

NHGRI Funding Opportunities for Research and Training

The **Forefront**
of **Genomics**[®]



Jamil B. Scott, PhD, MPH

(Pronouns: She/Her)

Training, Diversity and Health Equity (TiDHE) Office
National Human Genome Research Institute (NHGRI)

April 9, 2024



National Human Genome
Research Institute

Acknowledgements

- ❖ Training, Diversity, and Health Equity (TiDHE) Office
 - Lucia Hindorff, PhD & Ebony Madden, PhD
- ❖ NHGRI Office of Communications



—
The **Forefront**
of **Genomics**[®]
—

A close-up photograph of a human eye with light brown irises and dark eyelashes. The eye is looking slightly to the right. The background is blurred, showing skin and hair.

—
Establishing a 2020
Vision for Genomics

Vision and Mission

- **Our Vision:** To improve the health of all humans through advances in genomics research.
- **Our Mission:** To accelerate scientific and medical breakthroughs that improve human health, by driving cutting-edge research, developing new technologies, and studying the impact of genomics on society.

2020 NHGRI Strategic Vision



Perspective

Strategic vision for improving human health at The Forefront of Genomics

<https://doi.org/10.1038/s41586-020-2817-4>

Received: 30 June 2020

Accepted: 4 September 2020

Published online: 28 October 2020

Check for updates

Eric D. Green¹✉, Chris Gunter¹, Leslie G. Bleasecker¹, Valentina Di Francesco¹, Carla L. Easter¹, Elise A. Felngold¹, Adam L. Felsenfeld¹, David J. Kaufman¹, Elaine A. Ostrander¹, William J. Pavan¹, Adam M. Phillippy¹, Anastasia L. Wise¹, Jyoti Gupta Dayal¹, Britny J. Kish¹, Allison Mandlich¹, Christopher R. Wellington¹, Kris A. Wetterstrand¹, Sarah A. Bates¹, Darryl Leja¹, Susan Vasquez², William A. Gahl¹, Bettie J. Graham¹, Daniel L. Kastner¹, Paul Lu¹, Laura Lyman Rodriguez¹, Benjamin D. Solomon¹, Vence L. Bonham¹, Lawrence C. Brody¹, Carolyn M. Hutter¹ & Teri A. Manolio¹

Starting with the launch of the Human Genome Project three decades ago, and continuing after its completion in 2003, genomics has progressively come to have a central and catalytic role in basic and translational research. In addition, studies increasingly demonstrate how genomic information can be effectively used in clinical care. In the future, the anticipated advances in technology development, biological insights, and clinical applications (among others) will lead to more widespread integration of genomics into almost all areas of biomedical research, the adoption of genomics into mainstream medical and public-health practices, and an increasing relevance of genomics for everyday life. On behalf of the research community, the National Human Genome Research Institute recently completed a multi-year process of strategic engagement to identify future research priorities and opportunities in human genomics, with an emphasis on health applications. Here we describe the highest-priority elements envisioned for the cutting-edge of human genomics going forward—that is, at The Forefront of Genomics[®].

Beginning in October 1990, a pioneering group of international researchers began an audacious journey to generate the first map and sequence of the human genome, marking the start of a 13-year odyssey called the Human Genome Project^{1–3}. The successful and early completion of the Project in 2003, which included parallel studies of a set of model organism genomes, catalysed enormous progress in genomics research. Leading the signature advances has been a greater than one million-fold reduction in the cost of DNA sequencing⁴. This decrease has allowed the generation of innumerable genome sequences, including hundreds of thousands of human genome sequences (both in research and clinical settings), and the continuous development of assays to identify and characterize functional genomic elements^{5,6}. These new tools, together with increasingly sophisticated statistical and computational methods, have enabled researchers to create rich catalogues of human genomic variants^{7,8} to gain an ever-deepening understanding of the functional complexities of the human genome⁹, and to determine the genomic bases of thousands of human diseases^{10,11}. In turn, the past decade has brought the initial realization of genomic medicine¹², as research successes have been converted into powerful tools for use in healthcare, including somatic genome analysis for cancer (enabling development of targeted therapeutic agents)¹³, non-invasive prenatal genetic screening¹⁴, and genomics-based tests for a growing set of paediatric conditions and rare disorders¹⁵, among others.

In essence, with growing insights about the structure and function of the human genome and ever-improving laboratory and computational technologies, genomics has become increasingly woven into the fabric

of biomedical research, medical practice, and society. The scope, scale, and pace of genomic advances so far were nearly unimaginable when the Human Genome Project began; even today, such advances are yielding scientific and clinical opportunities beyond our initial expectations, with many more anticipated in the next decade.

Embracing its leadership role in genomics, the National Human Genome Research Institute (NHGRI) has developed strategic visions for the field at key inflection points, in particular at the end of the Human Genome Project in 2003¹⁶ and then again at the beginning of the last decade in 2011¹⁷. These visions outlined the most compelling opportunities for human genomics research, in each case informed by a multi-year engagement process. NHGRI endeavoured to start the new decade with an updated strategic vision for human genomics research. Through a planning process that involved more than 50 events (such as dedicated workshops, conference sessions, and webinars) over the past two years (see <http://genome.gov/genomics2020>), the institute collected input from a large number of stakeholders, with the resulting input catalogued and synthesized using the framework depicted in Fig. 1.

Unlike the past, this round of strategic planning was greatly influenced by the now widely disseminated nature of genomics across biomedicine. A representative glimpse into this historic phenomenon is illustrated in Fig. 2. During the Human Genome Project, NHGRI was the primary funder of human genomics research at the US National Institutes of Health (NIH), but the past two decades have brought a greater than tenfold increase in the relative fraction of funding coming from other parts of the NIH.

¹National Human Genome Research Institute, National Institutes of Health, Bethesda, MD, USA. ✉e-mail: egreen@nhgri.nih.gov

The Forefront of Genomics[®]

Box 1

Guiding principles and values for human genomics

• **Maintain an overarching focus on using genomics to understand biology, to enhance knowledge about disease, and to improve human health** — genomics is now foundational across the entire continuum of biomedical research, from deciphering fundamental principles of biology to translating that knowledge into disease prevention and medical advances.

• **Strive for global diversity in all aspects of genomics research, committing to the systematic inclusion of ancestrally diverse and underrepresented individuals in major genomic studies** — attention to diversity in genomics research is both socially just and scientifically essential, which includes meaningful, sustained partnerships with diverse communities in the design and implementation of research studies, the propagation of research findings, and the development and use of new technologies.

• **Maximize the usability of genomics for all members of the public, including the ability to access genomics in healthcare** — engagement, inclusion, and understanding the needs of diverse and medically underserved groups are required to ensure that all members of society benefit equitably from genomic advances, with particular attention given to the equitable use of genomics in healthcare that avoids exacerbating and strives towards reducing health disparities.

• **Champion a diverse genomics workforce** — the promise of genomics cannot be fully achieved without attracting, developing, and retaining a diverse workforce, which includes individuals from groups that are currently underrepresented in the genomics enterprise.

• **Provide a conceptual research framing that consistently examines the role of both genomic and non-genomic contributors to health and disease** — routinely considering the

importance of social and environmental factors that influence human health (and the interactions among those components and genomics) will be important for the comprehensive understanding of most human diseases.

• **Promote robust and consistently applied standards in genomics research** — the use of carefully defined standards (for example, those for generating, analysing, storing, and sharing data) has benefited genomics in numerous ways, and this must include appropriate privacy and data-security protections for those participating in genomics research.

• **Embrace the interdisciplinary and team-oriented nature of genomics research** — starting with the Human Genome Project, some of the most challenging genomics endeavours have benefited from the creation and management of large, interdisciplinary research collaborations.

• **Adhere to the highest expectations and requirements related to open science, responsible data sharing, and rigor and reproducibility in genomics research** — the genomics enterprise has a well-respected history of leading in these areas, and that commitment must be built upon and continually reaffirmed.

• **Pursue advances in genomics as part of a vibrant global community of genomics researchers and funders** — the challenges in genomics require the collective energies and creativity of a collaborative international ecosystem that includes partnerships among researchers, funders, and other stakeholders from academia, government, and the commercial sector.



NHGRI Scientific Interests

NHGRI supports resources, approaches, and technologies that accelerate genomic research focused on:

- the structure and biology of genomes
- the genomics of disease
- the implementation and effectiveness of genomic medicine
- computational genomics and data science
- the impact of genomic technology, advances, and implementation on health disparities and health equity
- ethical, legal, and social issues related to genomic advances

NHGRI supports studies that provide generalizable methods and knowledge – *disease, condition, and population agnostic institute*

Workforce diversity, infrastructure and research



SGM Health Research & Resources at NHGRI

RESEARCH

- **Genetic Privacy and Identity in Sexual and Gender Minorities: GetPrISM (R21)**
- **A novel approach for equitable characterization of gender and its use in exposing subgroup discrepancies in polygenic score associations (R01)**
- **Elucidating the phenome-wide impact of sex and gender on disease (R01)**
- **Ethical and Social Implications of In Vitro Gametogenesis (R21)**
- **Trans/Forming Genomics: Guidance for Research Involving Transgender and Gender Diverse People (R01)**
- **Differences in Weight Bias Internalization and Body Acceptance Based on Sexual Orientation and Gender Identity (intramural)**

SGM Health Research & Resources at NHGRI

PUBLICATION

- **LGBTQ+ Perspectives on Conducting Genomic Research on Sexual Orientation and Gender**
 - **Citation:** Hammack-Aviran, C., Eilmus, A., Diehl, C. et al. LGBTQ+ Perspectives on Conducting Genomic Research on Sexual Orientation and Gender Identity. Behav Genet 52, 246–267 (2022).

RESOURCES

- **Inter-Society Coordinating Committee for Practitioner Education in Genomics (ISCC-PEG) - LGBTQI+ Issues in Genomics Education Project Group**
- **PhenX Toolkit: Gender Identity, Sexual Orientation, Sexual Identity measures**

What Are The Gaps?

- Enhance support for genomics workforce development and capacity—skills, curricula, support faculty recruitment
- Broadening training opportunities and support for students
- Hands on training to include funding for personnel and supplies relevant to genomics
- Fund genomic cores at MSIs and fund genomics training utilizing the cores
- Partnership-building within and between MSIs
- NHGRI assist with training to operate genomics equipment
- Engagement with the community

Genome Research Experiences To Attract Talented Undergraduates Into The Genomics Field To Enhance Diversity (GREAT) Program (RFA-HG-22-004)

- Provides exposure to genomics research to undergraduate students enrolled at MSIs or IDeA-eligible institutions
- Supports educational activities with a primary focus on:
 - **Research Experiences** in NHGRI mission areas, to reinforce their intent to graduate with a science or social science degree and prepare them for graduate school admissions and/or research careers that contribute to the field of genomics.
 - **Courses for Skills Development** that have the potential to increase opportunities for success in genomics at the next career level.
- Collaborations required with research-intensive institutions or organizations that have a prominent genomics research training environment

Due date: July 1, 2024



SELECTED
Research Funding
Opportunities



Computational Genomics and Data Science

Investigator Initiated Research in Computational Genomics and Data Science (R01)

[PAR-21-254](#)

Application Due Dates: February 5, June 5, October 5

Investigator Initiated Research in Computational Genomics and Data Science (R21)

[PAR-21-255](#)

Application Due Dates: February 16, June 16, October 16

Genome Science

Centers of Excellence in Genomic Science (RM1 Clinical Trial Optional)

PAR-22-107

Application Receipt Date(s): **June 21, 2024**

Center for Inherited Disease Research (CIDR) High Throughput Sequencing and Genotyping Resource Access (X01)

PAR-20-230

Application Due Date(s): Continuous receipt

NHGRI Funding Opportunities

<https://www.genome.gov/research-funding/Funding-Opportunities>

NIH Central Resource for grants and funding information

<https://grants.nih.gov/funding/searchguide/index.html#/>

NHGRI Extramural Training Mission

Prepare a diverse and talented genomics workforce that is operating at the forefront of genomics in order to accelerate scientific and medical breakthroughs to improve human health.



Institutional training

Courses/curricula

Mentored research experiences

Career transitions

Loan repayment

Fellowships

Career development

Educational activities

Administrative supplements: diversity, re-entry, re-integration, continuity, retention

Training Information and Funding Resources



Careers in Genomics

Information about career opportunities in the genomics field

<https://www.genome.gov/careers-in-genomics>

Genomics Educational Resources

Educational resources for different academic levels

<https://www.genome.gov/About-Genomics/Educational-Resources>

Funding to Promote Diversity in the Genomic Workforce

Information about funding opportunities for individuals from underrepresented backgrounds

<https://www.genome.gov/careers-training/Funding-to-Promote-Diversity-in-the-Genomic-Workforce>

Funding for Research Training

Information about funding opportunities for research training

<https://www.genome.gov/careers-training/NHGRI-Funding-Opportunities-Training-Career-Development>

Engagement & Training



What Are the Gaps?

- Resources for genomics training throughout education/training lifecycle
- Emphasis on mentoring (including peer-mentoring)
- Broadening training opportunities for MS students
- Developing genomics skills and promoting genomics careers at undergraduate levels

What Are the Gaps?

- Leverage summer training opportunities at NHGRI, bring back new skills to institution
- Long-term workforce development programs to build partnership and training experiences for healthcare professionals
- Site visits from NHGRI staff to understand current programs for mentoring, advising, and training



SELECTED
Extramural Training
Funding Opportunities



NHGRI Training / career development by stage

	High School	Undergraduate/ Community College	Postbac	Master's	Medical Students	Predoc	Postdoc	Early Stage Investigator	Mid/Late Stage Investigator
Science Education Partnership Awards									
Diversity Supplements									
R25: Diversity Action Plan (DAP)									
R25: Genome Research Experiences to Attract Talented Undergraduates into the Genomic Field to Promote Diversity (GREAT)									
U24 Educational Hub									
R25: Entry Level Modules									
R25: Data Scientists									
R25: Genetic Counselors									
R25: Genomic Courses									
R25: Curriculum for Medical Students									
F30: Fellowship awards for Predoctoral M.D./Ph.D.									
F31: Predoctoral Fellowship Awards									
F99/K00 : Predoctoral to Postdoctoral Transition Career Awards									
T32: Institutional Research Training Grants									
F32: Postdoctoral Fellowship Awards									
K99/R00: Postdoctoral Career Transition Award									
K01: Mentored Research Scientist Development Award									
K08: Mentored Clinical Scientist Research Career Development									
K18 : Career Enhancement Award									
Loan Repayment Plan									
K25: Mentored Quantitative Research Career Development Award									

Individual awards: training and career development

Graduate / predoctoral

- Fellowships (F30, F31)
- Fellowships, diverse backgrounds (F31-D)
- Predoc to postdoc transition, diverse backgrounds (F99/K00)

Postdoctoral

- Fellowships (F32)
- Postdoc to faculty (K99/R00)
- Postdoc to faculty, diverse backgrounds (MOSAIC K99/F00)

Early and mid-stage investigator

- Workforce diversity (R01)
- Early career researcher (R01)
- Mentored research scientist (K01)
- Research career enhancement (K18)
- Loan repayment program (LRP)

Specific professional focus

- Clinical scientist (K08)
- Quantitative Scientist (K25)

← Diversity, re-entry, and re-integration administrative supplements →

NRSA Individual Fellowships (F30, F31, F31-diversity, F32)

FOAs: [PAR-21-050](#), [PAR-21-051](#), [PAR-21-052](#), [PAR-21-048](#)

Deadline: Standard dues dates

Goal: Provide support for trainees to obtain mentored research training while conducting predoctoral or postdoctoral training genomics research.

Eligibility: Graduate / predoctoral students, dual-doctoral degree candidates at institutions without NIH-funded dual-degree training programs, postdoctoral candidates

Budget: NRSA stipends, tuition and fees, institutional allowance

Who to contact: Heather Colley, heather.colley@nih.gov (F30). Temesgen Fufa, temesgen.fufa@nih.gov (all others)

NHGRI Predoctoral to Postdoctoral Transition Award for a Diverse Genomics Workforce (F99/K00)

FOA: [PAR-21-143](#)

Deadline: August 8, 2024

Goal: Provide a structured pathway for outstanding graduate students from diverse backgrounds to transition to postdoctoral research positions focused on the scientific, medical, ethical, social and/or legal areas of genomics research.

Eligibility: Graduate / predoctoral students

Budget: See FOA for allowable costs during F99 and K00 phases
The maximum project period is 5 years (up to 2 years in F99 phase, up to 3 years in K00 phase)

Who to contact: Lucia Hindorff, hindorffl@mail.nih.gov

Pathway to Independence (Parent K99/R00)

FOA: [PA-20-188](#)

Deadline: Standard dues dates

Goal: Provide a structured pathway for timely transition of outstanding postdoctoral researchers with a research and/or clinical doctorate degree from mentored, postdoctoral research positions to independent, tenure-track or equivalent faculty positions.

Eligibility: Postdoctoral researchers

Budget: See FOA for allowable costs during K99 and R00 phases

The maximum project period is 5 years (up to 2 years in K99 phase, up to 3 years in R00 phase)

Who to contact: Heather Colley, heather.colley@nih.gov

Maximizing Opportunities for Scientific and Academic Independent Careers (MOSAIC) Postdoctoral Career Transition Award to Promote Diversity (K99/R00)

FOA: PAR-21-271

Deadline: Standard due dates

Goal: Provide a structured pathway for timely transition of outstanding postdoctoral researchers from diverse backgrounds with a research and/or clinical doctorate degree from mentored, postdoctoral research positions to independent, tenure-track or equivalent faculty positions.

Eligibility: Postdoctoral researchers from diverse backgrounds

Budget: See FOA for allowable costs during K99 and R00 phases

The maximum project period is 5 years (up to 2 years in K99 phase, up to 3 years in R00 phase)

Who to contact: Heather Colley, heather.colley@nih.gov

Mentored Research Scientist Development Award (K01)

FOAs: [PA-20-176](#), [PA-20-190](#)

Deadline: Standard due dates

Goal: The K01 award will provide support and protected time for an intensive, supervised career development experience in genome sciences or ethical, legal and social issues (ELSI) research.

Eligibility: Individuals with no more than 4 years of postdoctoral research experience

Budget: Salary, other program-related expenses

Who to contact: Heather Colley, heather.colley@nih.gov

Mentored Quantitative Research Award (K25)

FOA: PA-20-199

Deadline: Standard due dates

Goal: The K25 award will provide support and protected time for a period of supervised study and research for productive professionals with quantitative and engineering backgrounds to integrate their expertise with NIH-relevant research.

Eligibility: Professionals with quantitative (e.g., mathematics, statistics, economics, computer science, imaging science, informatics, physics, chemistry) and engineering backgrounds

Budget: Salary, other program-related expenses

Who to contact: Sandhya Xirasagar, xirasasa@mail.nih.gov

Research Supplements

A C G
C G T
A C G

**To Promote Diversity in Health-Related Research
To Promote Re-Entry and Re-Integration into Research Careers**

FOA: [PA-21-071](#)

FOA: [NOT-OD-21-134](#)

Deadline: Ongoing (May 15 for current fiscal year funding)

Goal: Supplements to existing research project grant to provide mentored research experiences within the scope of the parent award

Eligibility: From high school to the faculty level. Consult FOA for additional eligibility information. Individuals from diverse backgrounds or seeking re-entry or re-integration into research

NIH Loan Repayment Program (LRP)

Goal: Recruit and retain qualified professionals into biomedical or biobehavioral research careers.

Eligibility: Researchers with qualified educational debt

- Applicants must be U.S. citizens, U.S. nationals, or permanent residents of the U.S.
- Applicants must have total qualifying educational debt equal to or in excess of 20 percent of their institutional annual base salary at the time of award.

Funds: Repays up to \$50,000 annually of a researcher's qualified educational debt

More information: <https://www.lrp.nih.gov>

Who to contact: Heather Colley, heather.colley@nih.gov

Ruth L. Kirschstein NRSA Institutional Research Training Grant (T32)

FOA: PAR-23-048

Deadline: May 25 & September 25; January 25, May 25, September 24, 2025

Goal: Develop and/or enhance predoctoral and postdoctoral research training, including short-term research training. Programs should include engaging, didactic, research and career development elements to prepare trainees for research careers.

Target audience: Predoctoral or postdoctoral trainees

Budget: Trainee stipends tuition, fees, travel, and training-related expenses.
The maximum project period is 5 years.

Applications may request up to 10 training positions per year.

Who to contact: Lucia Hindorff, hindorffl@mail.nih.gov

NHGRI Short Courses for Genomics-Related Research Education (R25)

FOA: [PAR-22-095](#)

Deadline: January 25, 2025

Goal: Facilitate the development of scientists with the skills to advance the research mission of NHGRI.

Target audience: Individuals, ranging from master's level students to well-established investigators, who need new knowledge and skills to apply to a relevant genomics research area

Budget: Personnel, participants, other program-related expenses.

The maximum project period is 5 years.

Application budgets are limited to \$150,000 direct costs per year.

Who to contact: Lucia Hindorff, hindorffl@mail.nih.gov

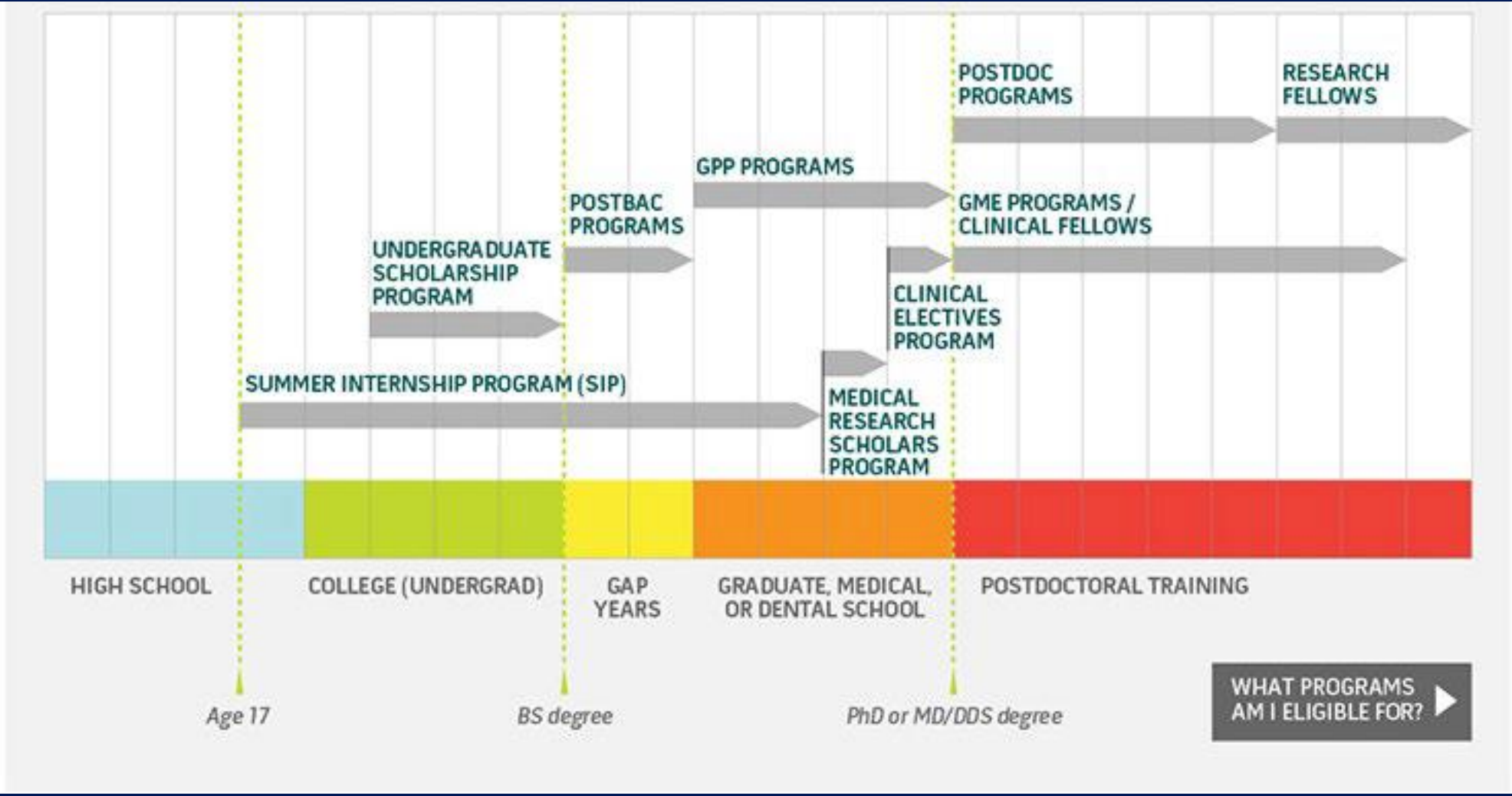
A C G
C G T
A C G



Training at NHGRI



What programs am I eligible for?



<https://www.genome.gov/careers-training/training-at-nhgri>

Immersive Summer Program for Research in Genomics (iSPRinG)

Website: <https://www.genome.gov/careers-training/research-training/Immersive-Summer-Program-for-Research-in-Genomics>

Deadline: FY2025 deadline TBA

Goal: Introduce highly motivated students to the field of genomics research through the NIH Summer Internship Program.

Target audience: Individuals enrolled in or accepted to community college, college, or university (including undergraduate, graduate or professional students)

Provides: Paid internship for a minimum of ten weeks

Who to contact: nhgritraining@mail.nih.gov

Diversity is key in unlocking scientific discovery and productivity



Jamil B. Scott, PhD, MPH

Training, Diversity, and Health Equity (TiDHE) Office
National Human Genome Research Institute (NHGRI)

Email: jamil.scott@nih.gov

Credit: NHGRI Office of Communications



A C G
C G T
A C G

THANK YOU!

