



# FASEB

Federation of American Societies  
for Experimental Biology

# National Institutes of Health & National Science Foundation

## PARTNERS IN RESEARCH

The National Science Foundation and the National Institutes of Health are partners in the U.S. research enterprise to advance scientific knowledge, health, environmental stewardship, and economic growth.

### National Science Foundation (NSF)

The only federal agency that supports fundamental research and education **across all scientific disciplines**, encouraging integration across these fields and promoting innovation.

### National Institutes of Health (NIH)

The nation's **primary funder of biomedical research**, advancing scientific knowledge that protects and improves human health and prevents disease.

By combining the biomedical expertise of NIH with the biological, mathematical, physical, social science, and engineering expertise of NSF, the two agencies jointly fund several interdisciplinary research programs.<sup>1</sup>

## Forecast and Respond to Public Health Issues<sup>2</sup>

NSF and NIH **promote ecosystem, human, and animal health** by studying the processes governing the relationship between humans, other organisms, and the environment.

This research **addresses local, national, and global health issues** by forecasting the emergence and transmission of infectious diseases, predicting the occurrence of environmental events, and improving the nation's capability to respond to adverse events including oil spills, wildfires, Lyme disease, and Ebola.

### Mitigating Harmful Algal Blooms (HABs)

HABs occur in oceans and lakes when microscopic algae grow uncontrollably and produce toxins that can trigger asthma and kill both animals and humans. HABs cost the nation up to \$82 million each year.<sup>3</sup>

The NSF- and NIH-funded "Oceans and Human Health" program has identified weather patterns to predict HABs and developed technology to detect blooms and their toxins. This improves the ability to forecast HABs and protects environmental, animal, and human health.



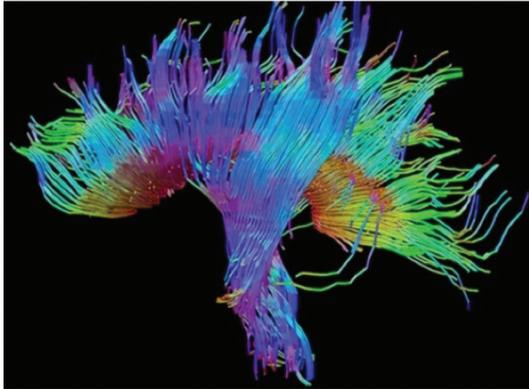
Green harmful algal bloom in Lake Erie.  
Photo: USGS/NASA

## Advance Biological and Biomedical Sciences

NSF and NIH support **interdisciplinary research** at the interface of biological, mathematical, geological, social, and engineering sciences.

By combining diverse research perspectives, they **facilitate transformative discoveries and create vital infrastructure** — such as collaborative research centers and data sharing frameworks — to advance scientific fields, solve important biological problems, and support the scientific enterprise.

### Data Sharing Progresses Computational Neuroscience



Nerve fibers connecting the human brain and spinal cord.  
Photo: Xiawei Ou

Computational neuroscience is fundamental for understanding human health and behavior to treat nervous system disorders such as concussions and Alzheimer's, improve education, and address public health issues.

Researchers funded by the "Collaborative Research in Computational Neuroscience" program created a website to share computational neuroscience data. This increased data accessibility and encouraged cross-disciplinary and international collaboration, resulting in multiple book chapters, roughly 50 conference presentations, and nearly 100 publications.<sup>4</sup>

## Develop Innovative Biomedical Technologies<sup>5</sup>

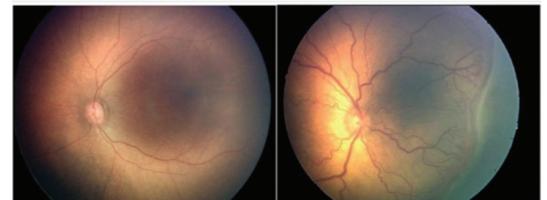
NSF's and NIH's multidisciplinary research **develops novel mathematical, computational, and statistical models and tools**.

These discoveries lead to innovative technologies — including smartphone-based tools to help doctors diagnose irregular heartbeats and bionic legs that adapt to amputees' movements — that **advance biomedical research and patient treatments**.

### Artificial Intelligence Diagnoses Childhood Blindness

The leading cause of childhood blindness is a disease called retinopathy of prematurity (ROP), which mostly affects premature babies, afflicts up to 16,000 infants each year, and causes blindness in 600 babies annually.<sup>6</sup> There is a shortage of trained doctors that can diagnose ROP.

The NSF- and NIH-funded "Smart and Connected Health" program developed an algorithm that uses artificial intelligence to diagnose ROP. This algorithm surpasses most experts' ability to identify this disease and increases diagnostic accessibility to treat and prevent blindness in babies with ROP.



A normal eye (left) and an eye with ROP (right).  
Photo: Michael Chiang

<sup>1</sup> NSF/NIH programs: Collaborative Research in Computational Neuroscience; Ecology and Evolution of Infectious Diseases; Cyber-Physical Systems; Joint Division of Mathematical Sciences/National Institute of General Medical Sciences Initiative to Support Research at the Interface of the Biological and Mathematical Sciences; Oceans and Human Health; A Science of Science Policy Approach to Analyzing and Innovating the Biomedical Research Enterprise; and Smart and Connected Health.

<sup>2</sup> NSF/NIH programs: Ecology and Evolution of Infectious Diseases and Oceans and Human Health.

<sup>3</sup> Anderson, Donald M., Porter Hoagland, Yoshi Kaoru, and Alan W. White. *Estimated Annual Economic Impacts from Harmful Algal Blooms (HABs) in the United States*. Report no. WHOI-2000-11. Woods Hole Oceanographic Institution. Falmouth, MA: Woods Hole Oceanographic Institution, 2000. 1-96.

<sup>4</sup> Teeters, Jeff, and Fritz Sommer. "Publications." CRCNS - Collaborative Research in Computational Neuroscience - Data Sharing. Accessed July 3, 2019. <https://crcns.org/publications>.

<sup>5</sup> NSF/NIH programs: Collaborative Research in Computational Neuroscience; Cyber-Physical Systems; Joint Division of Mathematical Sciences/National Institute of General Medical Sciences Initiative to Support Research at the Interface of the Biological and Mathematical Sciences; Smart and Connected Health.

<sup>6</sup> Facts about Retinopathy of Prematurity (ROP). National Eye Institute. June 2014. Accessed July 3, 2019. <https://nei.nih.gov/health/rop/rop>.



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