

Fight for Physiology:

**THE SCIENCE**



*Life*

**DEPENDS ON**



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# EXECUTIVE SUMMARY

## *The Science Life Depends On*

### THE CRISIS POINT

America's biomedical research enterprise stands at a crossroads. Decades of scientific leadership and the future of human health are at risk. America's capacity to lead in medicine, health, and scientific innovation depends on a strong, evolving foundation of discovery science—and that foundation is physiology, the integrative study of how the body functions.

### THE CHALLENGES ARE REAL AND IMMEDIATE

The President's fiscal year 2026 budget proposal calls for a 40% reduction in National Institutes of Health (NIH) funding—a move that, if enacted, would destabilize both established and emerging research programs and jeopardize the early-career pipeline of skilled researchers. Proposed cuts to the National Science Foundation (NSF) budget would further reduce support not only for graduate training, but also for critical areas of basic and applied research across disciplines. Even before these proposals take effect, uncertainty over federal funding and shifting visa policies are already pushing scientists to seek opportunities abroad, raising concerns that U.S. scientific leadership could erode amid intensifying global competition.

### PHYSIOLOGY: THE INDISPENSABLE FOUNDATION FOR BREAKTHROUGHS

Physiology is the foundational infrastructure of medicine, underpinning every modern breakthrough—from mRNA vaccines and artificial pancreas systems to organ-on-a-chip technologies, implantable sensors and emerging “digital-twin” modeling that simulates human systems in real time. By connecting molecules to functional systems, physiology reveals how life works across scales, from genes and cells to whole-body health and how we're impacted by the world around us. It is the indispensable backbone that all biomedical science and progress depends on.

### THE OPPORTUNITY

We face a critical moment that demands urgency, visibility and a unified voice. Physiology is the linchpin of discovery science. Protecting and championing physiology ensures the foundation for future cures, therapies and biomedical innovations, and keeps the U.S. at the forefront of biomedical progress. **The choices we make today about what science we value, fund and protect will determine the discoveries of tomorrow—and the future of health.** This report outlines clear actions that we all can take, whether you work in academia, industry, government or media, to support the science that fuels biomedical progress.



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*Physiology is an essential, modern driver of biomedical innovation. It's time to reintroduce this field to the world—not as the science of the past, but as the science our future depends on.*

**Robert L. Hester, PhD, FAPS**

*President, American Physiological Society  
University of Mississippi Medical Center*

# A TURNING POINT FOR BIOMEDICAL DISCOVERY

The biomedical ecosystem is solving complex, multiscale problems including the epidemic of chronic disease, global disease outbreaks and environmental challenges. These threats to healthy living cannot be solved by looking at genes, proteins or cells in isolation. They require a connected view of how the body's systems work together over time and under different conditions, an understanding that only physiology can provide.

## THAT IS THE DOMAIN OF PHYSIOLOGY.

By examining how biological systems interact in health and disease, physiology provides insights that no other discipline can. The progress it enables is critical—and cannot be taken for granted.

The biomedical ecosystem is at peril, and the science that makes every medical advance possible is currently under threat. Even brief interruptions in support stall the flow of research that sustains medical progress.

### Fractured Talent Pipeline

The future of the scientific workforce—and the innovation it fuels—is under direct threat. Long-standing programs supporting junior scientists are being cut back or canceled. The NSF slashed its flagship graduate fellowships by more than half in 2025, and NIH abruptly terminated many training grants for pre- and postdoctoral fellows. A recent poll reported that more than three-quarters (75%) of scientists in the U.S. are considering leaving the country.<sup>3</sup> Other countries, such as China, are actively establishing programs to attract disillusioned American and international scientists, offering housing subsidies, significant research funding and benefits for researchers and students.<sup>4</sup> Simultaneously, stricter visa policies in the U.S. and the perception of an unwelcoming environment are discouraging international talent. The resulting loss of domestic and international talent jeopardizes America's ability to maintain its global competitiveness.

### Destabilized Research Investment

The abrupt contraction of federal research and development (R&D) budgets is creating far-reaching instability, directly affecting local constituencies, universities, medical centers and jobs. Proposed cuts, such as the administration's recommendation to reduce the NIH budget by \$18 billion (40%),<sup>1</sup> represent the steepest cuts ever put forward.<sup>4</sup> While congressional appropriations are likely to avert this unprecedented reduction, months of uncertainty have already forced NIH to terminate or "flag" thousands of research grants<sup>2</sup> and delay reviews for ongoing projects across the country. Further, the scope of what can be proposed for study is narrowing, as shifting federal priorities reshape which areas of science are eligible for support. These sudden, drastic shifts delay lifesaving discoveries and threaten institutions across the country, with wide-ranging impacts across states, and the future of biomedical research.



## THE COST OF INACTION IS AT ONCE HUMAN AND ECONOMIC

Failing to sustain investment in physiological research and researchers delays critical, lifesaving discoveries. Additionally, without these discoveries, the cost of disease burden remains persistently high. Insufficient funding ultimately drives higher healthcare expenditures, imposing a broader toll on the U.S. economy. As one expert warned,

“A generation of scientists will have been lost,” because expertise, once squandered, cannot be instantly rebuilt.<sup>5</sup> These setbacks to the biomedical workforce jeopardize breakthroughs that improve longevity and resilience against current and future health crises.

## THE EFFECTS EXTEND BEYOND THE LAB

Federally funded biomedical research—including physiology—drives measurable economic growth. Every \$1 invested in NIH research generates an estimated \$2.56 in economic activity, supporting over 400,000 U.S. jobs and nearly \$95 billion in annual output.<sup>6</sup> More broadly, the life sciences and biopharmaceutical sectors—built on

physiological discovery—contribute more than \$1.6 trillion to the U.S. economy and employ over 7 million Americans.<sup>7</sup> Sustaining federal investment in physiology means not only protecting human health but also strengthening one of the most productive engines of national prosperity.



# DEFINING PHYSIOLOGY

## From Bedrock to Breakthroughs

Physiology is the science that explains life itself—and it’s at the heart of today’s most cutting-edge medical breakthroughs. By understanding how the body’s systems work together, physiologists help make cancer treatments safer, guide the delivery of gene therapies and ensure precision medicines hit their targets without harming other organs. This “slow science” may unfold over decades with countless collaborations from researchers and clinicians around the world, but it creates the insights that protect patients, prevent side effects and turn breakthroughs into therapies that help people live longer, healthier lives.

### FOR EVERY “OVERNIGHT” DISCOVERY, THERE ARE DECADES OF PHYSIOLOGICAL RESEARCH

Few discoveries illustrate this better than insulin, one of the most transformative medical advances of the last century. Understanding how hormones and metabolism interact—particularly the control of blood sugar by the pancreas—led to the groundbreaking discovery of insulin in the early 20th century. This physiological breakthrough transformed diabetes from a terminal illness into a manageable chronic condition and paved the way for

countless advances in metabolic science. The same foundational insights continue to inspire innovation today—from regenerative therapies to advanced glucose monitors and wearable health technologies.<sup>8</sup> Each modern leap, from decoding the genome to designing AI-driven drug models, stands on the shoulders of centuries of physiological discovery.

## PHYSIOLOGY POWERS MODERN BREAKTHROUGHS

Physiology turns fundamental insight into impact, ensuring that discovery translates into progress for public health, innovation and the economy. The past decade offers striking proof of its reach.



### CYSTIC FIBROSIS

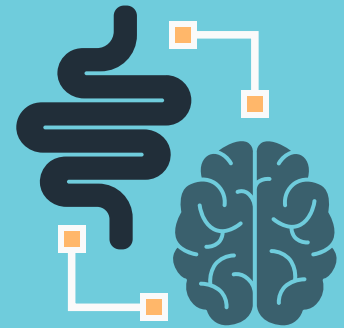
#### Cracking the Code of Cellular Function

In the 1970’s, children born with cystic fibrosis rarely lived long enough to finish grade school, and even at the dawn of the 21st century, many did not survive long beyond their teenage years. Today, decades of physiological research into how cells move salt and water in the lung and other organs has enabled the development of new therapies allowing people with cystic fibrosis to live well into adulthood—many now attending college, starting families, and participating fully in society.

## GLP-1 THERAPIES

### From Metabolism to Multi-system Medicine

Game-changing GLP-1 drugs for diabetes and obesity are the product of decades of basic physiological research on hormones, metabolism and cellular signaling. Early studies tracing how the gut communicates with the brain to regulate appetite and blood sugar revealed the mechanisms behind the body's energy balance and even inspired scientists to look to nature for answers. A key breakthrough came from the study of a hormone in Gila monster venom that mimicked human GLP-1, paving the way for the development of today's GLP-1-based therapies.<sup>9</sup> That same understanding of the gut-brain axis is now driving new investigations into the potential benefits of GLP-1 for cardiovascular, kidney and neurodegenerative diseases, demonstrating how sustained investment in basic, exploratory science yields compounding, cross-disciplinary returns.



## ORGAN TRANSPLANTATION

### Physiology at the Heart of Lifesaving Innovation

Advances in physiology are powering the next frontier in organ transplantation with organs from genetically modified pigs. With more than 100,000 men, women and children currently on the national transplant waiting list,<sup>10</sup> this breakthrough—rooted in decades of research on circulation, immune response and organ function—could help solve the global organ shortage, saving thousands of lives each year and reducing the immense costs of chronic organ failure.<sup>11</sup> It's physiology driving progress at its most tangible and profound—and a reminder of why continued investment in basic science saves lives.

## WEARABLE TECHNOLOGY

### Centuries of Physiology, Now on Your Wrist

From smartwatches to continuous glucose monitors, today's health devices convert centuries of physiological knowledge into digital tools that help people understand and manage their own bodies. Modern sensors and AI-driven diagnostics rely on principles first uncovered when physiologists mapped blood circulation and nerve signaling, turning observation into consumer-ready technology and actionable health insights that improve fitness and disease prevention.



## SUSTAINED SUPPORT FOR PHYSIOLOGY KEEPS THIS ENGINE OF PROGRESS RUNNING

Without reliable long-term investment, lifesaving discoveries are delayed, and promising technologies remain theoretical. Supporting physiology means securing the scientific infrastructure that every future breakthrough depends on.

*The speed of crisis response, the scope of innovation, and the strength of the health economy all rest on one foundation: **physiology.***

# PROTECTING DISCOVERY

## A Shared Agenda

Physiology is the science life depends on. Protecting this science requires a unified commitment from academia, government and industry alike. We must ensure that physiology remains visible, valued and fully integrated into the broader landscape of biomedical research. The path forward begins with shared action.

### COLLECTIVE IMPERATIVE

Protect funding for physiological research and promote physiology as a critical, indispensable science.

### CORE ACTIONS



1

#### PRIORITIZE DISCOVERY-STAGE FUNDING

Ensure sustained investment in exploratory research that fuels all downstream innovation.



2

#### REBUILD TRUST

Promote transparency and ensure science remains a trusted source of knowledge—one that benefits communities, improves health and supports informed decision-making.



3

#### REBUILD VISIBILITY

Elevate physiology within educational curricula, public discourse, and public health strategy.



4

#### EMPOWER COLLABORATION

Support interdisciplinary research that integrates physiology with data science, engineering and clinical medicine.



5

#### CHAMPION THE WORKFORCE

Expand opportunities for early-career scientists to build sustainable careers in discovery science.



6

#### CELEBRATE PROGRESS

Communicate the value of physiology through storytelling, data and advocacy to inspire continued investment.

*Every breakthrough begins with understanding how life works. **Supporting physiology means securing the foundation for every future discovery.***



# WHAT LEADERS CAN DO

## Academic and Institutional Leaders

### Strengthen the Foundation of Learning and Research

Universities and research institutions are the training ground for future scientists and the birthplace of discovery. Investing in physiology is a commitment to institutional excellence and long-term impact. Physiological science strengthens every aspect of academic life; it underpins high-performing biomedical programs, attracts top students and faculty and builds the interdisciplinary bridges that can lead to competitive grants and global recognition.

#### ACTIONS

1

##### REBUILD VISIBILITY AND IDENTITY

Reinforce physiology's relevance by reestablishing its foundational place in education. Strengthen its presence across undergraduate curricula and graduate programs to prepare the next generation of innovators with the integrative understanding essential to discovery and progress.

2

##### FUND CONTINUITY

Develop bridge grants, intramural support and endowed programs to stabilize core departments and research labs. Sustained internal investment helps ensure that experienced faculty, staff and early-career researchers can continue the work that drives institutional reputation and success.

3

##### PROMOTE SYSTEMS THINKING

Reward cross-departmental research that unites biology, data science engineering and clinical medicine through shared facilities and internal seed grants. Physiology should serve as the common ground where scientists and clinical departments connect to the fundamentals of life itself.

When institutions invest in physiology, they invest in their own ability to lead—in discovery, in education and in shaping the future of biomedical science.

# WHAT LEADERS CAN DO

## Biomedical and Industry Community Partner for Innovation

**Innovation depends on physiology.** Every therapy, device and technology begins with understanding how living systems work and how discoveries function in the real world. Physiological insight transforms potential into progress, validating findings from fields like genetics, biomedical engineering and pharmacology. When physiology is underfunded or siloed, development slows and risk rises. Stronger partnerships with physiologists help industry leaders de-risk discovery, accelerate translation and expand the frontiers of innovation.

### ACTIONS

1

#### INVEST UPSTREAM FOR DISCOVERY

Partner with physiology labs, departments and societies to support early-stage innovation. Strategic, early investment in foundational science strengthens translational pipelines and accelerates the path from discovery to application.

2

#### COLLABORATE ACROSS BOUNDARIES

Support joint R&D programs and interdisciplinary networks that integrate physiology with genetics, data science, biomedical engineering and clinical medicine. Recognize physiology as the essential connector that helps teams solve complex biomedical challenges that no single field can address alone.

3

#### BUILD AND BROADEN THE WORKFORCE

Build cross-disciplinary teams educated in physiological principles, engaging researchers across allied domains, from neurobiology to cell biology, to advance integrative science. A diverse, collaborative talent base helps accelerate the translation of discovery into real-world impact.

When the biomedical community invests in physiology, it invests in its own ability to translate discovery into impact, turning knowledge into health, technology and lasting progress.

# WHAT LEADERS CAN DO

## Policy and Government Leaders

### Protect the Nation's Discovery Base

Foundational science powers national progress—and physiology is its core. Breakthroughs that strengthen our health system, economy and global competitiveness depend on understanding the intricacies of how life works. Sustaining this discovery engine is essential for preparedness, innovation and long-term growth.

#### ACTIONS

1

### SECURE FUNDING TO PROTECT THE FOUNDATION OF DISCOVERY

Sustain steady, discovery-stage funding within federal research budgets to support the scientific groundwork that helps make every cure, device and prevention strategy possible.

2

### SUPPORT THE SCIENTISTS

Strengthen the nation's scientific workforce by expanding training and early-career grant support, such as fellowships and training grants, to ensure a robust supply of scientists grounded in expertise of human systems.

3

### CHAMPION AND AMPLIFY THE VOICES OF PHYSIOLOGY

Ensure physiology has a voice in major science and health strategy conversations, from biomedical innovation to public health preparedness, recognizing its role as the trusted connector that unites disciplines and drives progress.

Stable support for foundational research helps keep the U.S. a global leader in biomedical discovery, ready to respond rapidly to emerging health threats and seize new opportunities.

# CLOSING PERSPECTIVE

## *The Science Life Depends On*

Physiology is the blueprint for how life works, the connective tissue linking every field of biomedical progress. It lets science see the whole: how parts interact, adapt and heal. When physiology thrives, discovery accelerates, translation improves and all communities benefit.

By protecting physiology, we protect the future of health. This helps ensure the next generation of scientists, clinicians and innovators can solve the challenges ahead. In a period of heightened complexity and policy headwinds, leaders across academia, industry and government share both a responsibility and opportunity to keep this foundation strong.

**The choice is clear:** we can let the foundation of science erode—or we can invest in the science that transforms health, drives progress and saves lives.

***Physiology** fuels our understanding of life and health—unlocking endless possibilities for longer, healthier lives.*

Use this brief to align action  
within your organization.  
Share it with your partners.  
And join us in advancing  
**PHYSIOLOGY: THE SCIENCE  
LIFE DEPENDS ON**

Visit  
[fightforphysiology.org](https://fightforphysiology.org)  
to learn more  
and be part of  
protecting the science  
that drives every  
medical advance.



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