new Research Complex home to 40 labs, core research facilities, meeting spaces, and a pub.
- The Stanford Cancer Center is a National Cancer Institute-designated comprehensive cancer center with extensive core facilities, pilot funding opportunities, and training programs.
- The Stanford Diabetes Research Center with investigators from 23 departments, supports four research cores and a Pilot Award Program to advance discovery in metabolism and diabetes.
- The Stanford Innovative Medicines Accelerator is a new campus-wide initiative to accelerate the translation of Stanford research discoveries into new medicines while expanding our knowledge of human biology.

5. Ensuring that faculty have protected time for mentoring, training, and research, and that activities integral to excellent graduate training (such as teaching and mentorship) are valued in tenure and promotion decisions. The SoM fosters and rewards excellence in training and mentoring by our faculty. Each faculty member's effort with respect to teaching, research, clinical care, and administration is reviewed regularly by their department. The University encourages departments to implement retention strategies such as limiting service for junior faculty and providing resources on tenure. Stanford faculty are given the necessary time to excel as mentors, and the SoM offers various programs for faculty to enhance their skills in leadership, teaching, and mentoring (see below).

MSTP affiliated faculty consists of ~100 individuals with outstanding records of scholarship, mentoring and teaching. These faculty span nearly 20 departments and are well-balanced between senior faculty and junior faculty. Roughly 60 are thesis mentors of current MSTP students, and the others include prior MSTP students' thesis advisors and other basic or physician scientists with experience and insight into the physician scientist training path. As integral members of the Biosciences and other PhD programs, MSTP mentors are well supported both financially and professionally as described below. T32 program directors have full authority to remediate or remove program faculty who perform poorly according to the programs' mentoring guidelines and policies.

For the Stanford University Tenure Line (UTL) faculty, excellence in scholarship, teaching, and mentoring (and clinical care, if applicable) is an important prerequisite for tenured appointment, because the University is dedicated to outstanding achievement in all of these domains. Evaluations for appointment, reappointment, or promotion place strong emphasis on both the candidate's standing and impact on their scholarly discipline and on their quality as a teacher and mentor. A key criterion for a UTL appointment is a record demonstrating that the candidate is capable of sustaining a first-rate teaching program, in which teaching is broadly defined to include activities in the classroom, laboratory, or clinical setting; one-on-one advising; program building; and curricular innovation. Thus, direct trainees of faculty are asked to provide letters for the tenure application. These practices ensure that high quality mentoring by faculty is both encouraged and rewarded.

Stanford's Vice Provost for Faculty Development and Diversity (VPFDD) and the Office of Academic Affairs provide key resources to faculty to support their development within UTL criterion. These include faculty/professional development workshops, leadership programs, and networking. In 2020, the SoM launched the Biosciences

Faculty Mentor Training Workshops, which provide dynamic interactive sessions such as 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. These workshops complement offerings from the SoM's Teaching and Mentoring Academy to develop, support and recognize dedicated educators and mentors to ensure world-class training for the next generation of physicians and researchers. All MSTP mentors are strongly encouraged, and all new assistant professors are required, to participate in these programs.

6. Ensuring sufficient start-up funding to permit early-stage faculty to participate in training, and bridge funding to ensure continued training if a mentor experiences a hiatus in funds. The SoM is committed to providing faculty the financial support needed to ensure high quality training experiences for their students. The Office of Academic Affairs and Faculty Compensation reviews faculty offer letters to ensure that startup funds are adequate and equitable. Start-up funds cover research expenses and personnel typically for 3-4 years. Importantly, in the SoM, we instituted a program to remove financial pressure for faculty to support their PhD students. This program guarantees funding for all Bioscience PhD students independent of the faculty mentor for 4 years of PhD training for regular graduate students, and 3 years for MSTP students who are accelerated compared to PhD students. In rare cases when faculty experience a funding hiatus, bridge funding is provided to ensure continuity of the research and student training. In SoM basic science departments, investigators have access to bridge funding up to \$200,000. Clinical departments have department-specific bridge fund policies. Outside SoM, SoE and H&S provide substantial bridge funding options and guarantee funding support for students, with no specified limits.

7. Promoting diversity and inclusion at all levels of the research training environment. Diversity is essential to the success of our MSTP, our institution, and the nation's biomedical workforce. I made a commitment eight years ago to expand the MSTP directorate, as part of a long-term goal to improve the diversity of the program at all levels. In 2014, we appointed two new associate directors, Dr. Katrin Chua (who transitioned to MSTP Director in 2018) and Dr. Catherine Blish, the first women directors in the program's history. Under their leadership efforts in faculty and student recruitment, the MSTP increased the representation of women faculty on its Admissions Committee from 25% to 50%, and URM faculty from 2% to 13%. Similarly, we saw a striking increase of URM matriculants into the MSTP from 15% to 30%, and women matriculants from 30% to 50%. The 2020 entering MSTP class included 8 women and 2 men, and almost 60% of the entering PSTP medical students were women.

I have also committed to supporting new programming initiatives within the MSTP to cultivate a culture of diversity and inclusiveness. In 2018, the MSTP launched the student-led program BOOST (Bridge to Opportunity, Support, and Training), which introduces diverse college students to the Stanford Medicine physician scientist community and provides professional development to prepare for the MD-PhD application process. Importantly, BOOST also serves to ensure that our MSTP students, who undergo training to serve as mentors to the BOOST trainees, are inspired by the importance of diversity awareness and acquire essential skills for inclusive mentoring. In 2020, the MSTP created a Diversity Working Group (DWG) to identify and address ways to enhance equity and inclusiveness within the program and in biomedicine generally. I am committed to the mission of these initiatives and fully approve of the increased efforts of the MSTP directorate and staff to support them. Reflecting this, I have supported an increase of the MSTP administrative staff, including welcoming Dr. Dennis Bua, a Stanford PhD graduate from a URM background, as an MSTP staff diversity liaison.

These diversity initiatives within the MSTP are complemented by the many programs at the SoM and Stanford as a whole to foster a diverse community in which all individuals are welcomed, respected, and supported to achieve their full potential. We value diversity because we believe that the perspectives of people with unique backgrounds and life experiences allows us to reach a new level of innovation in education, scientific research,

and medicine. This essence is captured in Stanford's strategic plan and in the diversity inclusion initiative IDEAL (Inclusion, Diversity, Equity, and Access in a Learning Environment) launched in 2018. IDEAL works across the entire University community to ensure that diversity of thought is represented, that all members of Stanford feel that they belong, are supported, and have access to opportunities and benefits of the University. Recruitment of a diverse campus community of faculty, staff, and students is a University-wide goal. Notably, an increasing proportion of MSTP matriculants each year are alumni of one of our on-campus diversity programs. These include:

- The Stanford Institutes of Medicine Summer Research Program (SIMR), an 8-week program for high school students from diverse backgrounds to perform basic research in a Stanford lab. Created 22 years ago by Associate Dean Utz, SIMR has trained over 900 students and has strong links to the MSTP, whose faculty are frequent SIMR mentors. Approximately 15 SIMR grads are current or alumni of our MSTP.
- Stanford Summer Research Program (SSRP), a residential internship program for URM undergraduates who are interested in pursuing biomedical science PhDs. Since its inception, SSRP has trained more than 500 undergraduate students from diverse backgrounds, and 97% went on to pursue an advanced degree.
- Stanford ADVANCE Undergraduate Institute (AUI), a three-day program sponsored by Stanford Biosciences and the Stanford Black Bioscience Organization, for diverse college sophomores and juniors to obtain guidance on applying to graduate programs in the Biosciences.
- The Bioscience Diversity Advisory Council's Excellence Program provides financial support for departments to interview and proactively identify diverse and high achieving candidates through holistic approaches.
- Graduate Application Fee Waivers are provided to applicants to PhD programs, and VPGE Departmental Recruitment Support provides funds for to defray travel costs for diverse applicants.

Once students arrive on-campus, they are supported by a variety of resources. In the SoM, the Office of Diversity in Medical Education (ODME) aims to cultivate and sustain an environment that fosters the development of diverse physician leaders who are committed to eliminating the nation's health inequities through patient care, education, research, and advocacy. The SoM Diversity Cabinet coordinates and integrates program and communication strategies across Stanford Medicine to leverage diversity, equity, and inclusion partnerships. The Biomedical Association for the Interest of Minority Students (BioAIMS) provides a welcoming home for all Biosciences students at Stanford to celebrate their identities, especially those that have traditionally been marginalized in academia. Diversity Center of Representation and Empowerment (D-CORE) provides a physical location where any member of the Stanford Medicine community interested in issues of inclusion and diversity can hold meetings. Diversity-focused staff hold office hours to increase engagement with and support for students of all backgrounds. Stanford Schools and departments have dedicated Diversity Officers to support students. Stanford houses on-campus community centers and student groups to serve diverse University identities.

Our faculty serve as critical role models for our students in training. We believe maintaining a diverse faculty is a key component of our training environment. The VPFDD provides faculty search committees with guidelines on "Building for Excellence: Inclusive Practices for Faculty Recruitment and Searches." The University funds multiple programs to recruit and retain diverse faculty. The Faculty Incentive Fund supports appointments that bring diversity to departments and schools; Gabilan Provost's Discretionary Fund ensures that resources are available to recruit women in the sciences and engineering; and the Faculty Development Initiative recruits outstanding faculty whose research expands the mission of the Center for Comparative Studies in Race and Ethnicity.

8. Ensuring that research and clinical facilities are accessible to trainees with disabilities. The MSTP, SoM, and University at large support the recruitment, training and success of students with disabilities. Under Dr. Chua's leadership, the MSTP has integrated into its curriculum regular presentations and panel discussions on mental health, physical disabilities, invisible disabilities, learning disabilities, and chronic illness. This year, the MSTP partnered with the recently launched Stanford Medicine Abilities Coalition (SMAC) to promote disability

awareness and advocacy in the Stanford medical community through the MSTP Diversity Working Group and program panels.

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, and community resources. All of Stanford's research facilities are fully accessible to researchers with disabilities, and we are committed to providing any necessary accommodations for disabled students. The Office of Accessible Education (OAE) is a central resource for all students on campus who have disabilities, such as classroom and housing accommodations. The OAE staffs professional Disability Advisers (DAs) who work directly with students to understand their disability experiences, determine appropriate accommodations, and facilitate barrier removal with campus partners, in coursework and student housing. This year, we have set a new goal to recruit a dedicated Disabilities Service Provider with expertise in advising and advocating specifically for students who experience disabilities during their medical training.

9. Ensuring a positive, supportive & inclusive research & training environment for individuals from all backgrounds.

The SoM provides an environment of personal and professional exploration, allowing students and postdocs to define and follow their own paths to success. The MSTP brings together trainees with a variety of undergraduate degrees and diverse experiences. The multi-faceted mentoring approach of the MSTP and Stanford in general allows students to be matched with peer and/or professional mentors in addition to their faculty advisor, thereby increasing the breadth of advice they receive. The following programs and units enrich the research and training environment for students from all backgrounds:

- The Stanford Biosciences Grant Writing Academy ensures that trainees from all backgrounds obtain essential skills in grant preparation and scientific writing.
- The Wellness Matters program provides curricula, programs, and support for our graduate students that promote self-care, resiliency, and holistic personal health.
- The Solidarity, Leadership, Inclusion, Diversity (SoLID) Mentorship Program connects graduate students with faculty mentors who are dedicated to support students on issues such as mental health and wellness, academic activism, microaggressions, and imposter syndrome.
- The Office of the Vice Provost for Graduate Education (VPGE) offers complementary programs for PhD students to grow academically and professionally. It provides guidelines for Stanford's commitment to best practices for setting explicit expectations in faculty-students relationships.

Two key student organizations, Stanford Biosciences Student Association (SBSA) and Biomedical Association for the Interest of Minority Students (BioAIMS), welcome students from all backgrounds. Stanford has several centers committed to coordinating students' extracurricular and cultural activities and professional development. These include the Graduate Student Center and Cultural Community Centers for students from (or with interest in) the LatinX, African American, Native American, Asian American, International, and LGBTQ+ communities.

10. Ensuring that proper policies, procedures, and oversight are in place to prevent discriminatory harassment and appropriate responses to allegations, including providing required notifications to NIH.

Like the NIH, Stanford prohibits unlawful harassment and discrimination, including sexual harassment and sexual violence. We also do not tolerate unlawful discrimination on the basis of any characteristic protected by applicable law in the administration of the University's programs and activities. Stanford's Nondiscrimination Policy provides that: *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 provides that:

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.

Here, I specifically provide assurance, as required by NOT-OD-19-029, of Stanford University's institutional commitment to Harassment and Discrimination Protections as follows: (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.

11. 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 continued advancement 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. In 2014, Associate Dean Utz co-chaired a University Task Force on "Advancing the Culture of Laboratory Safety", leading to a 132-page white paper presented to university leadership. 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 (6) maintain a risk-based emergency management program to reduce the impact of emergency events to the Stanford community. Faculty, staff, and trainees are responsible for: (1) keeping informed of conditions affecting their health and safety; (2) participating in required safety training programs; (3) adhering to health and safety practices in the workplace, classroom, laboratory, and campus residences; and (4) reporting to supervisors, instructors or Environmental Health and Safety potentially unsafe practices or hazards in the workplace, classroom or lab.

12. Ensuring that trainees will continue to be supported when they transition from the training grant. For all four years of medical school and three years of graduate school, the SoM guarantees all MSTP student expenses that are not covered by the training grant, including a stipend considerably higher than the training grant minimum to reflect the high cost of living in the Bay Area. These funds are provided centrally to allow students the ability to carry out research in their lab of choice across all our PhD Programs, so that students have the opportunity to pursue their passions in research topic and lab. Due to early research rotations and thesis lab selection during the first two years of medical school, MSTP students frequently do not need additional years of PhD funding. If needed, additional PhD years are covered by the student's PhD advisor, a vast majority of whom are very well funded. In the unusual circumstance if a student's advisor has a funding gap, faculty have access to ample bridge funding and guaranteed student support, as described above. Substantial additional funds for a growing number of MSTP students derive from their selection for the prestigious Stanford Interdisciplinary Graduate Fellowship or the Knight-Hennessy Scholars program, which support full tuition and stipend for 3 years.

In addition to these sources of assured trainee support, Stanford's award-winning Grant Writing Academy has dramatically improved the success of our students' applications for independent fellowships as part of their professional skills training. Since 2016, the MSTP has provided additional grant writing training and resources and required MSTP students to apply for an independent award. As a result, MSTP class cohorts in the last five years have had 60-85% success in obtaining independent funding awards, contributing to ~17% of total student costs in 2021, more than 3.6 times the total funds from these sources in 2015.

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13. Providing resources and expertise for evaluating program training. We believe that an essential component of excellence in graduate training is a robust, objective, and iterative system to evaluate training program quality. Our Office of Graduate Education (OGE) recently launched a new Program Review system, which evaluated the MSTP in January 2021. In the OGE Program Review, an independent committee of faculty reviewers evaluates the program's strengths, weaknesses and opportunities, and provides recommendations for improvement based on review of (1) a Program Report provided by the T32 program director, (2) student and alumni survey findings, and (3) town halls with students and/or faculty. The Program Review offers an option for an external review process when requested by T32 programs. MSTP Directors organize annual self-evaluations through town halls, the annual retreat, and a formal meeting of the MSTP Advisory Committee which then reports to me.

Further reflecting the SoM's commitment to support effective evaluation of our training programs, my office supports the MSTP and affiliated PhD programs with administrative staff teams who coordinate with the OGE Program Review process as well as oversee internal program analyses. The MSTP staff work closely with the directorate to develop and administer annual surveys to students and alumni, to obtain feedback on program activities and components and assess how the program has benefitted our graduates' subsequent careers paths. To facilitate T32 program evaluation, Stanford Biosciences launched in May 2020 the Alumni Career Outcomes Dashboard, which highlights outcomes for 1,773 alumni since 2000. It organizes alumni data on geographic representation, employers, job sectors, and academic details. The goal is to track our PhD and MSTP alumni annually to understand their career choices and longer-term outcomes. Finally, Stanford's Office of Medical Education (OME) has a dedicated Evaluation unit that provides broad and robust evaluation of the MD curriculum and clinical clerkships. These offerings are evaluated by students at the end of every session, and extensive periodic course/clerkship reports are generated and provided to faculty to promote continuous quality improvement. The MSTP program will benefit from collaborating with this unit on their evaluation methodology.

Summary: I am proud, excited, and dedicated to assuring the continued success of our program. We strive not just to keep up with the ever-changing landscape of biomedical knowledge, but to be leaders in the generation of such knowledge, and to meet the growing challenge of training a diverse pool of high-quality researchers and intellectual leaders. The MSTP is a high priority at Stanford and I refuse to be complacent. Despite achieving a perfect score of 10 on our 2016 T32 submission, our MSTP Directorate has continued to evolve and improve the program. I hope that the changes that we have made display my deep commitment to our MSTP, and to physician scientist training overall. I ask for your support for continued NIH T32 funding for our MSTP and our request for 38 NIH-supported trainee positions. This will allow us to support the marked increased interest in physician scientist training that we have seen in our applicant pool and internal medical school cohorts, and our underutilized capacity to train even more outstanding physician scientists. The remaining funding for the MSTP will continue to come from my office's commitment to the MSTP and the Biosciences PhD program, and fellowship and grant awards earned by our talented faculty and students. With your support, I believe that Stanford will remain an integral piece to accomplishing the NIH's stated goals of making a significant impact on the health-related research needs of the nation. I am excited when I think about the contributions our trainees will make to medical science as it grows more complex, interconnected, and diverse. I hope that you will find that our proposal and dedication to the MSTP merit continued and increased support from the NIH.

Sincerely,



Lloyd B. Minor, M.D.