

National Advisory Council for Human Genome Research

February 22, 2021

Concept Clearance for RFA

Genome Research Experiences to Attract Talented Undergraduates into the Genomics Field to Promote Diversity

Purpose:

The NIH Research Education Program (R25) supports research education activities in the mission areas of the NIH. This concept proposes an R25 program - *Genome Research Experiences to Attract Talented Undergraduates into the Genomic Field to Promote Diversity (GREAT Program)* - with the overarching goal to encourage undergraduates from diverse backgrounds, including those from groups underrepresented in the biomedical, behavioral, and clinical research workforce, to pursue further training and careers in the scientific, medical, ethical, social and/or legal areas of genomics research. To achieve this goal, this program will support collaborative *institutional partnerships* that provide *two-year* research education programs comprised of genomics research experiences in areas of interest to NHGRI, as well as mentoring, educational, and career development activities.

Background:

The NIH recognizes a unique and compelling need to promote diversity in the biomedical, behavioral and clinical sciences research workforce. There are many benefits that flow from a diverse NIH-supported scientific workforce, including: fostering scientific innovation; enhancing global competitiveness; contributing to robust learning environments; improving the quality of research; advancing the likelihood that underserved or health disparity populations participate in, and benefit from health research; and enhancing public trust.

Accordingly, the NIH continues to encourage institutions to diversify their student and faculty populations and to enhance the participation of individuals from groups nationally underrepresented in biomedical, clinical, behavioral, and social sciences research, such as racial and ethnic minorities, those from socioeconomically disadvantaged backgrounds, and individuals with disabilities (see [NOT-OD-20-031](#)). Although the NIH currently provides multiple opportunities to develop research careers and improve participation for individuals from groups with lower representation in the biomedical and behavioral sciences, [reports](#) from the National Science Foundation (NSF) and others, provide strong evidence that diversity remains an ongoing challenge that must be addressed at every level of the educational pipeline.

Underrepresented racial/ethnic groups comprise 34% of the US population. In a [2018 NSF Survey](#), of students enrolled in graduate programs in genetics/genomics, only 10% were from traditionally underrepresented groups. In our internal analysis of 1,342 graduate student appointments on NHGRI T32 genomics training programs from 2010-2019, only 14% were from traditionally underrepresented groups. These statistics highlight the need to strengthen the pathway to graduate school for individuals from underrepresented groups.

The NHGRI's 2021 "[Building a Diverse Genomics Workforce: An NHGRI Action Agenda](#)", details the institutes vision for training, employing, and retaining a diverse genomics workforce. The GREAT program is intended to address the second major goal of that action agenda, which is to develop and support training programs and networks that connect undergraduate and graduate education to careers in genomics, and in particular, to ensure that undergraduate institutions with a historical mission or a demonstrated commitment to educating undergraduate students from groups underrepresented in the biomedical research workforce are aware of and tightly connected to that network.

Proposed Scope and Objectives:

The focus of this proposed GREAT Program is to provide hands-on exposure to genomics research to undergraduate students at institutions with a historical or demonstrated commitment to educating individuals from underrepresented groups. The program will complement these research experiences with activities to reinforce the student's intent to graduate with a science degree, and prepare them for graduate school admissions or careers in genomics research. For the purposes of this program, the term "genomics" encompasses issues and activities in the scientific, medical, computational, ethical, social and/or legal areas of genomics research that are of interest to NHGRI (see the NHGRI [Strategic Vision](#)).

The proposed GREAT Program will provide resources for eligible institutions (the "Applicant Institution") to implement collaborative approaches to genomics research education for students from diverse backgrounds, including those from underrepresented groups. Through this program, Applicant Institutions will establish partnerships with research-intensive institutions that have a prominent genomics research training environment (the "Partnership Institutions"). These collaborating institutions will work together to design and implement an education program that includes genomics research experiences at the Partnership Institutions; however, research experiences at the Applicant Institution are also encouraged if the research projects and environment are fitting for NHGRI's scientific mission. Mentoring and other educational activities are expected to be conducted at both Applicant and Partnership Institutions to maximize impact of the program. The collaborating institutions should collectively consider all factors that are likely to improve exposure, knowledge, and competency in the scientific, medical, ethical, social and/or legal areas of genomics research for participating students at Applicant Institutions. It is expected that long-term collaborations will be developed to allow faculty and students from collaborating institutions to have substantive and continuous interactions for the duration of the funded project period and beyond.

Each collaborative partnership must include:

- An *Applicant Institution* which has a historical mission or a demonstrated commitment to educating undergraduate students from groups underrepresented in the biomedical research workforce. Applicant institutions are limited to domestic baccalaureate-granting colleges/universities that receive less than \$7.5 million (total costs) of NIH research project grant (RPG) funding per year over the past 3 fiscal years (RPG data are available through [NIH RePORT](#)). Also, the institution must have an award-eligible pool of undergraduate students, at least 25% of whom are supported by Pell grants. The Applicant Institution will have responsibility for the conduct and oversight of the award, along with the flexibility to determine the optimal configuration with its Partner(s) to have the maximum impact.
- *Partnership Institution(s)* with a research-intensive graduate program in genomics as evidenced by a strong base of NIH- or NHGRI-funded research in the genomics. Partnership institutions are limited to domestic PhD-granting colleges/universities that receive greater than \$7.5 million (total costs) of NIH RPG funding per year over the past 3 fiscal years.
- A plan to address any geographical constraints to ensure students can receive effective research educational experiences from all collaborating institutions.

The GREAT Program will provide up to two years of support to appointed undergraduate students from diverse backgrounds, including those from underrepresented groups, to gain hands-on experience with research activities in genomics. Students must have already completed two academic years of post-secondary education to be eligible. The undergraduate students will be supported for up to 15 hours/week during the academic year and 40 hours/week during the summer.

GREAT programs are expected to consist of both a hands-on research project in genomics with participating faculty, and an organized educational program (seminars, courses, skills enhancement, etc.) designed to acquaint students with the larger field of genomics and to prepare them for graduate school admissions and/or careers in genomics research. The focus of both the research experience and the educational experiences/seminars should be within the [mission](#) of the NHGRI, which is to drive cutting-edge genomics research, develop new genomics technologies, and study the impact of genomics on society, all in order to accelerate scientific and medical breakthroughs that improve human health.

Programs must provide students with outstanding mentoring and education in other critical skills such as leadership, grant and manuscript writing, and time management. There should be dedicated efforts at providing not only technical expertise, but advice, insight, and professional career skills to students in the program.

Each GREAT program partnership will be carefully monitored and evaluated with internal reviews and assessments of the progressive scientific skill sets being developed through the research education experiences, the type of mentoring and supervision students are receiving, and the monitoring and evaluation plans for both the students and research mentors. Specific measurable objectives are to be determined by the Applicant Institution in consultation with the Partnership Institution(s), examples include: number of students matriculating through the research education programs and admitted to graduate programs in genomics; improvement in students' scientific research skills and academic achievement; and improvement in scientific writing and presentation skills. The evaluation should also include an assessment of whether the program and its environments are effective, inclusive, safe and supportive.

Relationship to Ongoing Activities:

This program is modelled after other R25 partnership programs to enhance diversity, including: the [BP-ENDURE](#) program, former [BD2K](#) program, and the [NIEHS UP program](#).

This program encourages collaborations with institutions that have an [NHGRI-funded T32 program](#) or other institutions that have a strong genomics research environment as evidenced by significant research funding from NIH or NHGRI (e.g. multiple research grants, a large center grant, or cooperative agreement, etc.) in at least one of NHGRI's research areas - genome sciences, genomic medicine, and genomics and society research.

This R25 GREAT Program is similar to NHGRI's long-standing R25 [DAP program](#) in that both are diversity research education programs focused at the undergraduate career level. The DAP programs largely recruit *individual* students from diverse backgrounds, including underrepresented groups, *to* their research-intensive institution for a summer or academic year research experience, whereas the GREAT Program is a *partnership* program recruiting a *cohort* of individuals *from within* the Applicant Institution that has a historical mission or a demonstrated commitment to educating undergraduate students from groups underrepresented in the biomedical research workforce. These NHGRI R25 programs complement and enhance the opportunities for individuals from diverse backgrounds based on career level, institution types, and educational activities.

Mechanism of Support and Funds Anticipated:

The R25 grant mechanism will be used to fund ~3 applications a year in each of FY22, FY23 and FY24. Each award is limited to \$350K direct costs per year (with 8% indirect costs) for up to 5 years. The total projected investment for nine awards is ~\$17M.