

HFSP Programs



International

**Human Frontier
Science Program**

Organization

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Supporting Frontier Research in Life Sciences

The Human Frontier Science Program (HFSP) supports innovative basic research that applies novel approaches to understand fundamental biological problems and to promote scientific exchange across national and disciplinary boundaries.

An understanding of the complexity of living systems is needed for contemporary life science research to disrupt paradigms. True insights often come after biologists team up with colleagues in diverse fields, including chemistry, computer science and engineering. Thus, HFSP aims to support frontier projects across disciplinary and continental boundaries and across multiple scales that span from molecules to systems. Therefore, applications involving scientists in other disciplines, developing new methods of significant impact on biology, are encouraged.

HFSP Peer Review

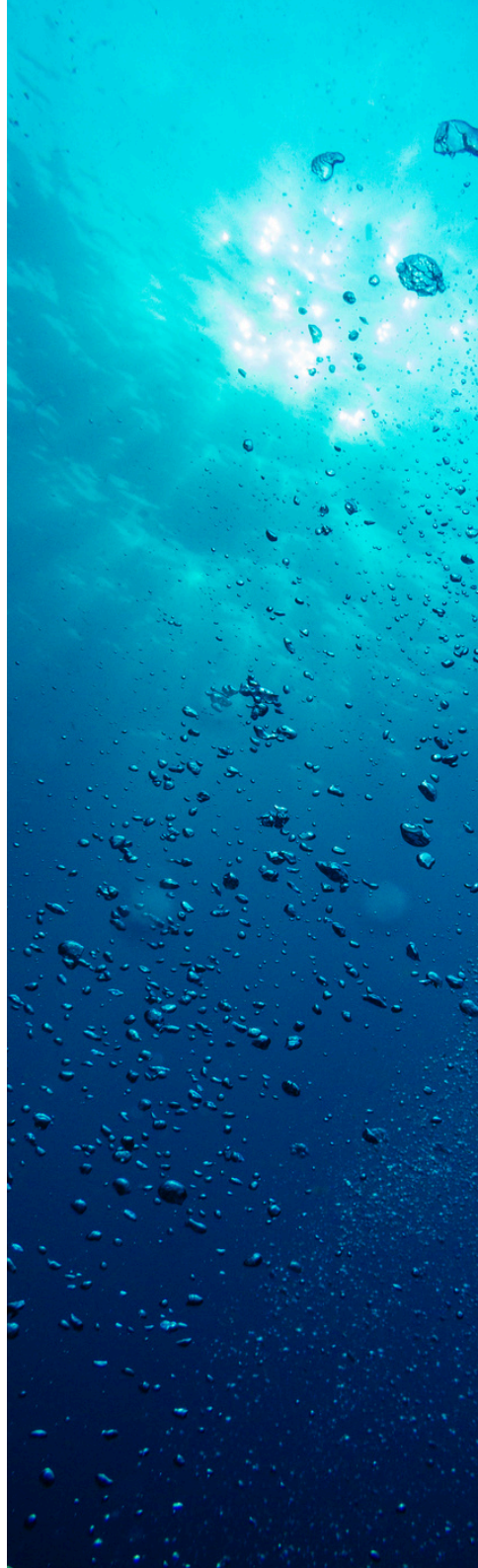
Rigorous international peer review is the cornerstone used in selecting HFSP awards.

There are two Review Committees. One for Fellowships and one for Research Grants, each comprised of 24 to 26 scientists.

Each committee has a broad international representation of scientific experts and reviews applications in all scientific fields supported by the HFSP. The committees are supported by mail reviewers selected for their expertise on an ad hoc basis. This approach ensures that awards are made according to international scientific standards with a minimum of geopolitical bias.

Extensive research is carried out into the breadth of expertise of committee members before appointment as reviewers.

The selection criteria and evaluation procedures are under regular review and the HFSP Secretariat works closely with the members of the Review Committees and the Council of Scientists, HFSP's scientific advisory committee, to ensure that all applications are assessed fairly and thoroughly.



Elegibility Criteria for HFSP Applications

Scientists with a PhD in the life sciences, or in a complementary discipline with a strong interest in driving discoveries at the newest frontiers of life science research are encouraged to apply to HFSP Research Grants and Fellowships.

Which opportunity is best for an applicant depends on a few considerations. One of the leading factors is citizenship in case of a fellowship application. For Research Grant applications the country where the laboratory of the principal investigator is located is taken into account.

HFSP is supported by the following Members: Australia, Austria, Belgium, Bulgaria, Canada, Croatia, Cyprus (EU part only), Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, India, the Republic of

Ireland, Israel, Italy, Japan, the Republic of Korea, Latvia, Lithuania, Luxembourg, Malta, The Netherlands, New Zealand, Norway, Poland, Portugal, Romania, Singapore, Slovakia, Slovenia, South Africa, Spain, Sweden, Switzerland, the United Kingdom, and the United States of America.

HFSP has supported over 8000 scientists during the last 35 years. Postdoctoral scientists alone represent more than 70 nationalities that have participated in HFSP fellowship program. In both programs, scientists from non-member countries are eligible to apply and further information is available in the corresponding sections of this brochure.

The complete list of eligibility requirements by program is available in the application guidelines on the HFSP website: www.hfsp.org.



HFSP awardees and alumni on a poster session at the 23rd HFSP Awardees Meeting, Washington D.C., USA, June 2024.

HFSP Research Grants

HFSP Research Grants support teams of scientists from different countries who wish to combine their expertise to apply innovative approaches to address questions that could not be answered by individual laboratories. Preliminary results are not required, and applicants are expected to develop new lines of research through the collaboration.

Daring research is often risky, so HFSP expects that applicants outline mitigation strategies for their research and how failed approaches could still yield valuable insights.

HFSP Research Grants require interdisciplinary team composition. Therefore, applications must include scientists from disciplines outside biology, such as psychology, biophysics, chemistry, computational biology, engineering, mathematics, nanoscience, or physics.

Research Grants are for three years and awarded to international (preferably intercontinental) teams of two to four investigators, who have not collaborated before. The principal investigator's lab must be located in an HFSP Member Country.

Financial support depends on team size, up to \$500,000 per year for a team of up to four (max.) investigators.

There are two types of Research Grants:

Research Grants – Early Career

For teams of researchers all within ten years after their PhDs and five years of establishing an independent laboratory.

Research Grants – Program

For independent scientists at any career stage.



in a nutshell...

- Investigate a fundamental problem in the life sciences with an interdisciplinary team
 - Establish a new international (preferably intercontinental) collaboration
 - 2-4 scientists
 - High-risk, high-gain project
 - No preliminary data required
 - Support for 3 years
 - Flat rate award amount depending on team size
-
- **Deadline** for Letters of Intent: March
 - **Full Proposals** (invitation only): September
 - **Decision:** March of the following year

HFSP Postdoctoral Fellowships

HFSP Fellowships support early career researchers in carrying out research projects in the world's best laboratories.

The HFSP fellowship program supports proposals for frontier, potentially transformative, research in the life sciences. Applications for high-risk projects are particularly encouraged.

The projects should be distinctly different from the previous work of the applicant and should challenge existing paradigms by using novel approaches and techniques. They should address an important problem or a barrier to progress in the field.

HFSP Fellowships encourage early career scientists to broaden their research skills by moving into new areas of study, while working in a new country.

Two different fellowships are available:

Long-Term Fellowships (LTF)

For applicants with a PhD in a biological topic to embark on a new project in a different field in the life sciences.

Cross-Disciplinary Fellowships (CDF)

For applicants who hold a PhD from a non-biological discipline (e.g., physics, chemistry, mathematics, engineering, or computer sciences), embarking on a biological research project.

HFSP Fellowships are for three years and cannot be renewed. Nationals from HFSP Member countries can apply to work in any country. Applicants from non-member states must apply to work in one of the HFSP Member countries. HFSP Fellows receive living, research, and travel allowances that are adjusted to the country of work.



in a nutshell...

- Work in a new country with a new host supervisor
 - Make a significant change of research topic and field
 - Ask a fundamental question in the life sciences
 - Challenge existing paradigms and concepts
 - No preliminary data
 - Have one first-author paper accepted or published
 - Apply within 3 years after PhD
 - Support for 3 years
 - Living allowance, travel allowance, family support
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- **Deadline** for Letters of Intent: May
 - **Full Proposals** (invitation only): September
 - **Decision:** March the following year

HFSP Breakthrough Research

HFSP-supported frontier basic science often breaks ground that leads to valuable innovations in the life sciences, new patents, and commercial enterprises.



Hiroaki Suga, Department of Chemistry, Tokyo University

Developing RNA-based catalysts that revolutionize the discovery of bioactive peptides

Suga's 2017 HFSP Research Grant isolated two types of tRNA-aminoacylating ribozymes from libraries based on an existing t-box riboswitch of *Bacillus subtilis* glyQS, which suggested a possible scenario of evolution of tRNA-aminoacylating ribozymes, primitive translation and T-box gene regulation systems. With this understanding, he was able to develop novel ribozymes, flexizymes, that can charge tRNAs with amino acids, with the goal of reintroducing ribozymes into cellular metabolism, ultimately replacing protein enzymes. His discoveries have had major impacts in the biopharmaceutical industry, and he co-founded MiraBiologics.



Raya Sorkin, Tel Aviv University

Using sound to stretch cells

In 2018, HFSP Long-Term Fellow Raya Sorkin and colleagues developed a groundbreaking approach to measure cell mechanical properties using acoustically exerted forces. Mechanical properties indicate a cell's condition, often changing in diseases like malaria and cancer. Sorkin's method employs Acoustic Force Spectroscopy (AFS), enabling researchers to probe changes in cell deformability with high sensitivity and throughput.

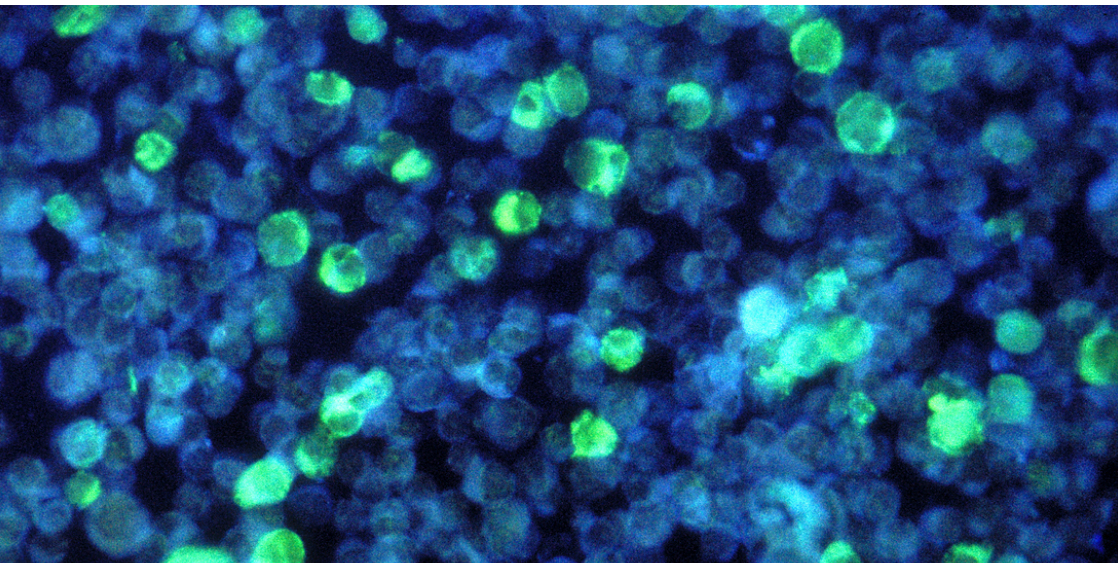
By applying acoustic pressure to red blood cells, the team revealed that extracellular vesicles, particles critical for cell-cell communication, make these cells more deformable after uptake. Elevated vesicle concentrations are observed in trauma, malaria, and cancer patients. The AFS technology, a powerful diagnostic tool, has been commercialized through LUMICKS, a spin-off company from the research group. This innovation highlights the transformative potential of HFSP-supported biophysical techniques for pressing biomedical challenges.



Stefan Hell, Max-Planck-Institute for Biophysical Chemistry, Goettingen, and Jonas Ries, European Molecular Biology Laboratory, Heidelberg

Super-Super-Resolution Microscopy That Can Image Actions in Living Cells

Nobel laureate Stefan Hell (HFSP Research Grant in 2017) developed a revolutionary super-resolution microscopy method called MINFLUX that allows imaging at a resolution the size of a small molecule and revealing unprecedented detail in imaging cellular structures. To demonstrate the power of these new developments, a precise cellular structure was needed, thus the Hell group teamed up with 2017 HFSP Young Investigator Jonas Ries, who had established super-resolution reference standards as part of his HFSP grant. These reference structures consisted of nuclear pore complexes, channels that regulate transport between the nucleus and cytoplasm of cells, which the Ries group had labeled with super resolution-compatible fluorophores using the CRISPR/ Cas9 technology. The MINFLUX microscope revealed the structure of these complex protein machines with unprecedented optical resolution. They demonstrated this was even possible in living cells, which paves the way for imaging molecular machines during their action.



Photomicrograph depicting leukemia cells containing Epstein-Barr virus. Courtesy of the Public Health Image Library, Centers for Disease Control and Prevention, Dr. Paul M. Feorino. © CDC CCO Images via Canva.com

HFSP Nakasone Award

The HFSP Nakasone Award is an annual award for groundbreaking contributions or breakthrough discoveries in the life sciences, which rewards achievements in scientific excellence resulting in a singular discoveries that have moved the frontiers of knowledge in biology.

The award recognizes the vision of former Prime Minister Yasuhiro Nakasone of Japan in proposing the Human Frontier Science Program, whose mission is “to promote, through international cooperation, basic research focused on the elucidation of the sophisticated and complex mechanisms of living organisms.”

HFSP is committed to diversity and inclusion and especially seeks nominations of scientists that advance greater equity and inclusion in the global scientific enterprise. The award is given for scientific excellence of a clearly defined discovery or series of discoveries in basic life science research that date back no more than 10 years, and that are in accord with HFSP’s mission to support basic research into the “complex mechanisms of living organisms.” The discovery’s impact should be clearly demonstrated by publications in the 10-year period following the discovery.

All levels of complexity involving mechanisms of biological phenomena or the interactions between organisms and with the environment are considered.



in a nutshell...

- Recognizing groundbreaking contributions that advanced the frontiers of biological knowledge
- Given for a discovery in basic life science in the last 10 years
- Conceptual, experimental or technological breakthrough(s) identifiable via scientific publication(s)
- The awardee receives a commemorative gold medal, a small unrestricted grant, and an invitation to deliver the HFSP Nakasone Lecture at the HFSP Awardees Meeting

15 Years of HFSP Nakasone Awards with 20 Awardees



Jacob (Yaqub) Hanna 2025

“For developing synthetic whole-embryo models from naïve pluripotent ex utero stem cells, providing a new foundation for developmental embryology and regenerative medicine strategies.”



Maiken Nedergaard 2024

“For her groundbreaking discovery and exploration of the glymphatic system that has transformed our understanding of the importance of sleep.”



Rotem Sorek, 2023

“For his groundbreaking discoveries of the diversity and operation of prokaryotic immune systems that revolutionized our understanding of virus defence and explained how related features of the human immune system evolved.”



Franz-Ulrich Hartl & Arthur L. Horwich 2022

“For their discoveries revealing the functions and mechanisms of chaperone-mediated protein folding and the implication of their work in understanding human disease.”



Aviv Regev 2022

“For unraveling the biological processes controlling cellular phenotype through innovative computational, mathematical, and experimental approaches applied to single-cell genomics.”



Anthony Hyman & Clifford Brangwynne 2021

“For their discovery of a new state of biological matter, phase-separated macromolecule condensates that play an important role in cell organization, gene regulation, signalling and pathology.”



Angelika Amon 2020

“For discovering aneuploidy-induced cellular changes and their contribution to tumorigenesis.”



Michael Hall 2019

“For the discovery of the master regulator of cell growth, the target of rapamycin (TOR) kinase.”



Svante Pääbo 2018

“For his discovery of the extent to which hybridization with Neanderthals and Denisovans has shaped the evolution of modern humans, and his development of techniques for sequencing DNA from fossils.”



David Julius 2017

“For his discovery of the molecular mechanism of thermal sensing in animals because it has defined a field of sensory reception.”



Emmanuelle Charpentier & Jennifer Doudna 2016

“For their seminal work on the CRISPR-Cas9 system.”



James Collins 2015

“For his innovative work on synthetic gene networks and programmable cells that launched the exciting field of synthetic biology.”



Uri Alon 2014

“For his pioneering work in discovering network motifs, which provided the single most important foundation of the field of systems biology, opening up the previously impenetrable complexity of genetic circuits to systematic analysis and understanding.”



Stephen Quake 2013

“For his prolific inventions that advanced biological measurement techniques.”



Gina Turrigiano 2012

“For her pioneering work on homeostatic plasticity in the nervous system.”



Michael Elowitz 2011

“For his pioneering work on gene expression noise.”



Karl Deisseroth 2010

“For his pioneering work on the development of optogenetic methods for studying the function of neuronal networks underlying behavior.”

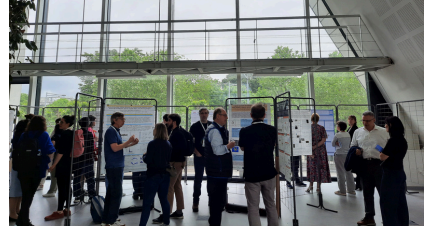
Engaging and Nurturing the Global Life Science Community

HFSP Frontier Workshops

The HFSP Frontier Workshops offer a dynamic platform for scientists and decision makers to explore pressing issues at the cutting edge of science and technology. Designed to encourage cross-disciplinary discussions, these workshops delve into themes that extend beyond traditional experimental research, bringing to light questions of broad scientific and societal concern that are often underexplored. Aligned with HFSP's mission, the workshops address challenging and sometimes controversial topics that push the boundaries of current scientific understanding.

Built on the success of past HFSP initiatives, the Frontier Workshops also seek to overcome barriers for young scientists who aspire to work across fields. Early career researchers face mounting pressures for immediate results, which can deter those in fields like physics, mathematics, and computer science from engaging in life sciences. However, fostering an interdisciplinary exchange of ideas is essential to addressing critical issues in health, agriculture, and the environment.

As the Frontier Workshops expand, they will continue to bring global experts together to inspire and sustain interdisciplinary collaborations in ever-evolving scientific landscapes.



Top two: First HFSP Frontier Workshop, “Frontier Science at the Interface of Physics and Biology,” Strasbourg, France, May 2024.

Bottom two: Second HFSP Frontier Workshop on “Driving Innovation in the Life Sciences: a role for AI,” New Delhi, India, November 2024.

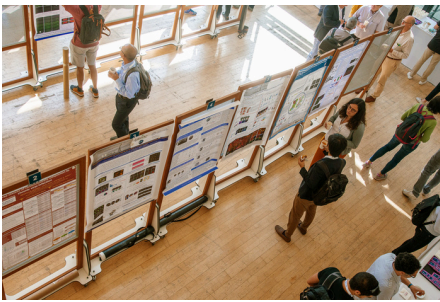
HFSP Awardees Meeting

The HFSP Awardees Meeting is an important, annual event that brings together outstanding scientists who have been awarded HFSP Research Grants and Postdoctoral Fellowships. The event also welcomes an increasing number of HFSP alumni, fostering an expanding community of innovative researchers.

These meetings promote exchange among scientists from different fields and countries and offer awardees the opportunity to share their work conducted with HFSP support.

Since 2001, the Awardees Meeting has taken place in various countries, including Australia, Canada, France, Germany, India, Italy, Japan, Portugal, the Republic of Korea, Singapore, Switzerland, the UK, and the USA.

The feedback from participants has been overwhelmingly positive, particularly highlighting the value of interactions across different scientific disciplines. This cross-disciplinary exchange is a core aspect of HFSP's mission, which aims to expand scientific frontiers through collaboration.



Every year, the HFSP Awardees Meeting takes place in a different HFSP Member Country.

Top-left: 21st HFSP Awardees Meeting, held in Paris, France, June 2022

Bottom-left: 22nd HFSP Awardees Meeting, held in Cape Town, South Africa, December 2023

Right: 23rd HFSP Awardees Meeting, held in Washington DC, USA, June 2024

Forging New Connections

HFSP Accelerator Grant

The new HFSP Accelerator Grant will contribute to strengthening diversity, equity, and inclusion. It supports the partnering of awarded HFSP Research Grant teams with excellent researchers in selected Member countries. All teams that have been awarded an HFSP Research Grant can apply for an HFSP Accelerator Grant to support the integration of one additional scientist – the accelerator team member – in the awarded HFSP grant project and team.

The HFSP Accelerator Grant offers mutual benefit: the new team member integrates into a high-quality research team that was successful in one of the most competitive peer review selections in the life sciences; the grant team has the chance to complement their research plan by integrating an additional member with corresponding expertise, skills, and knowledge.

HFSP MasterClass

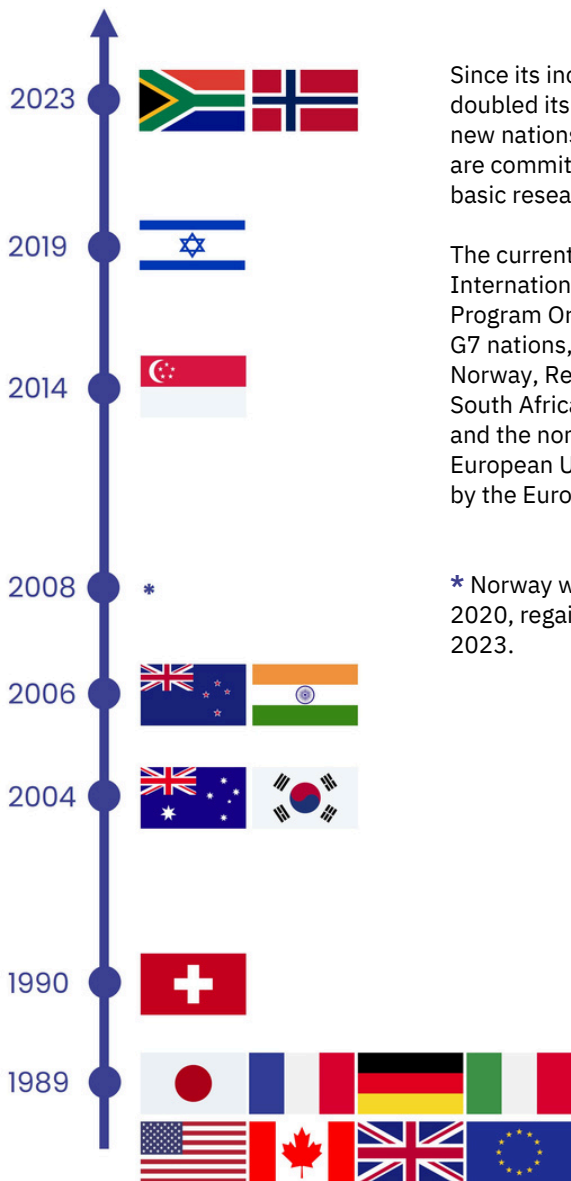
The HFSP Master Class is a special workshop for scientists interested in applying for HFSP Fellowships or Research Grants. The workshops offer practical instructions and hands-on training in grant writing. This approach ensures that equipping participants with valuable skills and insights will give them confidence to excel in their research endeavors. The interactive and engaging program features examples of HFSP-supported research projects, introductions to HFSP programs, and live exchanges with scientists in other countries.

The HFSP Master Class is taught by experienced HFSP reviewers. Their guidance, based on years of experience and expertise, is the basis for an interactive and engaging program.



The first HFSP Masterclass happened simultaneously in South Africa (in the image), the Republic of Korea, and India in November 2024.

HFSP/O Members



Since its inception in 1989, HFSP/O has doubled its membership, welcoming new nations from around the world that are committed to advancing frontier basic research in the life sciences.

The current Members of the International Human Frontier Science Program Organization (HFSP/O) are the G7 nations, Australia, India, Israel, Norway, Republic of Korea, Singapore, South Africa, Switzerland, New Zealand and the non-G7 members of the European Union, who are represented by the European Commission.

* Norway was a member from 2008 to 2020, regaining HFSP/O membership in 2023.



Photo credits: Dramatic Rocky Shoreline with Crashing Waves, Pexels, © Patrick Schulze

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