



THE Physiologist MAGAZINE

NOVEMBER 2024

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SUPPORTS WOMEN
IN SCIENCE
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MENTORS:
UNDERSTANDING
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AFTER PREGNANCY

How nine months can affect a lifetime of health.

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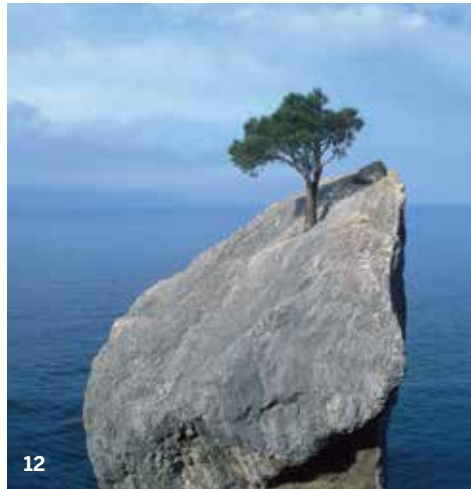
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aps

women's health
research initiative

Women's Health: A Physiological Analysis Webinar Series

Upcoming Sessions

Sympathetic Regulation in Human Pregnancy

Wednesday, Nov. 6, 11 a.m. EST

Qi Fu, MD, PhD, University of Texas Southwestern Medical Center

Preeclampsia Research from Hippocrates to Present Day

Wednesday, Nov. 20, 11 a.m. EST

Stella Goulopoulou, PhD, Lawrence Longo Center for Perinatal Biology, Loma Linda University

Cardiovascular Disease in Polycystic Ovarian Syndrome

Wednesday, Dec. 11, 11 a.m. EST

Licy Yanes Cardozo, MD, University of Mississippi Medical Center

Hormonal and Chromosomal Influences on Autoimmunity and Lupus

Wednesday, Jan. 29, 11 a.m. EST

Betty Diamond, MD, Donald and Barbara Zucker School of Medicine at Hofstra/Northwell; and Melissa Cunningham, MD, PhD, Medical University of South Carolina

Challenges and Opportunities for Treatment of Metastatic Breast Cancer

Wednesday, Feb. 5, 11 a.m. EST

Marsha Rosner, PhD, University of Chicago

Controversies in Menopause: A Public Health Mandate

Wednesday, Feb. 19, 11 a.m. EST

Wen Shen, MD, Johns Hopkins School of Medicine

Watch On Demand

Effects of Ovarian Failure on Muscle Form and Function

Genetic and Hormonal Components of Sex Differences in Alzheimer's Disease

Metabolic Mechanisms Contributing to Reversible Pregnancy-induced Cardiac Growth

Learn more and register
at [physiology.org/
WHRIwebinars](https://www.physiology.org/WHRIwebinars).

A Season of Progress

BY MEEGHAN DE CAGNA, MSC, CAE



Dear reader:

Happy fall! I am writing this as we wrap up the November issue and am amazed at how quickly summer flew by. Earlier this summer, APS held its annual Leadership Retreat, which, after governance changes were passed by the membership, marked the first meeting of the APS Advisory Council and the Board of Directors. The Advisory Council was established to work closely with the Board to shape the Society's strategic direction and provide insights into members' needs and concerns.

At the meeting, the Advisory Council explored the Society's new strategic plan; identified opportunities for sections, commit-

tees and interest groups to support the plan goals; and discussed strategies to broaden the community of scientists who are aware of and engaged with the Society. We look forward to bringing you updates from those discussions and how you can support these efforts in the weeks to come.

We also launched the webinar series Women's Health: A Physiological Analysis, which, as part of the APS Women's Health Research Initiative, will cover late-breaking research, novel discovery, fundamental principles and research innovation in the field of women's health. The series kicked off with a stellar webinar on the genetic and hormonal components of sex differences in

Alzheimer's disease. Be sure to catch the recording and register for future events at [physiology.org/whriwebinars](https://www.physiology.org/whriwebinars).

On the topic of women's health, this edition of the magazine highlights pregnancy and how it can be "a window to future health." Such a short period of time in a person's life can have a profound effect on their health for years to come. On page 24, we look at what physiologists are uncovering about how pregnancy complications may affect future health conditions.

Unexpected health issues can create career challenges. Pregnancy and postpartum is just one time period in a person's life when their science career may become stalled. In our profile this month, we chat with Xenia Tigno, PhD, whose focus at the National Institutes of Health's Office of Research on Women's Health (ORWH) is supporting women in science careers. She especially focuses on those times, like pregnancy, when women's careers can "fall off" the precipice, as she describes. Since she took the job at ORWH four years ago the office has launched several funding opportunities to support women. See how her office is making a difference on page 18.

An important aspect of anyone's career success is finding the right mentors and sponsors, but the two roles are vastly different. In our feature article on page 30, we examine what sponsorship means, how it's critical to career success and how to find or be a sponsor.

WHAT DO YOU WANT TO READ ABOUT?

We rely on you, the members of APS, to make *The Physiologist Magazine* happen. Thank you to everyone who participated in our reader survey. We look forward to sharing the results of that with you soon. In the meantime, share any feedback, suggestions or story ideas with us at tphysmag@physiology.org. Thank you for sharing your thoughts with us—have a happy holiday season!

Meeghan De Cagna, MSc, CAE, is APS chief community and learning officer and associate publisher and editor-in-chief of *The Physiologist Magazine*. You can reach her at mdecagna@physiology.org.

"This edition of the magazine highlights pregnancy and how it can be a window into future health. Such a short period of time in a person's life can have a profound effect on their health for years to come."

Celebrate Your Discoveries

Present your work at the 2025 American Physiology Summit (#APS2025) to gain valuable feedback and make vital connections.

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Abstract Submission Deadline:
Dec. 2, 2024

Early Registration:
Dec. 9, 2024–Jan. 31, 2025

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physiology
summit**

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Scott Steen, CAE, FASAE

*Publisher
Chief Executive Officer*

Meeghan De Cagna, MSc, CAE

*Associate Publisher and Editor-in-Chief
Chief Community and Learning Officer*

Amanda Bertholf, MA

*Senior Editor
Director of Communications*

Melanie Padgett Powers

Managing Editor

FREELANCE WRITERS

Glenn Cook; Anne Frances Johnson; Meredith Sell; Marijke Vroomen Durning, RN

CONTRIBUTORS

Kathleen Beaulieu; Sean Boyer; Brooke Bruthers; Audra Cox, PhD, ELS; Kristin Dougher, MBA; Claire Edwards; Mark Eichelberg, PhD; Kirsten Gossett; Alissa Hatfield, MS; Coleen Kitaguchi; Rebecca Osthus, PhD; Erica Roth, MS

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CONTACT US

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tphysmag@physiology.org | 301.634.7118 | physiology.org/magazine

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HEART AND CIRCULATORY PHYSIOLOGY

Standing and Moving Prevent Frailty

Frailty is the accumulation of health deficits that often leads to frequent use of health care services, poor quality of life and disability. It affects about 11% of older adults who live on their own—especially women. Frailty is a risk factor for heart disease, and those with high blood pressure are more likely to experience frailty. A study published in the *American Journal of Physiology-Heart and Circulatory Physiology* reports findings from the Canadian Longitudinal Study on Aging. The study of middle-age and older adult volunteers examined sex differences in frailty levels and their link with heart health. Researchers found that exercise had a positive effect on frailty levels and reduced the risk of developing high blood pressure. Specifically, sitting less and participating more in strenuous exercise led to fewer cases of high blood pressure in both sexes. Light-to-moderate exercise was particularly beneficial for women to keep frailty levels at bay and protect heart health.

Source doi.org/10.1152/ajpheart.00179.2024



APPLIED PHYSIOLOGY

Sweat Rate Calculator Helps Athletes Stay Healthy

The summer of 2024 recorded some of the hottest temperatures ever around the world. Extreme heat events pose a serious health risk for people who work outside, as well as athletes who must continue to train regardless of the weather. In an article published in the *Journal of Applied Physiology*, researchers developed a sweat rate tool that may help reduce the risk of heat-related illness during and after exercising outside. Volunteers ran and cycled outside in hour-long sessions where the temperature was over 64 F. Then they entered data about their workouts into the sweat rate tool. By accurately measuring sweat rate, athletes can regulate how much they drink before, during and after a workout and lower their risk of becoming sick.

Source: doi.org/10.1152/jappphysiol.00831.2023

All photos: iStockphoto

APPLIED PHYSIOLOGY

More Vaping Dangers Uncovered

The negative effects of vaping during pregnancy on the next generation have been well-established. Using e-cigarettes during pregnancy, even if the device does

not contain nicotine, can lead to many issues, including increased arterial stiffness and endothelial cell dysfunction. A study in the *Journal of Applied Physiology* examined rats exposed to e-cigarettes both before birth and at three or six months old. The second part of the



trial was designed to mimic human adolescence, a time in which some teens start vaping. Researchers found that the subsequent exposure to vaping affected the rats' cerebrovascular and neurocognitive health and led to increased oxidative stress.

Source: doi.org/10.1152/jappphysiol.00345.2024



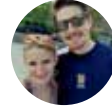
Park Kidney Lab (PI: Jeanie Park, MD)
instagram.com/parkkidneylab

Celebrated the grand opening of our 2nd lab space at Emory University! Exciting times at Park Lab!



Taben M. Hale, PhD
x.com/TMHalePhD

How lucky am I to work with this crew?



Megan Rosa-Caldwell, PhD
x.com/MuscleSciMegan

Check out these awesome undergrad students rocking their first ever RNA isolation!



Austin Robinson, PhD
x.com/AusRob_PhD

Our undergrads Noah and Nadiya represented the NVPL today at the 2024 @IndianaUniv STEM Summer Scholars Institute (STEM SSI) Reception. Thanks to @sanchezsofia, @braxtonlinder2, @SoolimJeong, & @CulverMeral for helping them.



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LABNOTES

MENTORING Q&A YOUR QUESTIONS ANSWERED
FROM EXPERIENCE LEADERSHIP AND CAREER TIPS
POLICY IQ PHYSIOLOGY ON THE HILL AND IN THE HALLS
UNDER THE MICROSCOPE OUR MEMBERS, UP CLOSE
PUBLISH WITH POLISH BUILD A BETTER RESEARCH PAPER
IN DEPTH DIVING DEEP INTO SCIENCE
STATS & FACTS PHYSIOLOGY BY THE NUMBERS



MENTORING Q&A | SCIENCE PROMOTION

A 21st Century PI

How to communicate science today, including embracing AI.

Each issue, we ask a student or early-career member to pose their career questions to an established investigator and mentor. Here, Zachary T. Martin, PhD, a postdoctoral fellow at Rollins School of Public Health at Emory University, asks Paul J. Marvar, PhD, a cross-disciplinary integrative physiologist, about science communication and life as a principal investigator (PI). Marvar is associate professor in the Department of Pharmacology and Physiology and Department of Psychiatry and Behavioral Health at George Washington University.

Q: Science communication is an important part of what we do. What tips and advice would you offer for giving the best presentations?

A: My advice for giving effective science presentations aligns with general public speaking and communication principles, with some tips based on my academic experience. First, know your audience and tailor your message accordingly. Preparation is key—research your topic presentation thoroughly, seek input from colleagues to refine your presentation format, and understand your speaking style to ensure it aligns with the allotted time and the material you plan to cover.

Regularly seek input from your mentors and someone outside your research area, such as a friend or partner, and learn by observing more experienced scientists present their research. Seek out and take every opportunity to communicate your research to colleagues, friends or a non-scientist and in different types of settings. These informal exchanges can provide valuable practice for honing your science communication skills in different ways to best describe the broader impact of your research on society.

Additionally, take advantage of formal workshops offered by your institution or conferences,

as they are invaluable for developing these skills. Finally, social media provides a valuable platform to effectively communicate and promote your research, offering opportunities to share your findings and reflect on them with a broader audience.

Q: Artificial intelligence (AI) is affecting many aspects of life, including biomedical research and higher education. What are you doing to adapt?

A: We are navigating uncharted territory with the rise of AI, and the landscape seems to be evolving daily.

I make it a priority to stay current with the latest developments, particularly in academic journals, grant funding policies and the applications of AI in research and education. I'm especially optimistic about how AI will transform the health care industry, with its potential to significantly enhance decision-making, diagnostic and treatment algorithms. For instance, recent advancements have shown that AI can help identify toddlers who may have autism, achieving an accuracy of 80% in screening children under 2 years old (*JAMA Network Open*, August 2024). This is an exciting area, and I look forward to contributing to be a part of the evolution of AI in science,

my professional roles and everyday life.

Q: Becoming a PI of your own lab often results in taking on many roles that you weren't overtly trained for. What have you done to bolster this aspect of your work?

A: Fortunately, there are numerous resources available today to help develop these skills. When I transitioned from postdoctoral fellow to faculty, I attended workshops focused on these topics and found textbooks such as "Academic Scientists at Work: Navigating the Biomedical Research Career" particularly helpful.

Also, actively seek guidance from your professional network and mentors. Lab management styles vary greatly, so gather insights from multiple senior researchers to find what resonates with you. Networking and mentorship are key to not only navigating lab management but also shaping your leadership style.

Think of your role as running a small business: You're responsible for securing funding, purchasing supplies and managing a team. Approaching your lab in this entrepreneurial way can help you develop a clear and sustainable lab management strategy.

Got a career question you'd like to submit? Email it to tpphysmag@physiology.org. We may use it in an upcoming Mentoring Q&A.

STATS & FACTS

84%

The portion of pregnancy-related deaths deemed to be preventable in a CDC analysis of data from 38 states in 2020.

Centers for Disease Control and Prevention

"Those experiencing common pregnancy complications of preterm delivery, hypertensive disorders of pregnancy, or [gestational diabetes/ impaired glucose tolerance] had an increased risk for mortality in the [approximately] 50 years after pregnancy."

Hinkle et al. reporting on the findings of a March 2023 study of 46,551 participants who were pregnant between the 1950s and 1960s.

Circulation

>3x

The U.S. maternal mortality rate compared to any of the 10 other wealthy nations included in a 2022 study of health and health care for women of reproductive age.

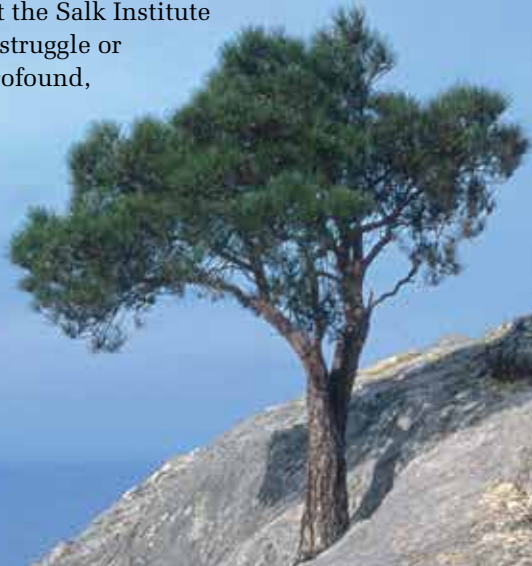
CNN Health

FROM EXPERIENCE | RESEARCH DISCOVERIES

A Feeling Like No Other

The life of a scientist can be tough, but the key is to remain resilient and remember why you do what you do. “When you make that first discovery, you have this feeling that you are the only one among billions of people who have lived on this planet who knows a secret about nature that no one else does,” says Satchidananda Panda, PhD, professor at the Salk Institute in California. “That feeling makes any other stress, struggle or anything negligible. I believe that to do anything profound, you must be resilient.”

Share your best advice, leadership tip or productivity hack with us at tphysmag@physiology.org.



iStockphoto



POLICY IQ | FEDERAL ADVOCACY

Physiologists Return to Capitol Hill

APS members advocate for more research funding.

Members of the APS Science Policy Committee and Early-career Advocacy Fellows took to Capitol Hill in July to urge congressional support for biomedical research. These were the first in-person Capitol Hill meetings for APS since before the COVID-19 pandemic. APS members met with staff in 26 offices from nine states, including both Democrats and Republicans.

The meetings were an opportunity to discuss the APS recommendations for research funding for the next fiscal year (see table at right). While the Appropriations Committee in the House of Representatives made significant progress on fiscal year (FY) 2025 funding legislation during June and July, the Senate was still working to determine funding levels for research agencies, including the

National Institutes of Health (NIH) and National Science Foundation. Constraints imposed by the 2023 Fiscal Responsibility Act continue to make it difficult to increase federal funding for research agencies.

APS members met with their congressional offices to describe the cutting-edge physiology research being conducted in their own labs, highlighting its broader relevance to problems related to human or animal health or the environment. They emphasized how grant funds are used to pay highly skilled lab personnel and purchase supplies and how rising inflation and stagnant research budgets are making it harder to carry out their research.

APS members also advocated for the need to increase funding for women's health research. In FY 2025, APS supports

efforts to double funding for the NIH Office of Research on Women's Health (ORWH) and calls for robust funding for women's health research across NIH and at other federal research agencies.

In addition to discussing research funding, APS members addressed a recently proposed framework for NIH reform. In June, House Energy and Commerce Committee Chair Rep. Cathy McMorris-Rodgers

issued a call for stakeholder input on a proposed framework for reforming NIH. The framework includes plans for many changes at NIH, including reducing the number of institutes and centers (ICs) from 27 to 15, implementing term limits for IC directors and reexamining indirect costs.

Elements of the proposed framework, including consolidation of ICs, were included in the House legislation to fund NIH in FY 2025. While it is unlikely, though not impossible, that these reforms will become law this year, there is concern that without adequate stakeholder input the proposed changes would have negative effects on the research community. APS members urged congressional offices to work with scientists to ensure that any changes at NIH are driven by science and the needs of the research community.

Send questions or comments to tphysmag@physiology.org.

Research funding recommendations

In their in-person meetings on Capitol Hill, APS members discussed funding recommendations with legislators.

AGENCY	CURRENT FY 2024 LEVEL	APS-RECOMMENDED LEVEL FOR FY 2025
NIH	\$48.7 billion	\$51.3 billion
NIH-ORWH	\$76.5 million	\$153.9 million
NSF	\$9.06 billion	\$16.7 billion
VA Medical & Prosthetic Research	\$943 million	\$1.05 billion
NASA	\$24.9 billion	Increase research funding

UNDER THE MICROSCOPE | WOMEN'S PHYSIOLOGY

Thirst for Understanding

As her fitness goals grew, this researcher found herself heading to graduate school.

Rauchelle Richey, PhD, is a postdoctoral scholar in the exercise and environmental physiology laboratory of the Bowerman Sports Science Center at the University of Oregon. Her research interests focus on women's physiology during health and disease across the lifespan. Here's what she shared with us:

5K TO GRADUATE SCHOOL. Following each of my first two pregnancies, I wanted to regain my fitness. Being goal-oriented—and loving a good “free”

T-shirt—endurance racing was the logical choice. As my goals shifted from 5Ks to triathlons, I wanted to optimize my training efficiently and effectively so I could train hard, recover and perform my best while fulfilling the demands as a stay-at-home mom.

This thirst for understanding led me to various books and podcasts, with one book called “ROAR” becoming my tipping point. The authors state that most information on female athletic performance has been adapted

from research conducted exclusively on men. This statement took up residence in my mind, and the more I reflected on it, the more I asked myself “Why don't you do something about it?” This question led me to graduate school and continues to fuel my scientific passion today. What started out as a curiosity of an understudied area has evolved into a pursuit to improve the understanding regarding women's physiology across the lifespan in health and disease.

LAB MISCHIEF.

I have a favorite lab prank: One of the University of North Texas Health Science Center's faculty had a birthday the same day as our department retreat, so I organized a group of us to wear shirts with his face on them and surprise him. This later backfired, as dear friends and colleagues wore shirts with my face on them to my dissertation defense.

SCIENCE HERO. I've got a running list of scientists I would have loved to have met, but the one at the top is Loring B. Rowell, PhD (who died in 2020). He and his colleagues did amazing research, work that is now seminal in our field. I would ask him what he thinks the most important scientific question is, why he chose the path

of a scientist, what his favorite scientific hypothesis to debate is and what his thoughts on current research that stems from his work are.

RESPECT AND

KINDNESS. I love everything about science, from project conception to grant writing, data collection, analysis, interpretation, and writing and presenting. I tolerate participant recruitment as it can be

“What started out as a curiosity of an understudied area has evolved into a pursuit.”

all-consuming, but working with human participants is a humbling reminder of those directly impacted by the work we do, so I guess I like that too.

I do not enjoy the politics and bureaucracy that infiltrate academia and research. These things shift focus away from what truly matters. The best advice I was given to try to combat this is to influence what I can within my sphere. In that regard I try to show respect and kindness to those around me, conduct science with integrity and acknowledge any potential biases that I may have when evaluating others' work. I am not perfect, but effort counts so I keep trying.

Do you know someone we should meet? Email us at tphysmag@physiology.org and tell us more.



Richey with her husband, Troy, and their two oldest sons, Harvey and Frost, after earning her doctorate.

The 5 Pillars of Publish with Purpose

How the APS journals reinvest in the Society.

Publishing in an APS journal means you will Publish with Purpose. Besides the catchy slogan, what does this really mean for authors? Because APS self publishes and is not owned by a commercial or nonprofit publisher, we reinvest journal revenue directly back into supporting you, the physiologist. We have five areas that we target: purpose, prestige, possibilities, progress and peers. Let's take a look:

Purpose. To Publish with Purpose means actively choosing to support a community of scientists and educators dedicated to the advancement of physiological research. APS reinvests in physiology by hosting meetings like the American Physiology Summit, as well as specialty conferences and webinars. Educators are also supported through the Center for Physiology Education. Through the Center, teaching and learning are championed, and educators find support in a like-minded community of physiology instructors. The Society also provides up to \$800,000 in awards and fellowships and offers publishing discounts to APS members.

Prestige. APS journals have a level of prestige that keeps authors coming back again and again. According to surveys, the biggest reason (65%) that authors return to publish in an APS journal



is “the journal’s reputation and impact.” APS publishes the highest-ranking journal in physiology: *Physiological Reviews*. And that’s by many different measures of success (journals.physiology.org/metrics). Further, the peer review process is top notch, with 94% of authors agreeing or strongly agreeing that their manuscript improved for having gone through the APS peer review process.

Possibilities. The possibilities for career growth and development are continually expanding with the Society’s resources such as Career Navigator, Career Gateway and a jobs board. APS recognizes the importance of networking in career building,

taking that to new levels with the American Physiology Summit. Through posters, symposia and networking events, researchers at all stages of their career gain the experience and collaboration they seek.

Progress. APS regularly interacts with lawmakers and funding agencies on Capitol Hill. The Society’s Science Policy team advocates for increased funding for four federal agencies that support physiology research: National Institutes of Health, National Science Foundation, NASA and Veterans Affairs. The policy team has recently developed tools for researchers to grow their own advocacy skills. APS also produces

guidelines on animal research and responds to standards on reproducibility and data sharing. These topics drive experimental progress and support the research life cycle.

Peers. Experienced and well-recognized peers are heavily involved in advancing content through the peer review process for our journals. Submitting to APS ensures your work is evaluated by journal editors who are working scientists rather than professional editors. The journals also possess an extensive list of reviewers, some of which have completed the Peer Review Training Course to demonstrate proficiency. Calls for papers allow the journals to highlight novel topics and use subject matter experts as guest editors, introducing new colleagues to your publishing journey.

Together, these five pillars enhance physiology research when you publish with APS journals. Your submissions allow APS to reinvest in physiological science and scientists. You also join a community of researchers, trainees, educators and students in physiology and related disciplines from over 95 countries worldwide. Submit to an APS journal today at journals.physiology.org/submit.

Send questions or comments to tpysmag@physiology.org.



IN DEPTH | NEURODEGENERATIVE DISORDERS

Cracking the Code

A neurologist takes insights from bedside to bench and back again for ALS and diabetic neuropathy.

Feva Feldman, MD, PhD, is the James W. Albers Distinguished University Professor of Neurology at the University of Michigan. Her studies on amyotrophic lateral sclerosis (ALS) and the neurological complications of diabetes have yielded important insights into the processes involved in these disorders, along with innovative diagnostic tools and therapeutic approaches.

What motivated you to study ALS?

When I was quite young, I saw a woman in my clinic who was my age. At the time, I had three young children, as did this woman, and I realized

after I'd spoken to her for just a few minutes that she had Lou Gehrig's disease, or ALS. I thought, oh my God—here she is, and we're trying to entertain her toddler as I'm going to tell her she has ALS. It's interesting

how your career in many ways can be moved by one patient. I had specialized as a neuromuscular neurologist, but I don't think I realized at the time that I would devote a good part of my career to ALS.

It's been gratifying to see how the field has grown in the last three decades. But what motivated me was a patient, and what continues my motivation is clinical practice. Every week, after I diagnose three or four new patients, I come back to my office and I say, "We just have to do more."

What approaches have you taken, and what has resulted from this work?

I've approached ALS in multiple ways. When I was younger, I wanted to develop one specific therapy. I took the idea of insulin-like growth factor 1 from the preclinical work to the clinic to a Food and Drug Administration (FDA) Phase 1, 2 and 3 multi-center trial. I remember the day I got the results of the trial—I was shaking, I was so excited. It had been 15 years in the making. And I opened the results and here was the progression of the control group, and the progression of the patients who had been on the drug, and they were completely superimposable. I remember feeling really discouraged.

I took a two-pronged approach at that point. One is that I've done a lot of work in stem cell therapy. We've done a Phase 1 and Phase 2 FDA-approved trial looking at intraspinal stem cell transplantation in patients

with ALS. In March 2020, I went to Washington, D.C., to present to the FDA the results of our Phase 2 trial to propose a Phase 2/3 trial. The hearing went well, but COVID hit two days later. The biotech company that was supporting our work went bankrupt, sold it to another company and another company, and at this point no one is interested in making the investment. We were one of the victims of COVID; there are many similar stories. That foray into stem cell therapy now is on hold.

However, what has robustly continued over the past decade is our work on the environment. [This started when] I thought, why have I diagnosed six husband and wife teams if it's supposed to be one or two cases per 100,000 people? I had in one square block four people who knew each other since kindergarten, and they all got ALS. I had three people whose boats were lined up on the same dock, and all three got ALS. It kept hitting me that there must be an environmental component.

We've been able to show in very large cohorts that patients with ALS have a significant increase in legacy pesticides in their blood and persistent organic pollutants. We've combined these pollutants into an environmental risk score, and that's been

transformative. We've also developed the first polygenic risk score for ALS, of greater than 200 genes, that can predict ALS risk. So now we have been able to assemble a polygenic risk score, an environmental risk score, and look at occupations and hobbies, and collectively, what that's enabling us to do is come forward with a program to strongly advocate for ALS prevention.

“What motivated me was a patient, and what continues my motivation is clinical practice.”

—Eva Feldman, MD, PhD

What other areas are you excited about?

I've also done a lot with diabetic neuropathy, the peripheral nervous system complications of diabetes. When I started out, the idea that if you had prediabetes you could get nervous system complications was unheard of. In fact, I got asked to leave the stage giving a talk very early on in my career when I was saying that prediabetes could give you peripheral neuropathy. Now that's in the textbooks.

What also became clear to me in my clinical practice—because I've been practicing for a long

time, and I see a lot of people with diabetic neuropathy—is I noticed that these individuals seemed to be having cognitive decline sooner than they should. It made me think that neuropathy is probably a neurodegenerative disease. It may be the first biomarker of neurodegeneration, so early neuropathy may portend early cognitive impairment. So, we went after that in our research program, and we've been successful in that realm, both in animal models and in patients.

What advice do you give to early-career scientists?

It requires persistence. If science always goes someone's way, you better question the science they're doing. My R01 got rejected six times before it got accepted. You can't take things personally, like if a trial fails. When one door closes you can find five that will open.

You have to believe in what you're doing. That mission I have for understanding neurologic diseases is part of my core values. If your core value is to understand a scientific question or a disease or make an impact, then regardless of how many times you're knocked off the horse, you need to get back on the horse.

Interview conducted by science writer Anne Frances Johnson. Send questions or comments to tphysmag@physiology.org.

STATS & FACTS

8%–16%

The portion of pregnant people who experience high blood pressure during pregnancy.

Yale Medicine

~20%

The portion of people in developing countries who experience clinical depression after childbirth.

World Health Organization

2.1x

The increased likelihood that a protégé will go on to be awarded a prize for their research if their mentor won a research prize, even if the mentor's success is a decade after the protégé graduates.

Proceedings of the National Academy of Sciences

48%

The portion of undergraduate faculty who agreed their institution takes mentoring into account during the promotion process, in a 2016–2017 survey.

Higher Education Research Institute at University of California, Los Angeles



At NIH, Xenia Tigno, PhD, is committed to supporting women in science careers.

BY MEREDITH SELL

CLIMBING ANOTHER LEADER

As a PhD student at the University of Würzburg in Germany, Xenia Tigno had her hands full. A Filipino woman outside her country of origin, she was juggling her research and studies with marriage and family responsibilities. Her first daughter was 10 months old when Tigno and her husband arrived in Germany in 1979. Both parents were furthering their education: Tigno by pursuing a terminal degree in natural science, her husband by entering a neurosurgery residency. Their families and support systems were a continent away.



Clockwise from top left: On a visit to Germany in April, Tigno and her husband, Teodoro A. Tigno, MD, meet up with her doctoral adviser, Professor Herman A. Henrich (left). Tigno listens to a poster presentation at the 2024 ORWH annual signature meeting, “Building Interdisciplinary Research Careers in Women’s Health” (BIRCWH). Tigno at the 2023 BIRCWH meeting.

“In Germany, they already had thought of these caregiving things,” Tigno says. “They had what they called *Kinderkrippe*, so you can put your baby in [daycare], the nuns will take care of them for the day, and then you take them back. Unfortunately, my daughter didn’t like to be in the *Kinderkrippe*, so at one point I had to bring her with me to the lab.” Tigno set up her daughter’s playpen and continued her research. “It was very, very challenging.”

Now the associate director for careers at the National Institutes of Health (NIH) Office of Research on Women’s Health (ORWH), Tigno directly draws from her own experience—and the experiences of her grantees and others she knows in the science and medical

communities—to inform policies and new grant opportunities specifically aimed at supporting women in science.

Since she took the job in 2020, just before the COVID-19 pandemic, the ORWH has launched a variety of funding opportunities that seek to address the points in a scientist’s career that Tigno refers to as “precipices where women usually fall off.” While men can also apply to the funding opportunities, they are designed with the needs of women in mind.

“For instance, we have what we call a continuity supplement,” Tigno says. “During your career development award or during your first R01—where you’re very vulnerable because you don’t know whether you will get a second big grant—say you delivered a baby and now you have

to go on maternity leave. What do you do? Your cells need to be fed or your clinical trial has to go on.” To address such situations, the office provides a one-time supplement award so that the grantee can hire somebody to do the work while they’re out. “That way they don’t lose the pace of the work and they remain competitive.”

It’s common for women in many fields to take years off due to family responsibilities. As the go-to caregivers for children and aging parents, women often have obligations, even if temporarily, that limit how much time they can devote to research or grant applications. For those who take time off, the gap in their working years can present an obstacle to future career advancement. When they return to their field, these women may feel like they’re starting over completely.

That experience is familiar to Tigno. Although she worked through the childhoods of her three children, when she moved to the U.S., she left behind a well-developed career of multiple decades at the University of the Philippines. She was a professor and chair of the Department of Physiology at the College of Medicine, the only faculty member at the time who had a PhD (as opposed to an MD). In 1997, she set up the University of the Philippines' first translational lab, the Center for the Enhancement of Human Performance, which received support from the country's congress, department of labor and eventually the president of the Philippines.

She was at the top of her game there, but that didn't translate to landing a full professorship or chair position in the U.S. She had to climb the academic ladder twice.

EMIGRATING TO THE U.S.

Tigno originally came to the U.S. because of her son, who was in high school in the early 2000s. He was attending a competitive science-focused school in the Philippines. "He didn't flunk anything," Tigno says, "but his drumbeat was different from the rest." He was a gifted child, but he also had Asperger's syndrome, which his school wasn't equipped for.

Over summer vacation in 2001, Tigno brought her son to the U.S., where they visited her sister in Maryland. They learned about the resources schools offered for students on the autism spectrum. "I thought, 'My goodness, this is heaven-sent,'" Tigno says.

On the same trip, Tigno met Barbara Hansen, PhD, and visited her Obesity, Diabetes and Aging Research Center at the University of Maryland School of Medicine. Tigno's PhD

work had focused on microvascular physiology, which naturally related to the study of diabetes and the complications it causes in patients. "[Hansen] needed somebody who was a little bit more senior to oversee some aspects of the lab," Tigno says. "She convinced me that if I wanted to stay, I could join her lab."

Tigno and her son moved to Maryland; her husband followed a few years later, after their two daughters finished their degrees.

In 2005, Hansen's lab transferred to the University of South Florida in Tampa, and Tigno followed. Soon after, Tigno was given the opportunity to coordinate the physiology course in the university's College of Medicine. She had already done this type of work as the department chair at University of the Philippines, so she harnessed her experience to make the course more engaging and relevant to students who were primarily focused on passing their medical school entrance exams.

JOINING NIH

A few years into her time in Tampa, Tigno collaborated with colleagues on a research experience for undergraduate students focused on women's health. Open to honors students, the summer course provided an introduction to sociocultural and medical aspects of women's health, as well as an opportunity to conduct research in the College of Medicine.

"Right now, sociocultural determinants of health are very much in, but at that time, they weren't," Tigno says. "But we had already introduced the concept that not everything that influences health is only biological—a lot of it is due to the sociocultural environment that you came from."

This was one of Tigno's first official efforts focused on women's health. When she returned to the Washington, D.C., area for a grant administration role in the National Institute of Nursing Research and later a similar role with the National Heart, Lung, and Blood Institute (NHLBI),

XENIA TIGNO'S BEST ADVICE ON...

CAREER

"Put your energies on work that you truly enjoy doing. If you are not passionate about your work, it will likely not make you successful, nor will it make the work product stellar."

LEADERSHIP

"Recognize your team members for the great work they do. Nominate them for prizes if possible. Make the team environment as happy and congenial as possible and understand their needs and responsibilities beyond the workplace."

Elevating Women's Health Research

Women's health has historically been under-explored. Learn more about efforts to highlight women's health and research by APS members that addresses health and disease in women at [physiology.org/WHRI](https://www.physiology.org/WHRI).

she was eager for the next chapter of her career. After about a decade of grant-making, she reinvented herself again with a revived focus on women's health and women in science.

In 2015, Tigno's current boss, Janine Clayton, MD, director of the ORWH, co-authored an article in *Nature* with then-NIH Director Francis Collins, MD, PhD, declaring that sex as a biological variable would now be considered in the evaluation of applications to the NIH. "That was a big step forward," Tigno says.

Historically, researchers have studied male subjects, whether rats, mice or humans, arguing that male subjects are more homogeneous, and thus easier to study, because they don't have an estrogen cycle. Along with neglecting the reality that males

have their own hormone cycle, this approach also ignored female physiology, leaving many women and their health care providers in the dark about how different conditions and medications affect women's bodies.

Women's health, Tigno says, is not just about breasts and reproductive organs, but "the entire human being, the entire woman from head to toe. Mental health is included, substance abuse is included, heart disease is included, lung, everything. Because women are not little men; they're a completely different physiological makeup."

Because of this, the ORWH isn't tied to one particular institute within NIH. It's part of the Office of the Director, an intentional decision so that its policies will affect every institute and center within the broader organization.

ADVOCATING FOR WOMEN

Tigno's official role is focused on the careers aspect of the ORWH, but she also advocates for the inclusion of women's health in the teaching of physiology and has recently co-edited a couple of books specifically focused on sex differences in disease. The first, "Sex-Based Differences in Lung Disease," she co-edited with a former grantee from

her time at NHLBI. This year, she is working on a similar book on cardiovascular disease, another project tied to NHLBI that taps leading researchers to write about cutting-edge issues and current science regarding cardiovascular health, sex and gender.

Tigno points to how certain conditions, such as autoimmune diseases and long COVID, predominantly affect women but that researchers don't know why. One of her goals is to prompt scientists to naturally wonder how what they are studying affects men versus women and whether there is a difference due to hormones, chromosomes, other biological factors or gender differences. "Everything should be looked at from a sex, as well as a gender, lens, which means biological as well as sociocultural determinants of health," she says.

Recently, more resources and attention have been given to studying women's health. Last November, the White House announced the first-ever initiative on women's health, and in March, President Biden signed an executive order calling on Congress to devote \$12 billion for research on women's health. While the money hasn't come through yet and there's no guarantee it will, Tigno is encouraged by the effort.

"People are starting to wake up to the fact that women's health really is important and it should no longer be ignored," she says. "This is a golden opportunity for the field to expand."

Because many of the researchers interested in women's health are women themselves, Tigno's work to support their careers is crucial to advancing the field. "If you want a robust cadre of women's health researchers," she says, "you also have to give equitable representation to women." 📍

“People are starting to wake up to the fact that women's health really is important and it should no longer be ignored. This is a golden opportunity for the field to expand.”



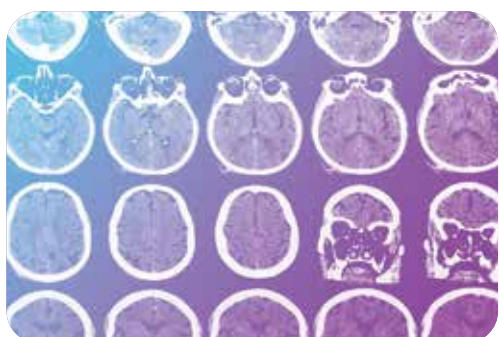
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After PREGNANCY

How nine months can affect a lifetime of health.

BY MARIJKE VROOMEN DURNING, RN

When people hear “women’s health,” they typically think of gynecological or obstetrical issues: pregnancy, postpartum, menstruation and menopause. While women’s health is much more than the reproductive organs, perhaps it is those reproductive-related conditions that may help researchers and clinicians begin to understand women’s health overall.


The Society of Maternal-Fetal Health Medicine calls pregnancy “a window to future health.”

In fact, complications during pregnancy could have a negative effect as many as 50 years later, according to a 2023 article published in *Circulation*.

But pregnancy-related conditions and later health issues lead to the chicken-and-the-egg conundrum: Did the pregnancy cause the problem

or was the problem already there?

“There’s a school of thought that pregnancy itself is a stress test,” says Eric George, PhD, associate professor in the Department of Physiology and Biophysics at the University of Mississippi Medical Center. “That what it’s doing is unmasking undiagnosed, perhaps clinical, preexisting cardiovascular issues that are coming to the front because of the pregnancy.”



Pregnancy-related complications such as preeclampsia, gestational hypertension and gestational diabetes could be early indicators of an individual's later risk of cardiovascular disease. Other research shows that pregnant people who had gestational diabetes have a three-fold risk of developing metabolic syndrome later in life. Those who had preeclampsia have a two-fold risk of developing diabetes for 10 years following their pregnancy. They also have a higher risk of long-term kidney disease.

Researchers are diving deeper than ever into pregnancy-related complications to understand the mechanisms behind them. Through more research, clinicians could increase awareness, develop routine screening recommendations and create integrated care models to mitigate risks and promote better health outcomes.

"These complications put women on an accelerated trajectory for chronic disease across the lifespan, and we're really interested in trying to understand why that is," says Anna Stanhewicz, PhD, assistant professor of health and human physiology and director of the Microvascular Physiology Lab at the University of Iowa. "If we can study them during that time when they've recovered after the pregnancy, but before they develop disease, to understand what's going on at the level of the blood vessel, it'll give us an opportunity to intervene before they actually develop disease, with the goal of preventing it."

Stanhewicz is motivated about her lab's latest data, which showed that women who had a history of gestational diabetes had blood vessels later that were not as responsive to insulin. This is important because animal research shows that when blood vessels cannot respond

appropriately to insulin, it predicts and precedes the development of systemic insulin resistance. "We're excited about those data because we think it might be showing that this is a mechanism that's contributing to the accelerated risk," she says.

A RETURN TO BASIC PHYSIOLOGY

The basic physiological changes that occur during pregnancy is what Helen E. Collins, PhD, assistant professor of medicine at the University of Louisville, is focusing on in her mice studies.

In studying how the heart remodels during pregnancy, she says, "we found that during pregnancy and the early postpartum period, the heart is enlarged in size and that, contrary to some other publications that exist, we actually see this enlargement going as long as one year postpartum in our animal studies." One year in a mouse's life is equivalent to middle age in humans, which is significant when determining how this might affect people.

Collins' lab also saw a profound impact of lactation on the process, whereby some of this growth of the heart was almost instantaneously resolved when the mice were not experiencing active lactation.

"We have also performed studies where we looked at the impact of multiple successive pregnancies on heart growth," Collins says. "We haven't followed those out as far as one year yet, but what we do see is that there is always a pregnancy-associated cardiovascular growth response, but it's comparable between successive pregnancy lactation cycles. It means there might be a set point at which the heart will grow to and [that] it won't get bigger, rather than a cumulative response."

Collins' second study arm is looking into the impact of liver-heart

communication, or inter-organ communication, during pregnancy. “We see in our pregnancy studies that liver-derived metabolites, such as ketone bodies, increase in circulation during pregnancy, but the physiological consequence of this is understudied.” Her grant focuses on examining the impact of ketone body metabolism on cardiac growth during pregnancy and the postpartum period.

“Hopefully upon completion of the study,” she says, “we’ll know not only the contribution of ketone bodies to metabolic remodeling in the context of physiological hypertrophy, but we’ll also have a greater understanding of whether our model could promote pregnancy-associated cardiovascular disease. We’ll know the contribution of that specific metabolic pathway to the disease progression, which could reveal future therapeutic targets.”

ANEMIA

It is not uncommon for a female of childbearing age to be told she has anemia, but the issue goes deeper than that, says Hilary Critchley, MD, DSc, professor of reproductive medicine at the Institute for Regeneration and Repair in the Centre of Reproductive Health at the University of Edinburgh in Scotland.

The late manifestation of iron deficiency is anemia. “One of the problems we have—and why both iron deficiency and anemia are under-recognized and undertreated—is the patient, particularly at the time of pregnancy, will have her hemoglobin checked. The hemoglobin may be in the normal range as determined by the [World Health Organization] criteria, but unless you actually check a marker for iron deficiency you will not pick up that they are also iron deficient.”

The International Federation of Gynaecology and Obstetrics issued

“Too often, heavy menstrual bleeding—which is far more common than recognized—is normalized by the patient, her family, society and health care professionals.”

—Hilary Critchley, MD, DSc

a position statement in September 2023 highlighting that anemia is under-recognized and undertreated. “It is present before pregnancy, during pregnancy and clearly gets worse as pregnancy progresses,” Critchley says. “It probably impacts more than 2 billion people worldwide and the predominantly affected are women, and during pregnancy there may be impacts on pregnancy outcomes, the developing fetus and infant.”

Clinicians should endeavor to identify and manage iron deficiency and iron-deficiency anemia, she says. “Too often, heavy menstrual bleeding—which is far more common than recognized—is normalized by the patient, her family, society and health care professionals. Women and reproductive-aged girls should be asked about their periods and menstrual bleeding experience.” Heavy menstrual bleeding can be addressed with often relatively simple, safe and effective interventions, she says.

The risk of preterm labor among pregnant people with iron deficiency is higher, as is the risk for severe postpartum hemorrhage and maternal death. “If your hemoglobin level is very low and you have a massive postpartum hemorrhage, you’re much more likely to die than if your

hemoglobin is at a higher level,” Critchley says. “This is why detection and causes of anemia and iron deficiency prior to pregnancy, such as heavy menstrual bleeding, is a real public health message.”

Critchley also points out that when females are iron deficient, even with treatment, it can be difficult to get their levels back to normal, especially if they are menstruating and losing blood every month.

In addition to physical complications from iron-deficiency anemia during pregnancy, there can be a significant effect on mental health later. There is a strong association between isolated iron deficiency and postpartum depression, which affects up to 20% of new postpartum individuals. An estimated 5% continue to have high levels of depression for three years after delivery.

PREECLAMPSIA

An estimated 5% to 7% of pregnancies are affected by preeclampsia, resulting in 70,000 maternal and 500,000 fetal deaths worldwide. Preeclampsia is a pregnancy condition that can cause elevated blood pressure and high levels of protein in the urine. The exact cause is unknown, and the only “treatment” is to deliver the baby. Despite the

belief that preeclampsia is resolved by delivery, some researchers think that the danger to the pregnant person doesn't stop after delivery.

George points out that many of the risk factors for preeclampsia are the same risk factors for cardiovascular disease, such as obesity and high cholesterol. "It's a very complicated relationship," he says. "But there is a very clear relationship, statistically, between women who have preeclampsia and what happens later."

George's lab has two projects in this area. One looks at the mechanisms that cause preeclampsia. "The prevailing wisdom about preeclampsia is that it's an error in implantation and that's causing inadequate blood flow to the placenta," he explains. "In response to that, the placental tissue starts to malfunction and produces things that are secreted into the mother's circulation, and that's what causes all the downstream effects."

The second project focuses on potential therapeutics for those with preeclampsia. Because the only "cure" is delivering the baby, babies are often delivered early, as early as 34 or 35 weeks of gestation. "Preeclampsia is the leading cause of prenatal birth," George says. "There are epidemiological studies that show that those babies are going to have higher risk for all sorts of diseases throughout the rest of their lifespan."

If researchers could find safe and effective treatment for preeclampsia, they could not only save lives during pregnancy, they could potentially prevent any long-term effects the preeclampsia might have caused in the child.

MITOCHONDRIA DNA

Styliani "Stella" Goulopoulou, PhD, associate professor of physiology at Loma Linda University School of Medicine in California, is looking at preeclampsia and future health from another angle: whether mitochondrial DNA in the circulation may be a potential biomarker for maternal vascular dysfunction.

"We're interested in the biomarker potential of circulating mitochondrial DNA, but we're also looking at mitochondrial DNA as a signaling molecule," she says. Her lab team is working to find out how mitochondrial DNA circulates and varies during pregnancy, specifically in preeclampsia. They also want to know what type of cells mitochondrial DNA activates, how it affects the maternal vascular function and how it gets out of the cell in the first place.

In 2022, the U.S. maternal death rate stood at 22.3 deaths per 100,000 live births, according to the National Center for Health Statistics. Goulopoulou points out that while social issues play a role in this number, biology does as well.

"Pregnancy requires many physiological changes," she says. "All maternal systems and organs change during pregnancy." Then after delivery, everything shifts again and the female body has to make more changes. While this helps individuals meet the high metabolic demands of pregnancy, it also makes them vulnerable.

"If we could understand what factors shift healthy pregnancy adaptations to increased vulnerability for complications and find ways to target these factors, this would definitely reduce pregnancy complications and alleviate risk for future cardiovascular disease," Goulopoulou says.

PROGRESS AND HOPE

When Collins gives talks about her research, she usually begins by saying that pregnancy, at least in the U.S., is dangerous. "But it doesn't have to be if we increase awareness of the mere fact that women can have pregnancy-associated cardiovascular complications," she says. "There have to be more people in the research arena that are looking at some of the key contributory factors. Also, we have to do a lot more in-depth mechanistic work to really elucidate those key physiological changes that occur in the heart during a normal pregnancy and disease-complicated pregnancy."

Bringing this research to real life is the ultimate goal of these researchers. As females age and seek medical care, they might be asked about pregnancy history, including how many successful pregnancies they had. But rarely are they asked about health issues they experienced during pregnancy, such as hypertension. Given the long-term impact pregnancy has on a woman's body, perhaps this should become routine practice. ☞

WEBINARS

Women's Health Webinar Launch

For more on the science behind pregnancy complications and other women's health issues, don't miss the Women's Health: A Physiological Analysis webinar series. As part of the Society's Women's Health Research Initiative, the program of live events includes scientific lectures from leading researchers around the world and technology and methods sessions focused on laboratory techniques central to research in this field. Learn more and register at physiology.org/WHRIwebinars.



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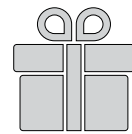
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UP LIFTING

Sponsors go a step beyond mentors to actively promote individuals and provide them access.

BY GLENN COOK

Nina Stachenfeld, PhD, FAPS, was working with a Yale School of Medicine colleague on a grant application when she witnessed an excellent example of leadership that has stayed with her.

“She’s an MD, and I’m a PhD, and we were working on a grant to recruit more diverse clinical populations,” says Stachenfeld, senior research scientist in obstetrics, gynecology and reproductive sciences at Yale. “At one point, she said a younger faculty member she had been mentoring should take over her part of the grant. What she was thinking of, handing off what she was doing to a younger

individual, was a great opportunity for someone else.”

The decision by Stachenfeld’s colleague to shift from mentor to sponsor—someone who actively champions and advocates for others—is critical in the professional development of future generations. Direct sponsorship is especially needed for women and other marginalized individuals who traditionally

have not had the same opportunities to advance in their careers as their white male colleagues.

“I see mentorship as a gift—a person who is senior to you in the workplace who feels you’re very worthwhile, lends advice and guidance, and provides you with a shoulder to lean on if you’re struggling,” says economist Sylvia Ann Hewlett, PhD, author of

“Forget A Mentor, Find a Sponsor.”
“Sponsorship, on the other hand, is an investment—a senior person who sits in a spot where he or she can open doors that are important to you and your career.”

MENTOR VS. SPONSOR

What’s a good way to describe the difference between a mentor and a sponsor? Mentors say, “You should apply to speak at conferences. These are great opportunities.” On the other hand, sponsors say, “I nominated you to speak in this conference session. Can you do it?”

“The mentor is right—this is a great opportunity,” says Erica Heinrich, PhD, an assistant professor of biomedical sciences at the University of California (UC), Riverside, School of Medicine. “But if they can help you achieve that opportunity by acting as a sponsor, that’s even better.”

Understanding these different, but at times overlapping, functions can help you navigate the increasingly complicated world of work, whether it’s academia, industry, government or any type of lab environment.

L. Gabriel Navar, PhD, FAPS, professor and chair of the Department of Physiology at Tulane University’s School of Medicine, views the mentor and adviser roles as similar. Both require a continuing, trusting relationship, while sponsorships are related to a specific process or function.

“I’m asked to sponsor a lot of people for different reasons, and I believe you should do what you can to help others, just like you were helped earlier in your career,” says Navar, a past APS president. “You review their credentials, see whether they have the qualifications needed, and go on from there. It’s an important role, but it does not require the long-term commitment. That’s not true when you’re mentoring someone.”

“You have to wear your value on your sleeve and persuade someone who is senior to sponsor you.”

—Sylvia Ann Hewlett, PhD

Stachenfeld says many people don’t know the difference between sponsoring and mentoring. She believes more would serve as sponsors if they realized it wasn’t such a commitment of time.

“Mentors and sponsors are both really important, and they play really different roles,” she says. “Finding a mentor is so much more difficult than finding a sponsor because of the time required and often the financial commitment. As a mentor, when I bring someone into the lab, it’s a large investment. And if that person doesn’t work out, it’s a very big thing for those of us who work in the soft money world of research.”

Navar says mentors often work with someone for more than a year and in some cases for three years or more. His first mentor, Navar says, was a “dominant figure at all times and we could not have an exchange of various theories and approaches.” When Navar moved into a mentor role, he was determined not to let that happen.

“It’s guidance rather than dominance,” he says. “Being prescriptive doesn’t work. You need to listen to what the mentee has to say and share your experiences without telling them that it has to be done a certain way.”

When she was in her 20s, Hewlett was working as an assistant professor of economics at Barnard College. She found “an amazing mentor,” a historian who was in her 50s, who provided her with help and guidance. But when

Hewlett came up for tenure, one of five candidates vying for two slots, her mentor proved to be “totally useless.”

“I didn’t know about sponsorship in any kind of formal way,” Hewlett says. “It was my first job, and there were no women in these kinds of jobs at Barnard. My mentor did not sit on any of the committees that were critical to my future. She wasn’t in the corridors of power. I needed to find someone who could open some doors and advocate for my value in my field.”

Hewlett was turned down for tenure despite “a publications record that was as good” as the other candidates, she says. What she realized then was the tenure committee “didn’t know me and hadn’t met me” and she did not have someone working on her behalf.

“I became much more intentional, almost transactional about it,” she says. “You have to wear your value on your sleeve and persuade someone who is senior and who you respect to sponsor you. You don’t have to make them your best friend; you have to believe they have integrity and respect what they do.”

A TEAM OF SUPPORT

Heinrich says new and upcoming professionals should look for a diverse team of people that can serve the various roles of mentor, sponsor and adviser. “With a diverse mentorship team, you ensure you benefit from the strengths of each mentor and adviser and have the career support of a

sponsor,” she says, noting it’s rare that one person can serve all three roles.

According to Henrich, the best mentors and sponsors are those who have “demonstrated expertise in those areas of need, whether it be improving teaching, grant writing, publishing, personal development or anything else.” They also make “a point to really, truly listen to their mentee, hear their unique goals and help them identify areas for growth and concrete timelines, rather than simply providing a lecture.”

Adrienne P. Bratcher, PhD, an associate professor and vice chair of the Department of Anatomy, Pathology and Medical Education at Morehouse School of Medicine, says mentors helped guide her through the complexities of academia. Compare that to her advisers, who “have been a constant source of strategic guidance [who helped me] navigate complex decisions specific to my career path.” It has been the sponsors who have helped her secure leadership positions.

Having strong sponsorship during the undergraduate level and early trainee stages can make a substantial difference for many students. It can help students develop confidence and independence early on, Henrich says. “If a trainee sees that their adviser or mentor is confident enough in them to recommend them for leadership positions or awards or have them represent the PI’s research group through presentations, this is a very meaningful experience.”

Sponsorship and mentorship roles should overlap, Stachenfeld says. She believes mentors should also serve as sponsors, pushing their mentees to take part in speaking roles at conferences, serving on editorial boards and other professional development opportunities. The best sponsors, she says, are those who see things in others that they may not see in themselves.

SPONSORS FOR LIFE

Finding a sponsor, Hewlett says, is a way to “cross the huge divide at the beginning of your professional career.” But she is quick to note that you will need mentors and sponsors at all phases. “There’s some kind of myth out there that you need mentors and sponsors when you’re younger,” she says. “I think you need both throughout your career.”

In UC-Riverside’s faculty mentorship program, Heinrich says many senior-level faculty are seeking out these relationships as they look at career transitions, work on technical skills or learn new approaches to teaching. Sponsorship adds up over time and can make individuals more competitive applicants for their next career stage.

Bratcher says she is pleased that more universities are creating dedicated mentorship programs, providing inclusion training for faculty and staff, and seeking out diverse mentors and sponsors. But, as she and others concede, more work needs to be done. As the diversity of undergraduate student populations has increased, Henrich says the leadership in many universities, editorial boards and societies has not followed suit.

Formal mentorship programs can be helpful to trainees from underrepresented groups. At UC-Riverside, for example, new faculty can ask to be paired up with a diverse group of volunteer mentors, taking the uncertainty out of the process. “It helps faculty mentees identify mentors they relate to across campus who they may not have interacted with otherwise,” Heinrich says.

This is borne out in Hewlett’s research. The author says 21% of white men earn sponsorships in their careers, compared to 13% of white women and 5% of people of color. She calls it “an uneven playing field”

3 Roles of a Sponsor

What makes someone a sponsor instead of a mentor, adviser or role model?

Economist Sylvia Hewlett, PhD, author of “Forget A Mentor, Find A Sponsor,” lists three key differences.

1 Believe in young talent.

“What’s additive and powerful about sponsorship is that you are willing to take some risks for them by using your political capital to advance their careers. If they mess up there’s egg on your face too, so it takes a commitment.”

2 Be a strong advocate.

Sponsors must advocate feverishly in arenas where the protégé is not present. “Because sponsors are often in management or in other senior positions, your strong support and endorsement of ‘new energy’ is looked upon differently. Your colleagues will pay attention when you speak on behalf of a protégé.”

3 Have their backs. Sponsorship is a two-way street. Protégés must be “incredibly proactive and willing to do the majority of the work” because sponsors are “traditionally some of the hardest working people on the planet.” At the same time, protégés “benefit greatly from having the protection of a trusted sponsor who is willing to advocate on their behalf.”

that won’t change until leadership changes at the top.

“It’s important to get more diversity at the top of the house,” Hewlett says. “That unleashes a lot of new energy in terms of talent in the middle that is proactively looking for sponsorship. They can say, ‘Hey, it’s possible that someone who looks like me can make it, too.’”

FELLOWSHIPS



Gertrude Arthur, PhD, a postdoctoral researcher at the University of Mississippi Medical Center, has been chosen as a **2024 Leading Edge Fellow**. Leading Edge is an initiative to improve the gender diversity of life sciences faculty in the U.S. The fellowship provides women and nonbinary postdocs with mentorship and career development opportunities. Arthur's work focuses on the mechanisms of metabolic dysfunction associated liver disease-induced kidney injury.

FACULTY HONORS



David Fuller, PhD, FAPS, a professor in the University of Florida (UF) College of Public Health and Health Professions Department of Physical Therapy, has been named a **2024 UF Research**

Foundation Professor. The honor is given to faculty who hold a distinguished current record of research and a strong research agenda that is likely to lead to continuing distinction in their fields. Fuller's research focuses on respiratory neuromuscular control and rehabilitation.



Annet Kirabo, DVM, PhD, an associate professor of medicine at Vanderbilt University, has been selected as a **2024 Chancellor Faculty Fellow**. The two-year program recognizes highly accomplished, recently tenured faculty from a wide variety of disciplines and areas of expertise. Kirabo studies the interaction between lipid oxidation-mediated protein modification and inflammation in the development of high blood pressure and kidney disease.

AWARDS

Terry D. Hinds Jr., PhD, associate professor of pharmacology and nutritional sciences at the University of Kentucky College of Medicine (UKCOM), is the 2024 recipient of UKCOM's **Pillar Award for Research**. UKCOM's Mission, Vision, Pillar and Enabler awards program recognizes faculty, staff and learners



who have made exceptional contributions to the overall mission, vision and purpose of the college's current strategic plan. The award acknowledges Hinds' approach to addressing critical health challenges and his leadership and mentorship.



Vjaughn Ingraham, founder and chief executive officer of the brain health consulting firm NatureKing Health, is a **2024 "Men to Watch" honoree**. The list, compiled by Black Leaders Worldwide, recognizes the brightest leaders, executives, entrepreneurs, investors, inventors and game changers around the world. Ingraham earned his master's degree in biology from Virginia Union University with research interests including pH and its effects on sodium channels in the hippocampus, along with endogenous cannabinoids and their effects on sst secretion in the stomach. His company's mission explores solutions to

sustain and enhance the brain, while promoting healthy and fulfilling lifestyles.



Shannon Niedermeyer, MD, an assistant professor in the Pulmonary and Critical Care Medicine (PCCM) Division of Johns Hopkins School of Medicine, is the 2024 recipient of PCCM's **Robert A. Wise MD Award for Clinical and Research Excellence**. The award recognizes a graduating fellow who exemplifies excellence in research and clinical work. Niedermeyer studies acquired molecular mechanisms of apoptosis resistance in pulmonary arterial smooth muscle cells in the context of pulmonary vascular remodeling.



Hershel Raff, PD, FAPS, a professor of medicine, surgery and physiology at the Cardiovascular Center at the Medical College of Wisconsin (MCW), is the 2024 recipient of MCW's **Harry Beckman Basic**

Science Teaching Award.

The award, selected by MCW's senior class, recognizes a faculty member "who had the strongest and most positive influence on their basic science teaching experience." Raff has received the Beckman award multiple times and researches the hypothalamic-pituitary-adrenal axis and the consequences of neonatal stress.



Megan Rhoads, PhD, a postdoctoral researcher at the University of Alabama at Birmingham (UAB), is a 2024

recipient of UAB's Department of Medicine Research Excellence Advancement and Mentorship Council's **Everyone Can Dream Award**. The award recognizes an early-career scientist's effort to becoming an independent investigator. Rhoads' research focuses on the interaction of the endogenous molecular clock and brain regions that regulate blood pressure and kidney function.

Alexander "Sasha" Staruschenko, PhD, FAPS, a professor and director of the Hypertension and Kidney Research Center at the University of South Florida, is the 2024 recipient of the Tampa Veterans Affairs (VA) Research and Education Foundation and James A. Haley Veterans Hospital's **Excellence in Mentoring Award**. The award recog-



nizes VA investigators who demonstrate dedication and commitment to excellence in the training of young researchers. Staruschenko mentors a number of students, post-docs and junior faculty and researches the mechanisms controlling ion channel activity and electrolyte homeostasis.

Joey P. Granger, PhD, FAPS, professor of physiology and medicine and director of both the hypertension and cardiovascular-renal training program and the MS Center for Clinical

and Translational Research at the University of Mississippi Medical Center (UMMC), is the recipient of the **2024 Regions Toward Educational Advancement in Care and Health (TEACH) Prize**. The TEACH Prize is one of UMMC's highest honors for faculty and recognizes those who excel in areas that include innovative teaching methods, mentoring and engaging with students. Granger's research focuses on hypertension in pregnancy and preeclampsia. He was the 84th president of APS.



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FASEB NEWS

APS Members Named FASEB Early-career Representatives

The Federation of American Societies for Experimental Biology (FASEB) has announced the 2024–2025 early-career representatives to the FASEB Board and Science Policy Committee. These two-year positions, which began on July 1, were created “to foster dialogue between current and future generations of researchers.”

Amy Engevik, PhD, an assistant professor at the Medical University of South Carolina, is one of two new early-career representatives to the FASEB Board. Engevik studies how gastrointestinal epithelial cells



function in health and disease. She is a past member of the APS Gastrointestinal & Liver Section Steering Committee and Trainee Advisory Committee.

Kevin Gries, PhD, an assistant professor at Concordia University of Wisconsin, is one of two new early-career representatives to the FASEB Science Policy Committee. Gries' research interests include how exercise can enhance skeletal muscle metabolic fitness and function, particularly in older adults. He is a member of the APS Science Policy Committee.



APS JOURNALS

Comprehensive Physiology: A New Scope

APS is excited to announce the official relaunch of *Comprehensive Physiology*, marking a new chapter for the journal and the Society. Starting with content publishing in the 2025 publication year, *Comprehensive Physiology* has



expanded its scope beyond review articles and has begun receiving original research submissions focused on inter-organ communication and its role in homeostasis.

The strategic shift of the journal aims to address the evolving landscape of physiological research, where understanding the intricate networks and signaling mechanisms between organs is of critical

importance. By concentrating on this area, the research published in the journal will shed light on the complex interactions that underpin human health and disease, advancing our knowledge and fostering innovation in the field.

APS JOURNALS

New Editors Named



Usha Raj, MD, was named the new editor-in-chief of *Comprehensive Physiology*, effective Sept. 1. Raj is the Anjuli S. Nayak Professor of Pediatrics at the University of Illinois College of Medicine. Her research is focused on investigating the role of extracellular vesicles and their microRNA cargo in communicating

between endothelial cells and pulmonary vascular smooth muscle cells in the pathogenesis of pulmonary hypertension.

Kamal Rahmouni, PhD, was named the new editor-in-chief of the *American Journal of Physiology-Regulatory, Integrative and Comparative Physiology*, effective Sept. 1. Rahmouni is a professor of neuroscience and pharmacology, professor of internal medicine and the E. Dale Abel Fraternal Order of Eagles Diabetes Research Center Chair at the University of Iowa. His research is focused on understanding the fundamental processes underlying the control of autonomic function, body weight and blood pressure in health and disease.



AWARDS



Award deadlines vary and may be subject to change. For the latest information, including award descriptions, amounts, eligibility requirements and to apply, visit physiology.org/awards.

NOV. 15

Annual Marion J. Siegman Lectureship Award

DEC. 1

RENAL SECTION

Robert W. Berliner Award for Excellence in Renal Physiology

TEACHING SECTION

Travel Fellowship

DEC. 2

APS Presidential Service Award

NEURAL CONTROL & AUTONOMIC REGULATION SECTION

Carl Ludwig Distinguished Lectureship

Lifetime Achievement Award

DEC. 15

PHYSIOLOGICAL -OMICS GROUP

Distinguished Lectureship Award

ADInstruments New Investigator Award

Trainee Research Excellence Award

DEC. 16

ADInstruments Macknight Innovative Educator Award

Arthur C. Guyton Awards for Excellence in Integrative Physiology

Barbara A. Horwitz and John M. Horowitz Outstanding Undergraduate Research Awards

Beverly Petterson Bishop Award for Excellence in Neuroscience

Dean Franklin Young Investigator Award

Early-career Advocacy Fellowship

Giles F. Filley Memorial Awards for Excellence in Respiratory Physiology and Medicine

Lazaro J. Mandel Young Investigator Award

Martin Frank Diversity Travel Award

Shih-Chun Wang Young Investigator Award

International Early-career Physiologist Travel Awards

Translational Research Award

JAN. 6, 2025

Arthur C. Guyton Distinguished Educator Award

Charlie Bates Research Award

Dale J. Benos Early-career Professional Service Award

Dependent Support Travel Awards

CARDIOVASCULAR SECTION

New Investigator Awards

Outstanding Graduate Student Trainee Award

Outstanding Postdoctoral Trainee Award

Research Recognition Award

Young Investigator Award

CELL & MOLECULAR PHYSIOLOGY SECTION

New Investigator Award

Research Recognition Award

Robert Gunn Student Award

CENTRAL NERVOUS SYSTEM SECTION

New Investigator Award

Research Recognition Award

Van Harreveld Memorial Award

COMPARATIVE & EVOLUTIONARY SECTION

FaunaBio Translational Research Award

New Investigator Award

Research Recognition Award

Scholander Award

Travel Award sponsored by Dr. Dolittle

Travel Award sponsored by Novo Nordisk Foundation

DATES & DEADLINES

AWARDS

JAN. 6, 2025

ENDOCRINOLOGY & METABOLISM SECTION

New Investigator Award

Research Recognition Award

Virendra B. Mahesh Award for Excellence in Endocrinology

ENVIRONMENTAL & EXERCISE PHYSIOLOGY SECTION

Early-career Research Award

New Investigator Award

CANTROL Environmental Systems New Investigator Research Award

CANTROL Environmental Systems Postdoctoral Research Award

CANTROL Environmental Systems Predoctoral Research Award

Gatorade Sport Science Institute Postdoctoral Research Award

Gatorade Sport Science Institute Predoctoral Research Award

Nike Loren G. Myhre Postdoctoral Research Award

Nike Loren G. Myhre Predoctoral Research Award

Partnership for Clean Competition Anti-doping Postdoctoral Research Award

Partnership for Clean Competition Anti-doping Predoctoral Research Award

Research Recognition Awards

GASTROINTESTINAL & LIVER SECTION

Research Recognition Award

Trainee Poster Awards

NEURAL CONTROL & AUTONOMIC REGULATION SECTION

Michael J. Brody Young Investigator Award

New Investigator Award

Outstanding Graduate Student Award

Janet and Robert Speth Undergraduate Researcher Award

NCARNation Trainee Presentation Award

American Physiology Summit Trainee Award

Linda F. Hayward Achievement Award

Research Recognition Awards

RENAL SECTION

New Investigator Award

Postdoctoral Excellence in Renal Research Awards

Predoctoral Excellence in Renal Research Awards

Research Recognition Awards

RESPIRATION SECTION

New Investigator Award

Outstanding Trainee Award

Research Recognition Awards

The Usha Awards

Trainee Poster Presentation Awards

TEACHING SECTION

Arthur C. Guyton Distinguished Educator Award

New Investigator Award

Research Recognition Awards

William Galey Scholarship Award

WATER & ELECTROLYTE HOMEOSTASIS SECTION

Juan Carlos Romero Postdoctoral Research Award

Leonard Share Award

Research Recognition Award

Predoctoral Research Award

New Investigator Award

JAN. 15, 2025

Porter Physiology Development Fellowship

TEACHING SECTION

Labfront Mid-career Educator Award



GASTROINTESTINAL & LIVER SECTION

Horace W. Davenport Distinguished Lectureship

John S. Fordtran Distinguished Research Award

New Investigator Award

Raj and Prem Goyal Lectureship in Pathophysiology of the Gastrointestinal & Liver Disease

JAN. 20, 2025

Graduate Student Ambassador

APPLICATIONS ACCEPTED YEAR-ROUND

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More details: [physiology.org/awards](https://www.physiology.org/awards)

WEBINARS



WOMEN'S HEALTH: A PHYSIOLOGICAL ANALYSIS

Sympathetic Regulation in Human Pregnancy

Nov. 6, 11 a.m. EST

Preeclampsia: From Hippocrates to Contemporary Research

Nov. 20, 11 a.m. EST

Cardiovascular Disease in Polycystic Ovarian Syndrome

Dec. 11, 11 a.m. EST

Hormonal and Chromosomal Influences on Autoimmunity and Lupus

Jan. 29, 11 a.m. EST

Content Partner: Society for Women's Health Research

More details: [physiology.org/webinars](https://www.physiology.org/webinars)

CALLS FOR PAPERS



American Journal of Physiology-Cell Physiology (Dec. 31)

- Advances in Adhesion and Cell Contact
- Cellular and Molecular Mechanisms of Cancer Drug Resistance
- Cellular Signaling in Diseases of the Extracellular Matrix
- Decoding Fibrosis
- Ketones in Cellular Physiology: Metabolic, Signaling and Therapeutic Advances
- Mechanisms Underlying Diversity in Cancer Cachexia
- Refining Inflammatory Disease Entities by Insights into Endotypes

American Journal of Physiology-Gastrointestinal and Liver Physiology (Dec. 31)

- Immunometabolism and Novel Gut-neural-cardiorenal Pathophysiological Mechanisms of Disease

American Journal of Physiology-Lung Cellular and Molecular Physiology (Dec. 31)

- Targeting Airway Immunity in Lung Disease

American Journal of Physiology-Regulatory, Integrative and Comparative Physiology (Jan. 31)

- Exploring the Inflammatory Theory of Disease: Mechanisms Underlying Chronic Inflammatory Diseases

American Journal of Physiology-Renal Physiology

- Mechanisms of Tubular Transport and Adaptation to Osmotic Stress in Honor of Dr. Maurice Burg (Dec. 1)
- Renal Tubular Function in Health and Disease, Honoring Prof. Gerhard Malnic (Jan. 31)

Function

- Neuroscience (ongoing)

Journal of Neurophysiology

- Now and Then (Dec. 31)
- Neuroimaging Meets Neurophysiology (Dec. 31)
- Sleep Disorders (Jan. 1)

Physiological Genomics (Dec. 31)

- The Microbiome in Health and Disease
- Nutrigenomics

Physiological Reports (Dec. 1)

- Exercise and Diet

Advances in Physiology Education (Dec. 15)

- Teaching in an Era of Generative Artificial Intelligence
- Virtual Teaching Technologies

More details: journals.physiology.org/calls

Embrace Your Curiosity

BY CARRIE NORTHCOTT, PHD

“Never stop being curious!” That sentiment has been a constant throughout my life. Mentors along my journey taught me how to channel that curiosity and test my hypotheses in well-planned studies: “If you can’t write a paper at the end of the study, you didn’t design it correctly.” This training and guidance have underpinned my career path.

I’m often asked, “How did I go from agricultural sciences, to pharmacology and toxicology, then safety pharmacology within the pharmaceutical industry, to now leading a team in digital sciences?” The short answer? I was curious. And, I asked questions, pursued, and continue to pursue, hypotheses.

My family, mentors, education and scientific training have taught me how to develop and test hypotheses, regardless of the scientific field I was in and to surround myself with experts. Digital sciences has me asking questions (be curious) and is one way I could help patients and scientists alike. For some time now, digital health technologies (DHTs) have been used within the consumer market, as well as in academic and preclinical research. Therefore, it made logical sense to also apply them for use in health care.

As you know, there is a prevalence of fitness trackers and “step tracking” devices available for consumers. In fact, recent surveys suggest approximately 1 in 3 U.S. adults own a smartwatch or a fitness band. Moreover, there is a desire to share their data with their health care providers to assist with health care decision-making. So, this begs the question, “Why not use these DHTs and associated novel measures to characterize physiology and inform and improve health?”

The measures obtained from the DHTs can be another way for us to understand various diseases and conditions, as well as evaluate the efficacy of treatments. Often, health care relies on qualitative or point-in-time measures that are performed in a clinical setting. But DHTs provide quantitative, unbiased, continuous data, obtained while someone is going about their daily lives. This enables us to understand a great deal more than how many steps someone did that day. It also looks at aspects of movement, gait, stride and moderate to vigorous activity (power-walking, running or tennis, for example.). This allows us to monitor movement indicative of activities of daily living, such as cleaning the house or gardening.

DHTs can even collect data while you are sleeping, such as how long you slept, number of awakenings and nocturnal scratching. These measures help in deciphering the puzzles of diseases and health, as well as monitoring the efficacy of a treatment.

In my current role, I collaborate with an amazing team from various scientific fields. Together, we bring our expertise to the table to test, develop new ways and assist in implementing DHTs into clinical research, trials and health care.

We evaluate new novel devices, machine learning and artificial intelligence methodologies. And we develop ways to operationalize these novel measures and qualify them for use in clinical trials and health care settings. We do this all while continuing to ask scientific questions: What do these novel digital measurements tell us about the disease or treatment? What are we learning about a certain population? How do measures relate to each other?

I encourage you to stay curious. Ask the questions. Do not be afraid to fail. Surround yourself with experts. And listen and keep pushing forward. We have discoveries to make, diseases to treat and people to help.

Carrie Northcott, PhD, is head of digital sciences within Biomeasures, Endpoints and Study Technologies (BEST) at Pfizer Inc. Send questions or comments to tphysmag@physiology.org.



APPLY FOR SOCIETY AWARDS



The American Physiological Society (APS) offers more than \$1.2 million in awards and fellowships each year as part of our mission to encourage excellence in physiological research and education. These awards are a vital investment in our researchers and educators of all career levels.

Learn more about all the available opportunities and apply for the awards highlighted below at [physiology.org/awards](https://www.physiology.org/awards).

November

15

Annual Marion J. Siegman Lectureship Award

\$1,000 honorarium. Recognizes an established investigator who has made outstanding contributions to our understanding of muscle contraction and motility and opened the way for new avenues of investigation.

Presidential Service Award

\$1,000 honorarium. Recognizes a member for extended and outstanding volunteer service to the Society and the broader physiology community.

December

2

December

16

ADInstruments Macknight Innovative Educator Award

\$1,500 honorarium. Honors an early- to mid-career member who incorporates innovative teaching techniques and technology in engaging students in physiology education.

Early-career Advocacy Fellowship

\$1,500 award. Engages early-career investigators in a two-year program of advocacy activities, providing skills to become long-term advocates for scientific research.

December

16

December

16

International Early-career Physiologist Travel Awards

\$1,000 award. Presented to members living and working internationally to assist with travel expenses incurred in presenting their work at the American Physiology Summit.

Recognizing Excellence in Physiology

The American Physiology Summit brings together outstanding researchers from around the world to celebrate and share breakthroughs and advances in physiological research.

Apply for one of the 100+ awards intended to honor and spotlight stellar science. Travel and abstract-based awards are available for investigators, students and educators at all career levels. Many awards require you to submit an abstract. Please read criteria carefully.

Apply for Summit awards at [physiology.org/SummitAwards](https://www.physiology.org/SummitAwards).

2025 Award Deadlines:
Nov. 14, 2024–March 21, 2025

Abstract Submission Deadline:
Dec. 2, 2024

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