

THE Physiologist MAGAZINE

JULY 2023

HOW GRIEF AND TRAUMA
COURSE THROUGHOUT
YOUR BODY **26**

MENTAL HEALTH CRISIS
OVERWHELMS COLLEGE
CAMPUSES **32**

ART & SCIENCE

Usha Raj's need to know 'why' led to a rewarding
career studying the pulmonary circulation.



CAREER RESOURCES



CAREER NAVIGATOR

Some physiologists move up the academic research ladder, while others explore career opportunities in the government, nonprofit organizations or careers outside the lab, such as science communication, teaching or administration. Learn about career opportunities in all these areas with our new Career Navigator.

CAREER GATEWAY

A successful scientific career requires more than just scientific expertise. To maximize a career in science, investigators, clinicians and educators need a well-rounded professional skill set. The APS Career Gateway provides physiologists the tools for every step of their career journey.

JOB BOARD

Looking for the next step in your career in science? Visit APS' new tech-enabled job board connecting members of our scientific community with career opportunities across academia, government, industry and nonprofits. Find the ideal match for your experience and expertise.

Learn more at [physiology.org/careerresources](https://www.physiology.org/careerresources).

CONTENTS

FEATURES



20

Art & Science

Usha Raj's need to know 'why' led to a rewarding career studying the pulmonary circulation.

BY MELANIE PADGETT POWERS

26

Emotional Overload

How grief and trauma course throughout your body.

BY CHRISTINE YU

32

Taking Its Toll

Mental health crisis overwhelms college campuses, as students and professors feel the burden.

BY GLENN COOK

CONTENTS

DEPARTMENTS

THE EDITOR'S DESK

4 APS Recognizes Mental Health Challenges

EVOLUTION WITH SCOTT STEEN

8 Modernizing APS Governance

Exploring APS' current initiative to modernize its governance with APS President Rick Samson, PhD, FAPS, and governance expert Mark Engle, CAE, FASAE.

IN REVIEW

10 2023 American Physiology Summit

LAB NOTES

MENTORING Q&A

14 Forward Bound

How to advance your career and find the right path for you.

POLICY IQ

16 Learning to embrace the postdoc exodus.

UNDER THE MICROSCOPE

18 Rapid Fire Q&A

Ashley Griffin shares what inspired her to become a scientist, her favorite and least favorite parts of her job, and a lab mishap story.



14



12



18

NEWS FROM THE FIELD

38 Meet the recipients of two new APS awards; New section and interest group chairs start terms.

TRANSPORT

39 Career successes and milestones of APS members.

DATES & DEADLINES

39 Calls for awards and papers and upcoming events and webinars.

THE LAST WORD

40 Find Your Service 'Niche'

Sonnet S. Jonker, PhD, FAPS, chose a service area she was passionate about and it elevated her career.



40



Translational Physiology of Cardio-oncology

October 22–25, 2023

Snowmass Village,
Colorado

Abstract Deadline: July 7

**Early Registration
Deadline: September 1**

**Submit and register at
physiology.org/cardio-oncology.**

Cardiovascular disease is a leading cause of death in cancer survivors, second only to the development of recurrent or secondary cancers. It is imperative that scientists increase understanding of the basic, clinical and translational physiological challenges that occur with anti-cancer therapies and explore novel avenues of counteracting adverse cardiovascular events in response to anti-cancer therapy.

Join us as we focus on topics, from cells to communities, that are critical for addressing the increased observed adverse cardiovascular events in cancer patients. Programming will include basic scientific research, clinical and community-engaged work.

APS Recognizes Mental Health Challenges

BY MEEGHAN DE CAGNA, MSC, CAE



Dear reader,

Recently, an APS member shared with me how much they loved reading *The Physiologist Magazine* and wondered where we got our story ideas from. The truth is that ideas come from all across the Society, from research published in our journals, to policy issues being discussed on Capitol Hill and in the federal agencies. We develop story concepts from the various surveys we issue when you share what's happening in your life. For example, we've heard repeatedly about the postdoc shortage or the need for information about career options outside academia. Often, members tell us about scientists they admire and mentors who've shaped their lives. The ideas are gathered and discussed; some move forward for further exploration and some stay in the "maybe" pile.

Just over a year ago as I sat with four of our APS leaders at Experimental Biology in Philadelphia, our dinner conversation turned to mental health and wellness during the pandemic or borne out of a traumatic event. We discussed what was happening in our world, and more specifically in college classrooms and campuses across the U.S. For nearly an hour, emotional and compelling stories were shared about the privilege and burden faculty were feeling in order to support their students,

“Emotional and compelling stories were shared about the privilege and burden faculty were feeling in order to support their students, their fellow faculty and staff, and their own mental well-being.”

their fellow faculty and staff, and their own mental well-being.

I heard comments about not being trained to counsel students and the overwhelming volume of students seeking support. I learned about faculty burnout, the lack of available resources and compassion fatigue. I learned that one member would have a teaching plan for that day only to scrap it at the last minute because it was clear the students were not in a learning mindset. Another shared that they were building trust but also had reporting responsibilities to keep students safe, placing them in a position where they might have to break that trust. One member asked, “Can APS help?”

This important discussion stayed with me for quite a while. I won't say that featuring an article about trauma from a biological function perspective and another describing what your fellow members and students continue to

experience will solve the issues of mental health and well-being. But I do hope that our APS community can learn and share with each other how they are using tools in their classrooms and campuses to find support.

Our third feature this month is our cover profile on Usha Raj, MD, MHA, FAPS, a fascinating leader and researcher with talent in both science and art.

Story ideas and what you want to read and learn about is what fuels this publication. Everything about this magazine is created with you in mind. Always feel welcome to share your thoughts with us. (You can email tphysmag@physiology.org.) You never know—your story concept, or you, just might end up on these pages. 📧

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



american
physiological
society®

Thank You Participating Institutions

Howard University

Kansas State University

Louisiana State University
Health Sciences Center

Michigan State University

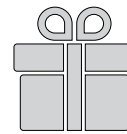
Monash University

Texas A&M University

University of Illinois
Chicago

University of Oregon

University of South Carolina
Columbia



**PERKS &
DISCOUNTS**



**SAVE
MONEY**



**GAIN
ACCESS**

APS Institutional Group Membership

Building your department's group membership is quick and easy!

- ✓ Access deep membership rate discounts.
- ✓ Each group receives up to 20 complimentary trainee and/or student members.
- ✓ Unlock up to 10% in additional savings on American Physiology Summit registration.

Complete the interest form and start benefiting today.

physiology.org/IGM

THE Physiologist MAGAZINE

VOL. 66 | JULY 2023

The Physiologist Magazine is published bimonthly and distributed by the
American Physiological Society (APS).
6120 Executive Boulevard, Suite 575, Rockville, MD 20852-4911

Scott Steen, CAE, FASAE

*Publisher
Executive Director*

Meeghan De Cagna, MSc, CAE

*Associate Publisher
Chief Community and Learning Officer*

Melanie Padgett Powers

Managing Editor

FREELANCE WRITERS

Glenn Cook, Christine Yu

CONTRIBUTORS

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

DESIGN

Latham Creative, LLC

SUBSCRIPTIONS

The Physiologist Magazine (ISSN 0031-9376) is distributed to members as part of their membership. Nonmembers in the U.S. (print only): Individuals \$260. Nonmembers international: Individuals \$315. Tier definitions/custom pricing: www.physiology.org/tiers. The American Physiological Society assumes no responsibility for the statements and opinions advanced by contributors to *The Physiologist Magazine*. Please notify the APS Membership Department of changes to your address or telephone number.

Phone: 301.634.7118 | Fax: 301.634.7241 | Email: tphysmag@physiology.org | www.physiology.org

Printed in the U.S. by Intellicor Communications on acid-free paper. Please recycle.



APS EXECUTIVE CABINET

Willis K. "Rick" Samson, PhD, FAPS

*President
St. Louis University School of Medicine*

Dee Silverthorn, PhD, FAPS

*Past President
University of Texas at Austin*

Timothy Musch, PhD, FAPS

*President-elect
Kansas State University*

APS COUNCILORS

Lacy Alexander, PhD, FAPS, Pennsylvania State University; **Heddwen Brooks, PhD**, University of Arizona; **Michael Caplan, MD, PhD, FAPS**, Yale School of Medicine; **Nisha Charkoudian, PhD**, U.S. Army Research Institute of Environmental Medicine; **Margarita Curras-Collazo, PhD, FAPS**, University of California, Riverside; **Karla Haack, PhD**, Merck; **Dexter Lee, PhD**, Howard University College of Medicine; **Evangeline Motley-Johnson, PhD**, Meharry Medical College; **Gina Yosten, PhD**, Saint Louis University



Ask Congress to Support Biomedical Research

Insufficient U.S. investment in scientific research leaves thousands of high-impact research proposals unfunded each year. As Congress considers funding levels for 2024, it is essential that representatives and senators hear from the research community about needed resources.

Raise your voice in support of research today by filling out the form via the QR code below.



APS

ACTION

ALERTS

Modernizing APS Governance

Executive Director Scott Steen, CAE, FASAE, discusses APS' current initiative to modernize its governance with APS President Rick Samson, PhD, FAPS, and governance expert Mark Engle, CAE, FASAE, from the Association Management Center.

Steen: Mark, could you tell us what governance is and why it matters to APS members?

Engle: There are three primary legs to the stool. The first one is around strategy, which approaches getting to member value. The second is around structure, and that's how we do it—how we encourage members to engage, what that looks like, some structural elements within the organization. And then the third element is really around culture. And that's where we get the soft side of the business, about relationships. Sometimes some elements really enhance member value, and sometimes elements really inhibit driving value to the membership.

Steen: When people think about governance, they think of the board—in our case, the Council. Is it more than that, or is it really focused there?

Engle: What we see actually is a flattening of structures. It is broader than it was in yesterday. When we created these organizations—and some of them are a hundred years old—we had weeks or months or years to make decisions. Change was slow to come. Organizations are under assault today, in governance, in competition: competition for members' time, competition for their resources, particularly financial resources, too. We see that whole landscape directly impacting how we look at the structural elements of governance.

Steen: Rick, why is APS taking on this really big initiative now?

Samson: My answer would be “why not?” This is a very important issue. We haven't changed our governance in over 40 years. And as Mark says, culture is a really important part of our Society, as with all societies, and culture has changed. We have a broad and diverse membership. We have a structure that some feel does not serve all corners of that membership. And we are looking at financial exigency here with the loss of revenue from open access.

So, as we consider how we're going to deal with the loss of revenue, we have to consider at the same time, are there programs that we can no longer afford? Or are there programs that should be replaced because there are aspects of our current culture which have yet to be served? So now's actually a very good time to do it.

Steen: Mark, I would imagine that agility is such an important part of the equation now, being able to act quickly, but also taking in a lot of information from your members.

Engle: Right. Look at the business skills on your staff today compared to where they were five or 10 or 15 years ago. The business acumen of associations has changed dramatically—and the ability that we have to process information and to say, this is where the members really want to go. How do we get tools and programs that are meaningful to them? What does that look like? Those dynamics are very different than writing a book, which we used to do 20 years ago, or creating a course where people would come together. Those dynamics are very different. The business skills are very different today than they have been in the past.

Steen: How do you balance the idea of transparency with the importance of protecting the space, so that people can make the best decisions for the greater good?

Engle: Warren Bennis and Ethan Bernstein, out of Harvard, have done some wonderful research on transparency. What they talk about is informing widely, getting that robust set of information you can ask broadly. Process all these opportunities and start prioritizing them, as Bernstein would say, in a more of a protected environment,



Scott Steen, CAE, FASAE



Left: Mark Engle, CAE, FASAE; right: Rick Samson, PhD, FAPS

where we have to safeguard the ability to challenge each other on decision-making and priority-setting, on a smaller limited basis. And then communicate where we are going, what we are doing and what the value is for members on a very large, robust basis.

Steen: Rick, what are your hopes for this initiative?

Samson: We have to be better at getting a broad spectrum of information from our members. I think our current structure only allows us to receive information from limited groups, and it leaves other people out. Changing the way we gather information, and appreciating the situations of all of our members, and what their needs and what their contributions are, and then having a group of competency-based leaders who can make those decisions.

The final step is we've got to do a better job with transparency. I think this is what's been bleeding air out of our tires. Members constantly are coming up to me saying, "why did this decision get made? Who made this decision?" We have to be better at communicating the effort we took to make a decision, who made it, why it was made and how it's going to affect everyone. So, my hope is we can get to that point.

Steen: When do you think members should expect to see some of these changes?

Samson: We're having a leadership retreat this summer when the task force meets in person and will present an example of where we think we should head, so that we can get

feedback from our current leaders. We certainly would like to go to the fall Council meeting with a proposal that would be edited, fine-tuned and then prepared for the members to actually vote on. It'd be nice to get this done before open access rolls down the hill and crushes us.

But more importantly, I think we need to serve the members. We've heard that many of the members are not happy with the way leadership is managing the Society. We have to address that or we'll lose these people. We can't let them split farther apart than they are already. We need to value everyone and what their contributions are. Leadership largely in APS, ever since I've been in, is very senior. I think we're doing a much better job in terms of diversity, age, sex, the whole thing. But we can find a way to bring younger people with new ideas into our leadership structure, but not in the current structure. We need to change our structure so that the young vibrant people who have a career ahead of them help us make decisions.

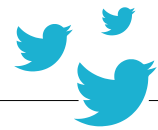
“We've got to do a better job with transparency. ... Members constantly are coming up to me saying, ‘why did this decision get made? Who made this decision?’ We have to be better at communicating the effort we took to make a decision, who made it, why it was made and how it's going to affect everyone.”

—Rick Samson, PhD, FAPS

Steen: So the idea here is: Get broad input from lots and lots of members, create a space, a competency-based space, where leaders can make the best decision for the whole. And then broadcast those decisions out, communicate much more widely on the other side. That's kind of it.

Engle: That's it. 📞

View the conversation in full at www.physiology.org/evolution.



The first-ever American Physiology Summit, held in April in Long Beach, California, was a roaring success. As the excitement of coming together to celebrate physiology continues, planning is already underway for next year's Summit.

Share your story with us and it may appear in the next issue of *The Physiologist Magazine*. Email your thoughts—and links to your tweets and posts—to tphysmag@physiology.org.



Orlando Laitano
@olaitano

Playing Chess with @DrCRWest and bringing back great memories from our grad school times at @CHPER_Brunel @APSPHYSIOLOGY @APSEEPSSECTION #APS2023



1:36 PM · Apr 22, 2023



Vii Pszczolkowski
@alpha_casein

I'm heading out to Long Beach CA today for the inaugural #APS2023 summit! I can't wait to reconnect and newly connect with metabolism folks, and even more thrillingly, talk with so many trans biology researchers!

10:43 AM · Apr 20, 2023



Declan McCole
@DecMcCole

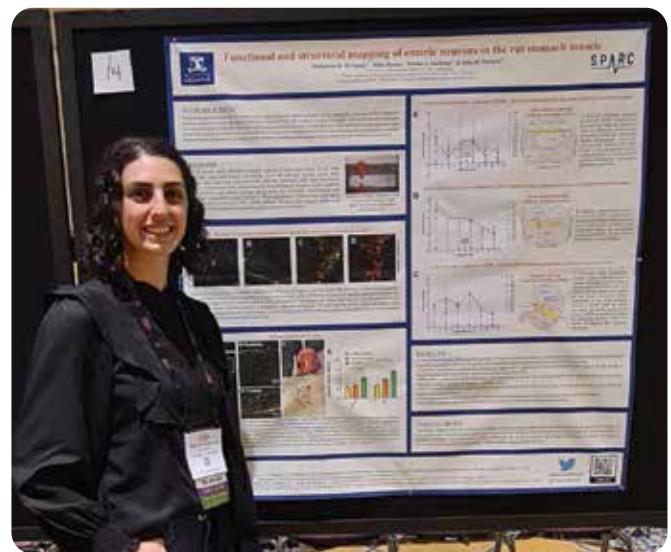
Wonderfully insightful, inspiring and of course humorous Davenport Award Lecture by Jim Goldenring. A very well deserved honor for a fabulous scientist! @APSPHYSIOLOGY Summit

2:27 PM · Apr 21, 2023



Furness Lab
@TheFurnessLab

🌞 What a jam-packed couple of days at #APS2023! Incredible works shared by @NobelPrize @DJuliusSF 🌟 Fabulous physiology presentations, discussions, and posters! @MadeleineDiNat1 presented her data on stomach innervation! 🧑🏫



11:01 AM · Apr 22, 2023



Taben M. Hale, PhD
@TMHalePhD

It warms my heart to see the Hale and Tobet labs together in real life! @MicrosoftTeams makes it easy for us to work together between @uazmedphx and @ColoradoStateU, but nothing beats getting together in person. @ICON_X @APSPHysiology @Jherve_MGH #APS2023 #MeetMeAtTheSummit.



9:53 AM · Apr 22, 2023



Anne Ramsey
@draramsey

Terrific time in Long Beach @APSPHysiology Summit! Looking forward to next year!



2:02 AM · Apr 23, 2023



Lashodya Dissanayake
@lashodya

Physiologists come in all shapes ❤️ #APSSummit2023 @APSPHysiology



1:09 AM · Apr 22, 2023



Marcus Wagner
@wagner_mj

So excited to be at the APS summit meeting this weekend. Special thanks to @sday_hcm for making it happen! Awesome to have Graham, one of our undergraduate students here with me!

3:49 PM · Apr 21, 2023

Follow APS on Twitter

@APSPHysiology @SciPolAPS @APSPublications

IN REVIEW | AMERICAN PHYSIOLOGY SUMMIT





LABNOTES

MENTORING Q&A YOUR QUESTIONS ANSWERED
POLICY IQ PHYSIOLOGY ON THE HILL AND IN THE HALLS
RESEARCH FIZZ BUZZ-WORTHY RESEARCH
STATS & FACTS PHYSIOLOGY BY THE NUMBERS
UNDER THE MICROSCOPE OUR MEMBERS, UP CLOSE
PUBLISH WITH POLISH BUILD A BETTER RESEARCH PAPER

STATS & FACTS

~13 million

The number of adults in the U.S. living with post-traumatic stress disorder in 2020.

U.S. Department of Veterans Affairs

RESEARCH FIZZ



161 Human skeletal muscle-specific atrophy with aging: a comprehensive review

This review gives a comprehensive summary of the existing literature on age-related muscle atrophy in the arms, legs and trunk.

Journal of Applied Physiology, April 2023

<https://doi.org/10.1152/jappphysiol.00768.2022>

STATS & FACTS

21.1

The fold-increase in risk of acute myocardial infarction during the first 24 hours of learning of the death of a significant person in one's life.

Circulation



MENTORING Q&A | CAREER ADVANCEMENT

Forward Bound

How to advance your career and find the right path for you.

Each issue, we ask a trainee or early-career member to pose their career questions to an established investigator and mentor. Here, Tala Curry, a PhD candidate at the University of Arizona Translational Neurotrauma Research Program, asks Kedra Wallace, PhD, how to advance a career and knowing when to say no. Wallace is at the University of Mississippi, where (as of July 1, 2023) she is associate dean of academic and faculty affairs, School of Population Health; professor, Department of Pharmacology and Toxicology; and professor, Department of Obstetrics and Gynecology, School of Medicine.

Q: What is something you learned and implemented that has been fundamental to advancing your career and laboratory?

A: To be comfortable with what you don't know. I think as a young scientist a lot of people feel as if you have to know everything in order to be successful. I personally love collaboration and am very

“The more I think and think about something that has stalled, I start to overlook the really obvious answers or pathways. Pulling back gives me time to completely clear my mind.”

secure in what I know and in the fact that I do not know everything. I think the tricky part about collaborating is to make sure that you are only collaborating with people who you know are highly ethical and knowledgeable. A very influential person in my life once said, “If you wouldn't want to sit down and have a beer with them, then don't collaborate with them.” Now that philosophy may not work for everyone, but for me it does. That also doesn't mean don't know anything about that area, because you do need to know more than the basics, but you don't necessarily need to be an expert.

Q: When you feel like you are not progressing forward, how do you find the right path to create new opportunities?

A: I like to run two different projects simultaneously. That way if I am stumped by one study or if my team has been working in this area for a few years and we aren't really getting anywhere, we can pull back and refocus our efforts on the other project. I have found that the more I think and think about something that has stalled, I start to overlook the really obvious answers or pathways.

Pulling back gives me time to completely clear my mind of that project and focus on a different study. Then what often happens is one day a light bulb goes off and I am ready to start working on that other study again.

Q: What career/professional development activities have been most influential in your career?

A: As a postdoctoral fellow I attended a week-long leadership training for STEM professionals hosted by SACNAS. This was the training that I signed up for as a CV filler but that in reality changed my life. As a minority scientist, a STEM training

that openly addressed and talked about barriers/statistics/problems (and offered solutions), along with cultural and professional issues, was a true game changer. I did not attend any other leadership trainings to know if they were equally as valuable, but I can say I would recommend leadership trainings.

Q: How do you recognize when you are doing too much, and how do you say no?

A: I personally have a hard time saying no to opportunities that are dear to me. Early in my career I developed a passion for mentoring and sponsorship, which later grew to include advocacy. As such, it is very easy for me to say no and not even consider opportunities that are not going to advance my passion. But if it is something that is going to help one of my causes advance, then I struggle to this day to say no. I have found that having a great team has helped me both balance my commitments along with helping me say no. 🙏

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

STATS & FACTS

27%

The portion of respondents to the APA Stress in America 2022 poll who reported “that most days they are so stressed they can't function.” This portion jumps to 46% for adults under 35.

American Psychological Association

RESEARCH FIZZ



The molecular athlete: exercise physiology from mechanisms to medals

This review summarizes changes and molecular mechanisms that underlie exercise adaptation to endurance- and resistance-based training, including muscle plasticity in response to different modes of exercise.

Physiological Reviews, July 2023

<https://doi.org/10.1152/physrev.00017.2022>

STATS & FACTS

76%

The portion of respondents to the APA Stress in America 2022 poll who reported experiencing negative health effects of stress in the past month.

American Psychological Association

STATS & FACTS

32.7%

The portion of graduate or professional students in 2022 who reported that stress had impeded their academic performance in the previous 12 months.

American College Health Association-National College Health Assessment

RESEARCH FIZZ



Prolonged sitting and peripheral vascular function:

potential mechanisms and methodological considerations

This review of prolonged sitting time explores potential contributing mechanisms to sitting-induced vascular dysfunction and stresses the importance of considering the investigational environment, which may exacerbate prolonged sitting's negative effects, in future studies.

Journal of Applied Physiology, April 2023

<https://doi.org/10.1152/jappphysiol.00730.2022>

STATS & FACTS

2

The number of years on average that it takes to recover after a major life disruption.

The Wall Street Journal

POLICY IQ | POSTDOC CHALLENGES

Learning to Embrace the Postdoc Exodus

BY D. RYAN KING, PHD

It is true that postdocs are leaving academia. And no, they're likely not coming back. But understanding why postdocs choose to exit academia is more complex than pointing out that the salary is bad.



I fell in love with cardiology as an undergraduate research assistant at the University of North Carolina-Chapel Hill. I was particularly fascinated by atrial fibrillation—a cardiac arrhythmia that affects 1 in 4 people in the U.S. during their lifetime. A significant impediment to “curing” atrial fibrillation is that we have no clear understanding of what causes it.

I began my PhD with Steven Poelzing, PhD, at Virginia Tech by investigating the etiology of arrhythmias. I loved my PhD. For me, it was a time of unfettered scientific exploration. I was encouraged to pursue my own interests and provided both the resources and guidance to help turn big ideas into reality. I was expected to compete for grants and publish papers, but I had support from my mentor regardless of whether the grants were funded or the papers were accepted.

Following my graduate work, I chose to become a postdoc because I had a notebook full of unanswered questions and a mindset to figure them out. It was not an easy decision—I had day-care bills in excess of \$1,000 a month for my daughter and more than \$70,000 in student loans, in the midst of the COVID-19 pandemic.

Many of my colleagues opted out of the academic path immediately. According to the National Science Foundation's

Far left: iStockphoto; right: courtesy of D. Ryan King, PhD

Survey of Earned Doctorates, the varied career paths sought by my colleagues are the norm, not the exception. Recent PhD graduates are more often choosing to pursue careers in industry, government and nonprofit sectors. Ultimately, I was one of the few from my PhD cohort that chose to stay, at least temporarily, in academia.

“Recent PhD graduates are more often choosing to pursue careers in industry, government and nonprofit sectors.”

Shortly after beginning my postdoc, I welcomed my second child into the world, adding to the financial burden. (Son Everett is with King on the left.) I was incredibly fortunate to receive student loan assistance through the National Institutes of Health (NIH) Loan Repayment Programs, which made the finances of remaining a postdoc feasible.

Now in year three of my postdoc, following two years of extreme inflation, the finances are increasingly uncomfortable as NIH salary minimums haven't increased with inflation. Moreover, despite reports of a “postdoc crisis,” there are still far too few tenure-track faculty positions available, leading to postdocs being “stuck” within their current positions. The salary is bad, but equally important, the

job prospects are dismal.

The postdoc crisis is generally framed in a negative light, as a problem that needs to be solved. But when speaking to PhDs employed outside academia, I find they are quite satisfied with their choice. So why is there such an emphasis on recruiting more graduates into the academic fold? An oversimplified answer is that postdocs play a vital role in academic research. If the postdocs disappear, so too does an important sector of the labor force.

There are several problems with postdoctoral training that could be addressed: insufficient salaries to meet the cost of living in cities where academic institutions are located; meager and inconsistent benefits such as retirement savings and disability leave; lack of a defined timeline for being “finished”; no employment agreement beyond one-year contract periods; and, at the end, no guarantee of a job in academia.

These are all points the APS Science Policy Committee raised in response to NIH's request for information on Re-envisioning U.S. Postdoctoral Research Training and Career Progression within the Biomedical Research Enterprise

(NOT-OD-23-084). For those who continue to pursue a postdoc, we must address these issues. But opting out of a postdoc is not inherently bad, and we should begin the conversation about what comes next for the academic workforce.

There are other solutions that would alleviate the stress on postdocs. First and foremost is to raise the salaries of students and postdocs. Beyond that, there is a need to create more permanent staff scientist positions. These positions would create a non-transient workforce and likely improve laboratory efficiency. For those who do choose to do a postdoc, promotion to independence should be built into the training. While it is not feasible to give everyone who completes a five-year postdoc their own laboratory, there should be better defined pathways to independence.

The life of a postdoc is not one of glamour. Pursuing a postdoc often means living on credit. The constant pressure to publish or perish is exhausting for both postdocs and principal investigators—and it should come as no surprise that both are leaving academia in droves. Even if a postdoc chooses to tolerate the low salary, long hours and pressure to publish, there is still only an outside hope of landing a tenure-track position.

It is time to destigmatize walking away from academia. There are many fulfilling career paths outside the university system, and we must support our colleagues who choose to walk a different path. ☞

D. Ryan King, PhD, is a third-year postdoc studying the physiological links between infantile epilepsy and early-life cardiac arrest. He currently serves as the trainee member of the APS Science Policy Committee.

APS Shares Comments with NIH on Re-envisioning the Postdoc

An academic postdoc position can provide valuable training for the next stage in a researcher's career. However, postdocs face many challenges, including low pay, a lack of critical job benefits and almost no structured career training or skill development.

That's why APS worked with members from the Science Policy Committee and Trainee Advisory Committee to formulate a response to a National Institutes of Health (NIH) request for information on postdoctoral training. The NIH Working Group on Re-envisioning NIH-Supported Postdoctoral Training will rely on this information to form policy recommendations to address the national shortage of postdocs. Read APS' response to the NIH request at www.physiology.org/NIHPostdocTraining.

RESEARCH FIZZ



Case studies in physiology: male to female transgender swimmer in college athletics

This case study analyzes elite-level swim performances of a transgender woman before and after two years of feminizing gender-affirming hormone therapy.

Journal of Applied Physiology, April 2023
<https://doi.org/10.1152/jappphysiol.00751.2022>

STATS & FACTS

9

The average number of close relatives left grieving for each person who dies of COVID-19 in the U.S.

Proceedings of the National Academy of Sciences

RESEARCH FIZZ



Icing after skeletal muscle injury with necrosis in a small fraction of myofibers limits inducible nitric oxide synthase-expressing macrophage invasion and facilitates muscle regeneration

This study finds that icing after a muscle injury with little tissue death facilitates muscle regeneration by limiting white blood cell accumulation.

American Journal of Physiology-Regulatory, Integrative and Comparative Physiology, April 2023
<https://doi.org/10.1152/ajpregu.00258.2022>



UNDER THE MICROSCOPE

Rapid Fire Q&A

Ashley Griffin shares what inspired her to become a scientist, her favorite and least favorite parts of her job, and a lab mishap story.

Q: Ever had a “eureka” moment? Tell us about it in ... 10 words or less.

A: Realizing I can explain my dissertation topic to lab members.

Q: What do people call you?

A: AshCash or Ashley Marie.

Q: What inspired you to become a scientist?

A: My grandfather passed from Alzheimer’s disease, and that made me curious as to how disease affects the human body, in particular the brain.

Q: How has the pandemic changed the way you work?

A: I have learned to prioritize my mental health and have more of a work-life balance. I also learned to incorporate at least one nonwork-related thing to destress every day.

Q: “Old school” technique you’re most proud of mastering?

A: Western blots.

Q: Most challenging laboratory technique you’ve learned to use?

A: Catheterization surgeries.

Q: Items on your lab bench that you are most possessive of?

A: My good pipettes.

Q: Favorite lab mishap story that you can share without incriminating the innocent?

A: I had animals in metabolic cages, and when I went to check, one was missing. I called my mom, freaking out because I’m trying to figure out where this little lady was. She was behind a cage drinking water.

Q: If you could meet any scientist (living or dead) who would it be and why?

A: Charles Scott Sherrington because of his fundamental work of neurons.

Q: If you could do a sabbatical with any scientist (living or dead) who would it be and why?

A: Jane Goodall. I have always admired her work with chimpanzees, especially her behavioral observations.

Q: What do you wish the general public understood about science or research?

A: Research takes time, and with scientific discoveries science is ever evolving.

Far left: iStockphoto



Top: Griffin recently went to Ireland for St. Patrick’s Day. Bottom: When Griffin is not traveling or in the lab, she’s spending time with her fur baby, Cooper.



Griffin uses her favorite lab instrument, the multi-well pipette, to complete an assay.

Q: Favorite book about science (fiction or non-fiction)?

A: "The Immortal Life of Henrietta Lacks."

Q: No. 1 guilty pleasure?

A: Watching anime.

Q: Most influential scientist on your career?

A: My mentor, Kedra Wallace, PhD.

Q: Favorite science-related TV show (fictional or factual)?

A: "Planet Earth."

Q: The scientific discovery or invention (made by someone else) that you wish you had made?

A: Multi-well pipettes.

Q: Biggest misconception about physiology/physiologists is ...

A: Physiologists know everything about the body.

Q: Favorite way to spend a free hour?

A: Playing with my dog, Cooper.

Q: If you were a model organism, which model organism would you be?
A: E. coli.

Q: Most valuable quality in a colleague?

A: Being a team player.

Q: Tell us a surprising fact about you.

A: In 2015, I was the first African American Greenwood (Mississippi) Miss Hospitality.

Q: Favorite part of your job?

A: Making connections with my data and my hypothesis.

Q: Least favorite part of your job?

A: Manually counting cells.

Q: Notable scientists you follow on Twitter?

A: Heather K. Beasley, PhD, MS (@HKBeasley) and Angeline Dukes, PhD (@TheRealDrDukes)

Q: Title you'd use on your autobiography?

A: "Pageants and Pipettes."

Q: How would you describe your job to a child?

A: I have an idea based on what I see every day. I do the same thing over again to see if the results support my idea. Then I get more ideas based on what I saw.

Q: Favorite charities you support?

A: Alzheimer's Association.

Q: One thing every researcher/scientist should try at least once in their life?

A: Get to know your animals.

Q: Favorite TV show, movie series or podcast to binge-watch/listen?

A: "Hunter x Hunter."

PUBLISH WITH POLISH | MANUSCRIPT PREPARATION

How to Manage Your Data

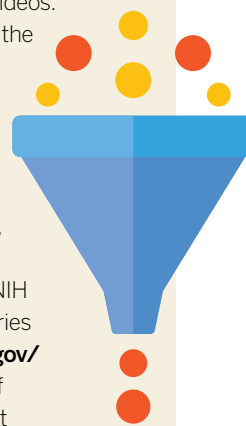
Earlier this year, the National Institutes of Health (NIH) began requiring a data management and sharing plan in all new grant applications. APS Publications support the sharing of data, and we have some tips when preparing your manuscript.

APS research journals allow three categories of supplemental data: supplemental material, raw or source data, and review-only materials. The Supplemental Material section of a manuscript may contain link outs (DOI preferred) to supplemental figures and tables but also computer code, audio files or videos. Such materials are peer-reviewed and cited within the article. Common generalist repositories for such objects include Figshare, GitHub and Zenodo.

The next category, raw or source data, enables other researchers to evaluate and even reanalyze your data. The article's Data Availability statement may direct readers to expression array, proteomic and metabolomic outputs as well as detailed protocols and virtual microscopy slides. NIH maintains a list of approved subject-area repositories designed for distinct data types at www.nlm.nih.gov/NIHbmic/domain_specific_repositories.html. If no specific repository is available, then a generalist repository may be used.

Finally, authors may share other forms of data for review only. These may include antibody control experiments, negative results (cited in the manuscript as data not shown) or other items to aid reviewers in evaluating your results and conclusions. These data are not published and therefore should not be cited in the manuscript text.

Are you ready to open up and share your data? You can find more detailed instructions on APS Journals' Supplemental Data Policy at <https://journals.physiology.org/editorial-policies#data>. 📄



Q: Favorite musician/musical artist/band?

A: Lil Wayne.

Q: Go-to snacks to get you through long days?

A: White cheddar Cheez-Its and cran-grape juice. 🍷

Ashley Griffin is from Greenwood, Mississippi, and attended Delta State University. She is currently a graduate student at the

University of Mississippi Medical Center in the neuroscience program. Griffin's dissertation focuses on pregnancy-related acute kidney injury, uremic toxins and cognition in the postpartum period. She wants to continue her career by completing an academic postdoctoral fellowship.

Art & Science

Usha Raj's need to know 'why' led to a rewarding career studying the pulmonary circulation.

BY MELANIE PADGETT POWERS

When Usha Raj, MD, MHA, FAPS, was a little girl growing up in India, there were two acceptable career paths: engineering and medicine. Boys could choose either, but girls were steered into medicine.

However, young Usha wanted to be an artist. "When I was 15 I used to hang out with artists in their studios and do a lot of painting," she says. But when she read about famous artists such as Vincent van Gogh, they all seemed to be poor and willing to give up everything for their art.

Photo by Diane M. Smutny/DMS Photography







Left: Raj with colleagues and friends at the APS American Physiology Summit in April 2023. Right: Raj delivered a keynote to 100 Fulbright Scholars. She is with Peggy Parfenoff, MBA, president of WorldChicago, a nonprofit that Raj is on the board of.

“I really questioned myself: I mean, would I be willing to be barefoot and hungry on the street because that’s all I wanted to do? And I decided I didn’t really have that fire in the belly.”

So, what path should she choose? “I was raised in a Christian family, and my mother was really a very devout Christian, and she used to tell us, ‘to whom much has been given much is expected.’ She would tell me that we have to give back.”

When Raj realized giving back is inherent to being a doctor, she chose medicine. Fortunately, she was naturally good in the sciences, and as she began studying medicine, she became fascinated by how the body works.

Raj, who is the Anjuli S. Nayak Professor of Pediatrics at the University of Illinois Chicago (UIC) College of Medicine, has spent the past four decades studying the pulmonary circulation. She is determined to figure out how to cure pulmonary hypertension, a rare disease associated with high blood pressure in the arteries that go from the heart into the lungs.

FINDING HER WAY TO PHYSIOLOGY

As a medical student in India, Raj knew she wanted to become a neonatologist because treating the sickest babies could teach her a lot about physiology. “I was one of those residents who always asked, ‘why, why, why?’ I did not like just getting an answer from a textbook.”

Neonatology allowed her to observe how a newborn’s lungs and heart were functioning. Once a baby was born, a neonatologist monitors every aspect of the baby. “To me, it was absolutely fascinating.” But her ultimate goal was to become a researcher.

India didn’t have a neonatology subspecialty at the time, so after residency, Raj moved to the U.S. for a two-year neonatology clinical fellowship at Tulane University in New Orleans. Next, she spent four years at the Cardiovascular Research Institute at the University of California, San Francisco, to train as a researcher before being recruited by UCLA. She spent 24 years at Harbor-UCLA and its research institute, doing research about 75% of the time.

In 2008, UIC offered her the opportunity to completely rebuild its department of pediatrics and establish the children’s hospital.

“[My mother] used to tell us, ‘to whom much has been given much is expected.’ She would tell me that we have to give back.”

She led the overhaul of the UIC department; established all the subspecialty programs that were missing; rebuilt the training programs for medical students, residents and fellows; and recruited close to 50 new faculty, many with their own research programs funded by the National Institutes of Health. “It was just an enormous lift,” Raj says. Soon, it was ranked first among the pediatric programs in Chicago for its academic excellence.

In 2015, she stepped down as pediatrics department head and gave up her clinical and administrative work to focus entirely on research. “I think I worked hard to create a great department and children’s hospital, and now that the job was done, I could hand it over safely to someone who I had recruited.”

BREAKTHROUGH FINDINGS

When Raj first set up her own laboratory at UCLA, she focused on the pulmonary circulation, eventually zeroing in on one type of cell: the pulmonary vascular smooth muscle cell. Her breakthrough finding in the field was her discovery that both arteries and veins in the lungs regulate flow. In the rest of the body, the veins only take blood back to the heart. But Raj discovered that veins in the lungs “are very active. They contract, relax. They can also remodel and lead to this problem of pulmonary hypertension.”

There were skeptics when she first published her findings, and she received a lot of pushback. “But after many, many publications, now everybody accepts it,” she says, “and in every patient with pulmonary hypertension, they look very carefully at both the arteries and the veins. ... That discovery is going to last the test of time.”

Her research has been funded by the National Heart, Lung and Blood Institute for over 38 years, and she

has over 203 peer-reviewed manuscripts and book chapters published. Over the years, she has discovered different signaling molecules that regulate the smooth muscle cell, which eventually led to drug companies developing medications to treat pulmonary hypertension.

For her research, she was awarded the Julius H. Comroe Distinguished Lectureship of the APS Respiration

Section and was elected an APS Fellow. She has received several top research awards from the American Thoracic Society, including the Recognition Award for Scientific Accomplishment, the Elizabeth Rich Award and the Distinguished Achievement Award. She received an honorary doctorate from the University of Lausanne in Switzerland in 2016.



Clockwise from top: Raj celebrating her birthday with friend Marion Cameron, MBA; Raj with John Clements, MD, who discovered surfactant, celebrating his 100th birthday; and at the APS Respiration Section dinner during the 2023 American Physiology Summit.



Clockwise from top: with friends in India; Raj with her son's cat, Django; and Raj with her son, Danny.

More recently, her laboratory has been studying the microRNAs that are involved in regulating the growth of pulmonary vascular smooth muscle cells. Her team identified a novel microRNA that regulates its growth, one that was previously not known. "It turns out this microRNA tries to inhibit the growth of the smooth muscle cells when all the other stimuli are making it overgrow," she explains. "So, we have developed a new way of delivering more of this microRNA to try to inhibit the growth of the smooth muscle cell."

Raj's laboratory is also studying extracellular vesicles, recently engineering them with the newly dis-

covered microRNA to give to animal models with pulmonary hypertension.

"We found that it works very, very well and gets them to almost 100% recovery from the pulmonary hypertension," she says. She has established a small startup company and is preparing to pitch venture capitalists to fund drug development based on this research, which would lead to better treatment for pulmonary hypertension.

EMBRACING CREATIVITY

Raj's mother's instruction to always give back has stayed with Raj her entire career. Since stepping down from her UIC administrative and clinical responsibilities, she's found

more time to focus on her passion of global health. She organized a medical mission trip to Cuba, where she delivered a truckload of needed medical supplies. She plans to return to Cuba next year and hopes to take a few residents with her.

She also has an appointment, and is working with faculty, at the Robert J. Havey, MD Institute for Global Health at Northwestern University Feinberg School of Medicine.

When she finds time after all that, she returns to the art she loved as a child. Pastels, watercolor, oils. Her own artwork covers the walls of her Chicago home, including a few of her son and of her cat. She gave her sister an oil painting of her dog for Christmas.

Both of Raj's sons developed her love and talent for painting. She says her oldest son was a "brilliant" artist who had an artistic "fire in the belly." Sadly, he died at age 18 from leukemia. Her younger son also loves art but decided to combine it with a love of the environment, becoming a landscape artist. "He does beautiful designs in all his work," she says. And he encourages his mom to lean into her art: "He always tells me, 'Mom, why aren't you painting?' so I do a little bit and I should do more."

Raj also started writing memoir-style essays that she plans to eventually turn into a book. She was delighted when two of her essays were selected for publication in the *Smart Set*, a journal of arts and culture published by Drexel University's Pennoni Honors College (www.thesmartset.com/belonging).

There's a piece of advice when people are looking to reduce stress or invite more joy into their life: Return to the hobbies you loved when you were 12 years old. In addition to building a successful, rewarding research career, Raj has embraced her childhood self, nurturing the joy she finds in art and self-expression. 🐾

Save up
to \$200.

REFER A COLLEAGUE



**Be entered
to win \$50!**

Members who refer colleagues that join the American Physiological Society (APS) will be entered into a drawing to win \$50. New members must join by September 30, 2023.




Visit [physiology.org/referrals](https://www.physiology.org/referrals) for terms and conditions.

There is power in numbers.

Show your commitment to advancing the discipline of physiology by recruiting your friends and colleagues to join APS as new members.

Regular members that recruit new regular or trainee members can save up to \$200 on their next APS membership renewal (\$25 off per new member referred).*

How Growing Your APS Community Benefits You:

-  Expand your professional network to bring different ideas, foster diverse thoughts, expand conversation and offer unique ways of thinking.
-  Receive special recognition and bolster your professional standing as a recruiter on the APS website and in our widely distributed publications.
-  Provide others with the opportunity to succeed through access to valuable APS resources.

[physiology.org/referrals](https://www.physiology.org/referrals)

**Terms and conditions apply. Visit [physiology.org/referrals](https://www.physiology.org/referrals) to learn more.*


american
physiological
society®




Emotional Overload

How grief and trauma course throughout your body.

BY CHRISTINE YU

John Chatham, DPhil, FAPS, describes the last year of his wife's life as stumbling from one crisis to another. As a patient with brain cancer, she was in and out of the emergency department multiple times. "It was slow-moving trauma and slow-moving grief," says Chatham, professor of pathology at the University of Alabama at Birmingham.

After his wife's death in 2016, Chatham experienced severe fatigue and brain fog. He lost his appetite and felt less coordinated. He assumed his body just needed to recover from the accumulated stress from caring for his wife and from her death. But two years later, he was diagnosed with a type of arthritis associated with an autoimmune disorder.



Chatham was familiar with the “broken heart syndrome,” also known as stress-induced cardiomyopathy or takotsubo cardiomyopathy. Emotionally stressful events can trigger a surge of stress hormones, leading to severe short-term heart muscle failure. But he wondered if repeated stress events, like he experienced while caring for his wife, affected his long-term health. “Was [the arthritis] caused by that extended period of trauma? By grief? I don’t know, but I could certainly imagine that they are connected,” he says.

The emotional wounds left behind by grief and a broken heart can linger for months or even years. The death of a loved one is one of life’s most traumatic events. Not only can it have a deep and intense impact on our emotional state, it can profoundly affect our physiology, too.

For instance, in the first 24 hours after the death of a significant other, the surviving partner is 21 times more likely to have a heart attack, according to a 2012 study in *Circulation*. Within the first six months of experiencing a loss, there’s a 41% increased risk of mortality, another study showed. Even after one year, those who have lost a loved one still have a 25% higher risk of dying. And, it’s not only heart attacks and strokes. “It’s all-cause mortality,” says Mary-Frances O’Connor, PhD, associate professor of psychology at the University of Arizona and the author of “The Grieving Brain.”

And it’s not just grief. Emotionally traumatic events can also precipitate meaningful effects on physiology, leading to changes in the immune system and vascular function and increasing the risk of cardiovascular or metabolic conditions.

A SHOCK TO THE SYSTEM

When we experience psychological stress—whether it’s grief or emotional trauma—the body responds

like it would to a massive physical threat. The hypothalamic-pituitary-adrenal (HPA) axis and the sympathetic-adreno-medullar (SAM) axis are activated, leading to the release of stress hormones such as cortisol and epinephrine, and the immune system is triggered. “This will increase heart rate, blood pressure, inflammatory markers and clotting factors,” says Nathaniel Jenkins, PhD, assistant professor in the Department of Health and Human Physiology at the University of Iowa.

Jenkins studies individuals who have experienced adverse childhood experiences (ACEs). Occurring in the first 18 years of life, ACEs include situations such as physical, emotional and sexual abuse; neglect; witnessing violence; foster care; and what Jenkins describes as “household dysfunction,” such as parental separation or divorce, a family member who has been incarcerated, or a household member who abuses substances.

Sixty percent of people—particularly underrepresented individuals and people from lower socioeconomic status—report one ACE or more. And since these events occur during childhood, Jenkins believes they may be a particularly noxious form of psychosocial stress. “The data is pretty clear across many different cohorts that they’re associated with lifetime risk in a big and meaningful way,” he says.

The HPA and SAM axes are designed to return the body to homeostasis after experiencing a stressor. But in Jenkins’ data, there’s preliminary evidence to suggest that the HPA axis is chronically disrupted. “We see flatter diurnal cortisol in those who have been exposed to high levels of ACEs compared to those without ACEs,” he says.

His data also suggest that those with greater ACE exposure will

“Was [my arthritis] caused by that extended period of trauma? By grief? I don’t know, but I could certainly imagine that they are connected.”

—John Chatham, DPhil, FAPS

report an amplified response to subsequent stressful events. “Stress begets stress,” he says. If these systems are continuously activated, it could lead to a maladaptive response and more inflammation. “Higher inflammation will promote higher oxidative stress and vice versa,” he says.

Similar to people who’ve been exposed to ACEs, there’s an increase in cortisol in people who are bereaved, changes that O’Connor says appear to persist. Researchers also see greater markers of inflammation in those who have lost a loved one and particularly in those who experience severe symptoms of grief.

O’Connor has seen blood pressure changes occur in people with the most intense and frequent symptoms of grief. “Not everyone has a really strong grief reaction when a loved one dies for a variety of reasons, and that’s normal. But [severity of grief symptoms] may be a risk factor that we should be looking at in terms of health outcomes,” O’Connor says.

O’Connor was interested in investigating inflammation because the higher risk of dying among those who have lost a loved one is across all causes, not just heart attacks. “Inflammation is something that affects all of our tissues and organs systems. Potentially, it’s a way that stress gets translated into something

that could lead to mortality across these different conditions,” she says.

A MATTER OF THE HEART (AND BLOOD VESSELS)

In some, stress can also lead to depression, a mood disorder in which there’s a relative inability to regulate emotions. “Depression is a risk factor for cardiovascular disease,” says Jody Greaney, PhD, assistant professor at the University of Texas at Arlington. Vascular dysfunction is one of the main pathways, she says.

When Greaney investigated vascular health in humans with depression, she found a blunted endothelium-dependent dilation in adults with mild-to-moderate depression—and in the absence of other risk factors.

“This seems to be mediated in large part by reductions in nitric oxide bioavailability” due to an increase in oxidative stress, Greaney says. The loss of nitric oxide in the blood vessels damages them and how they function. “It has long-term implications that can lead to the development of atherosclerosis and plaque development,” she says.

What’s more, the balance between constriction and dilation appears to be off-balance in adults with depression. “They seem to have this hyper-constrictor state,” Greaney says. “They’re less able to dilate, which is

going to increase blood pressure, and that may drive targeted organ damage.” While depression is different and distinct from grief or emotional trauma, Greaney says it’s reasonable to suspect that similar mechanisms may be at play in people who are bereaved or who are survivors of emotionally traumatic events.

Jenkins has found endothelial dysfunction in those who’ve been exposed to ACEs, but it wasn’t always clear why. Recently, he and his team identified disrupted sleep as one possible reason. Sleep disruption is a hallmark symptom of post-traumatic stress disorder (PTSD), and they’ve found a strong association between ACE exposure and sleep disruption.

“We know that stress and sleep have a reciprocal relationship, which we’ve all experienced. When you’re highly stressed or anxious, it’s hard to fall asleep or you might have disrupted sleep,” he says. What’s interesting is that sleep disruption appears to explain some of the association between ACE exposure and vascular dysfunction he’s seen in young adults.

IT’S ALL IN THE BRAIN

Grief and emotional trauma are two different experiences, yet the body responds in a similar fashion physiologically—for example, elevated heart rate, blood pressure and cortisol. It’s the brain that differentiates between the two. “We don’t see PTSD responses that have to do with the reward network the way we do with grief. We know that amygdala responsivity is important in a trauma response, but we rarely see that in grief,” O’Connor says.

When we love someone, it’s encoded in our brains. The nucleus accumbens, a tiny region deep in the middle of the brain that’s part of

the reward system, is vitally important to creating the bond between loved ones. In voles, who bond for life, scientists have seen epigenetic changes in this region. “Once these pair-bonded mates are separated, we see changes in the oxytocin binding in that region. It sets you up to realize that part of you is missing,” O’Connor says.

She believes there’s a similar mechanism at play in humans. In her fMRI studies, there’s a correlation between self-reported yearning for the deceased and nucleus accumbens activation. Because of our neurobiological bond to a loved one, we’re driven to seek them out. At the same time, rationally, we understand the person we love isn’t coming back.

“Part of grieving is reconciling these two ways of understanding the world so you can begin to predict their absence, but it takes time,” O’Connor says.

LEARNING TO COPE

Experts are interested in identifying ways to mitigate the physiological changes associated with the death of a loved one or an emotionally traumatic event, especially if they can lead to negative health outcomes.

Caretakers’ health is often overlooked, especially those who are caring for someone with a serious illness such as cancer. They likely haven’t kept up with their own routine medical check-ups and screenings, when doctors would likely notice an increase in blood pressure or potential signs of cancer.

“We had great physicians for my wife and great hospice staff, but when things were getting bad, nobody asked, ‘Are you taking care of yourself? Maybe you need to schedule a checkup.’ Nobody did that, but I could see where that could be a valuable step,” Chatham says.

O’Connor says the medical community has known about the broken heart phenomenon for years. “We know when someone has died. If the medical system really looked at the caregiver or next of kin and recognized that this event has put their cardiac health at risk, we could actually intervene,” she says.

For instance, what if within 24 hours of the death of a loved one, the survivor was given aspirin? She conducted a small feasibility study to investigate. “Imagine a world where, if this was proven to be effective, EMTs, emergency departments, ICUs and palliative care were able to make this recommendation,” she says.

There may be better ways to cope with the psychosocial stress that accompanies traumatic experiences, too. Jenkins is the principal investigator for a pilot project to see whether cognitive behavioral therapy for insomnia (CBT-I) can improve sleep quality in individuals with ACE exposure. The hope is by improving sleep quality, you decrease the risk for cardiovascular disease because sleep disruption is associated with increased risk.

While the project is still in its early phases, the results seem promising. As sleep quality improves, vascular function appears to improve along with it. “If we see improved physiologic function with improved sleep, then we may have a core component of an effective intervention,” Jenkins says. He can imagine potentially layering traditional psychotherapy to address the trauma along with CBT-I.

Grief and emotional trauma aren’t in your mind. It’s a part of your body, which means we can develop the ability to cope with the physiological changes.

“As a community, we can provide support to care for your physical health. We can provide that sort of compassionate response,” O’Connor says. ☞

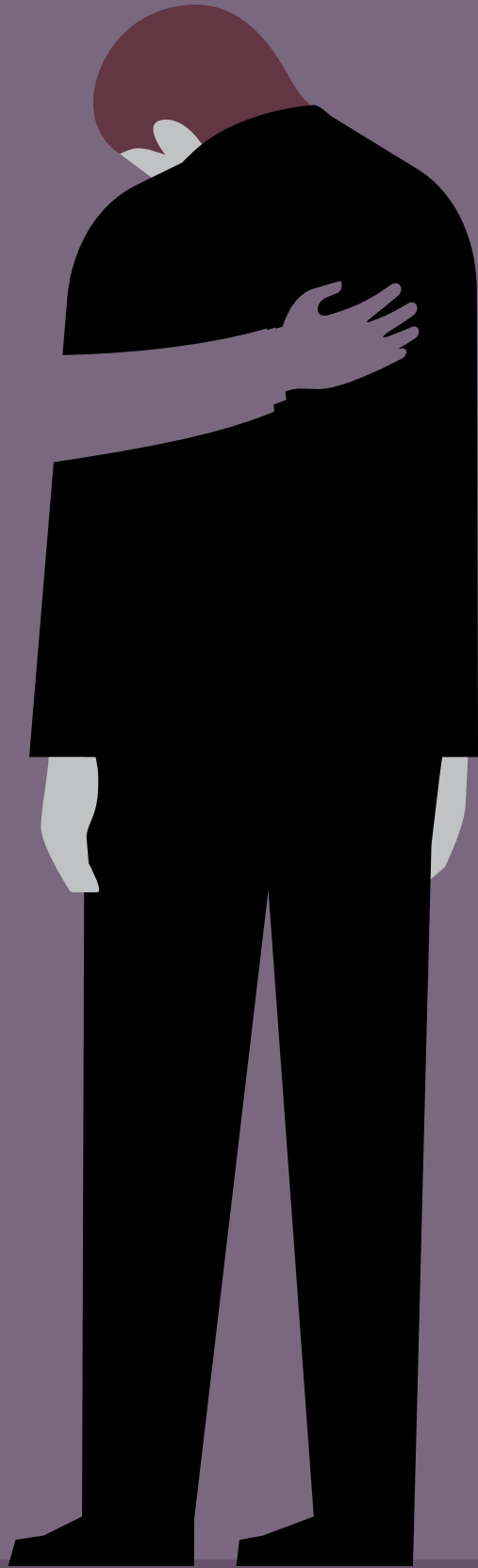
Publish With APS and Support Your Scientific Community

When you publish with the American Physiological Society (APS), you strengthen the community of scientists solving major problems affecting life and health.

As a self-publishing society, APS reinvests any income completely back into the research community we serve and the science we support. APS reinvests in you by hosting scientific meetings, championing physiology educators, granting more than \$1 million in awards and fellowships, building career resources, passing on publishing discounts to APS members, and much more.

Support your scientific community by publishing with APS today!





Taking Its Toll

Mental health crisis overwhelms college campuses, as students and professors feel the burden.

BY GLENN COOK

Patrick Crosswhite, PhD, is the first to tell you he’s not a mental health expert. As an associate professor in Gonzaga University’s Department of Human Physiology, he has not done research or received formal training on how to address the issues his students face.

“In my doctoral studies, I had very little training on how to be an educator, and I definitely didn’t receive training on being a frontline or first responder to a student’s mental health crisis,” says Crosswhite, who has worked at Gonzaga for seven years. “A lot of educators have a lot more hands-on experience in this area than I do.”



“Everything is so uncertain, and the ambiguity has added an additional layer of stress that impedes [students’] learning and ability to focus.”

—Alice Villalobos, PhD

But, like many of his peers, Crosswhite has found himself talking to students more about their mental health and wellness challenges over the past several years. And those challenges are acute, researchers say, with increased levels of depression, anxiety and suicidal ideation as students reacclimate to college and university life following the disruption of the COVID-19 pandemic.

“It is getting worse and worse and worse,” says Mac Murphy, a research coordinator at the Healthy Minds Network, an organization that collaborated with Boston University and the Mary Christie Foundation on a 2021 study about student mental health in higher education. “The crisis is not abating. If anything, it’s been ramping up for several years now.”

The study gathered responses from 1,700 faculty members at 12 colleges and universities with enrollments of 2,000 to 20,000. The findings showed that 87% of professors found student mental health had “worsened” or “significantly worsened” during the pandemic. Concern about mass shootings and social justice issues, in addition to the financial and social struggles undergraduates and postgraduates face, has only added to student angst.

“The pandemic revealed the type of stress and unrealistic expectations students have placed on themselves,”

says Alice Villalobos, PhD, assistant professor of medical education at the Texas Tech University Health Sciences Center. “And now, even in this new normal, everything is so uncertain, and the ambiguity has added an additional layer of stress that impedes their learning and ability to focus. It does take some sensitivity on our part to meet them where they are.”

About 80% of those surveyed said they had one-on-one phone, video or email conversations with students about their mental health and wellness, with almost half feeling like they were not qualified to recognize those in emotional or mental distress.

“We’re in contact with these individuals day to day and week to week, and students are more open and willing to come talk to us about the issues that are affecting their ability to perform in the classroom,” Crosswhite says. “It has placed a heavy burden on my end, having to serve in that capacity unofficially without training or minimal training, even though I’m fortunate to work at a university where support is available to students.”

PANDEMIC EFFECTS LINGER

When campuses shut down in March 2020, the day before spring break started at Texas Tech, Villalobos was teaching

undergraduates on the main campus. In July 2021, she took on a new role as an assistant professor at the university’s Health Science Center.

“Many of our students started their medical training in the middle of the pandemic, and we all sort of scrambled to make the necessary adjustments,” she says. “It was stressful dealing with the ambiguity of life and the unknown.”

Villalobos says she started to suffer from “screen fatigue” and “trying to literally read what was on my students’ faces” during what seemed like never-ending Zoom calls. She saw that her students were dealing with the same challenge.

“For our undergraduates, it was very unsettling. Whether they had a supportive group or not, it was an anxious time for everyone,” she says. “I was nervous, too, but I tried to be forthcoming and honest and transparent. I said we were all in this new experience together, and if we don’t know something we’ll learn it together.”

Villalobos says Texas Tech has been very clear about her role in dealing with student mental health concerns. The university has mental health professionals on staff who are focused on wellness, and her school has a clear chain of command if someone needs help beyond what she can provide.

“My responsibility is to start a conversation with students that is focused on academics. My job is to stay on point using positive, constructive language, listen carefully and be aware of the things that are stressing them out. If I pick up on anything that is serious, I can call our associate dean and our Office of Student Affairs, and they can get support from a faculty member who is better trained to discuss what they need than I am.”

Crosswhite says similar processes are in place at Gonzaga, a liberal arts Catholic Jesuit institution. He says he is fortunate “not to be expected to be an expert on all things outside the classroom, including mental health” and notes that the university has offered professional development on resources available to faculty.

“When I’m talking to a student and the situation has risen to a point where it is affecting their performance or their ability to learn and

process information, but is not yet a crisis situation, I try to talk to them as just a fellow human being, not as a faculty member,” he says. “If I feel it’s beyond my ability to help them navigate what they’re going through or if I feel they need professional help, then I can physically walk them to our student health center.”

Murphy says students “are really starting to close the gap for themselves” by actively talking about their mental health, a sign she finds

‘Where do faculty go when they need help?’

As critical as it is to meet student mental health needs, equally important is ensuring faculty are taken care of as well.

“In our field, scientists are trained as scientists, and then they move into teaching. Many don’t know that much about pedagogy and theory, and now they’re in a classroom and dealing with a very different ecosystem with their students,” says Erica A. Wehrwein, PhD, of Michigan State University. “It’s about balancing compassion with rigor and still being able to do our teaching.”

Universities need to encourage that approach and train faculty “how to be a broker of services,” says Mac Murphy of the Healthy Minds Network. Faculty should know where to send students “when a need arises rather than feel like they have to support the students by themselves,” she notes.

Burnout among faculty and staff can result in compassion fatigue, Murphy says. “Sometimes they’re not capable of being there for their students in the way the students need,” she says. “We have to recognize that students and faculty go hand in hand. It’s not either or. It has to be how can we support our faculty

so they can support our students, and how we can support our students so they don’t have to lean so hard on our faculty?”

In a 2021 survey led by Boston University, almost half of the professors said their institutions should invest more in faculty mental health and well-being. Almost 30% of the professors said they had two or more symptoms of depression, and 20% said that supporting students in mental or emotional distress had negatively impacted their own mental health.

Murphy says colleges and universities should ask what professors are doing to protect their own mental health and well-being in such stressful times.

“Where do faculty go when they need help? What kind of days off do they need? What kinds of stressors are they facing? Universities need to understand these things too,” Murphy says. “Helping faculty and helping students goes hand in hand. Neither can be fixed without fixing the other.”

In the days following the February 2023 Michigan State shooting, Wehrwein says she definitely “got a little burned out.”

“One of the bigger challenges for me was finding balance,” she says. “In one sense, I was a victim of what happened on campus because I was teaching class that day, and I was dealing with personal grief, loss and trauma on my own while serving as a frontline supporter to my students. It was a tough balance to strike.”

Wehrwein says she was fortunate to have a community of fellow faculty members to turn to for support. She continues to meet with a small cohort regularly to share concerns and challenges and says universities should help in developing these groups.

“Having a supportive community has been very helpful to me,” Wehrwein says. “Broadly, we are collectively ill-equipped to deal with a pandemic or a mass tragedy. It’s easy to neglect yourself. How do you keep your own wellness in check? Most professors have never had to think of being a first responder or on the front lines in this way, but we are. And we have to find that balance, for ourselves and for our students.”



“It has placed a heavy burden on my end, having to serve in that capacity unofficially without training or minimal training, even though I’m fortunate to work at a university where support is available to students.”

—Patrick Crosswhite, PhD

encouraging. Another bright spot: Data from the 2021 study and other research show that college and university students are actively working to find community.

“Community is really important, and you will need support,” Crosswhite says. “I tell all of our students, ‘If you try to navigate higher ed for the next four years on your own without support, you will encounter challenges. And that is especially true for first-generation college students, those coming from underrepresented or minority groups, and those coming from a situation where it is harder to find an ally or support network.’”

VULNERABILITY AFTER A MASS SHOOTING

Erica Wehrwein’s research focuses on the connection between breathing and the nervous system, how mindset and personality impact physiological health outcomes, and the neural control of blood pressure. She says studying how personality, mood and emotions “intersect with how the body works” led her

to change the way she teaches even before the pandemic.

“Going way back, I’ve always been strongly interested in how the science of physiology and psychology intersect and overlap,” says Wehrwein, PhD, associate professor of physiology at Michigan State University. “We know students can’t learn well when they’re emotionally unwell. When they are forced to deal with an extreme traumatic event or

grief process, they can’t engage in learning in a meaningful way.”

Wehrwein and her colleagues at Michigan State have seen this firsthand. In mid-February, a gunman killed three students and injured five others in a shooting on campus. School was closed for a week as the university worked to provide faculty and staff with trauma-based training on what to do when students returned.

“During the pandemic, we had a lot of opportunities for training on the practicalities of teaching and ways to support students, helping the faculty define compassionate policies and appropriate amounts of flexibility,” Wehrwein says. “When the mass shooting happened, they went up another level, with extra counseling services, workshops and seminars for faculty. We were forward thinking in real time. Overall, they’ve done a great job with that.”

Having a week between classes was critical for Assistant Professor Jennifer Doherty, PhD, who is in her first year at Michigan State after working for almost a decade at the University of Washington.

“I felt really supported with the resources and training that was made



“One thing that we learned from the training is that trauma hits everyone differently, and I tried to emphasize to my students that it comes in waves.”

—Jennifer Doherty, PhD



“During the pandemic, we had a lot of opportunities for training on the practicalities of teaching and ways to support students, helping the faculty define compassionate policies and appropriate amounts of flexibility. When the mass shooting happened, they went up another level, with extra counseling services, workshops and seminars for faculty. We were forward thinking in real time.”

—Erica Wehrwein, PhD

available to us,” says Doherty, who teaches beginning biology classes. “We talked about the physical signs of psychological trauma, what students and we would be feeling, and the current research that is out there on treating trauma. It helped me design a way back for what I would do in my classroom.”

Doherty says half of her 48 students returned in person on the first day and 12 attended via Zoom. That day, she talked about her feelings and vulnerability and urged students to do the same.

“One thing that we learned from the training is that trauma hits everyone differently, and I tried to emphasize to my students that it comes in waves,” she says. “I also told them we were going to slow down. Normally, we would have moved faster through the content, but I took about a month of the coursework out. We moved exams back until after spring break and recorded all of the classes so students could stay caught up if they weren’t here. I was flexible.”

When she arrived last fall, Doherty implemented a standards-based grading structure that offers retakes on tests without penalty. “It makes the class more equitable for students,” she says. “If someone has a bad day and it happens to be on an exam day, they’re not punished for it. It helps them to focus on learning and not on points, and it gives them grace when they have these problems.”

Extending that grace is a key factor in dealing with after-effects of trauma and stressful situations that can affect mental health.

“It really hit me at that point that what we are doing with this approach is really important. It was helpful to my students who needed it in the fall,” Doherty says. “It was helpful to everyone this spring. It was hard to put it in place, but given everything that everyone is dealing with, in terms of looking at our students and their mental health, it’s important to do.”

Wehrwein says changes she made in her teaching style during the

pandemic were helpful as she tried to navigate the aftermath of a mass shooting. She has a “no questions asked” late pass that allows students to turn in their work on their own time without penalties. Lectures recorded during the pandemic were made available to students who could not come to class. The university also has implemented a grief absences policy that allows students dealing with the death of a loved one to contact a single person who then informs the faculty.

“The mass shooting was a breaking point for a lot of my students. It was absolutely heartbreaking,” Wehrwein says, noting she has spent a lot of time this semester talking about purpose. “When something like this happens, you have to have a great deal of intentionality—helping them realize that what has happened is painful and scarring. In some cases, it might be life-defining. At the same time, we have to reassure them and tell them they can get through this. They still have purpose.”

ACCOLADES

Belin De Chantemèle, Carroll Recipients of New APS Awards Recognizing Outstanding Research and Volunteerism

Eric J. Belin De Chantemèle, DSc, and **Robert G. Carroll, PhD, FAPS**, were recognized at the American Physiology Summit with two new Society awards established in the past year to highlight outstanding contributions to research and APS volunteer service.

Belin De Chantemèle, a professor of medicine at the Medical College of Georgia, is the 2023 recipient of the Charles Bates Research Award. The abstract-based award recognizes a scientist who identifies as LGBTQIA2+ and has submitted the most meritorious abstract to the American Physiology Summit.

The award honors the memory of Charlie Bates, the late son of APS members Melissa Bates, PhD, FAPS, and Michael Tomasson, MD, and a member of the LGBTQIA2+ community. Belin De Chantemèle's abstract, titled "T cell-derived HIV proteins promote oxidative stress, endothelial dysfunction and hypertension via interleukin-mediated mechanisms in mice," was selected from a field of outstanding submissions.

"It just seemed natural to establish this award to support and recognize colleagues within our Society that haven't previously been acknowledged for their participation," Bates said.

Robert G. Carroll, PhD, FAPS, a professor of physiology at East Carolina University's Brody School of Medicine, is the 2023 recipient of the Presidential Outstanding Service Award. This new award recognizes an APS member for extended and outstanding volunteer service to the Society and the APS community.

The current APS president chooses each year's awardee from a pool of qualified nominees. Carroll's roles within the Society include serving as past chair of the Teaching of Physiology Section and the Education Committee and as a former editor-in-chief of *Advances in Physiology Education*. He also co-organized the Medical Physiology

Learning Objectives project, co-published in 2006 by APS and the Association of Chairs of Departments of Physiology.



Above: Robert G. Carroll, PhD, FAPS
Right: Eric J. Belin De Chantemèle, DSc, left, receives the APS 2023



Charles Bates Research Award, which honors the memory of the son of APS members Melissa Bates, PhD, FAPS, and Michael Tomasson, MD.

"APS is a member-driven organization that relies heavily on its member-volunteers, many of whom spend their entire careers in service to the Society with little public recognition," said outgoing APS President Dee Silverthorn, PhD, FAPS. "I'm pleased to recognize Rob for a lifetime of volunteer service to the Society and to the broader physiology community."

MEET THE CHAIRS

New APS Section and Interest Group Chairs Elected

Meet the five new APS section chairs and three interest group chairs. Their terms began at the American Physiology Summit in April, unless otherwise noted.

CENTRAL NERVOUS SYSTEM SECTION



Gene "Lee" Bidwell III, PhD
Professor, neurology, University of

Mississippi Medical Center

ENDOCRINOLOGY & METABOLISM SECTION



Licy L. Yanes Cardozo, MD
Associate professor, cell and molecular

biology, University of Mississippi Medical Center

RENAL SECTION



Robert A. Fenton, PhD
Professor, biomedicine, Aarhus

University, Denmark

RESPIRATION SECTION



Christopher M. Waters, PhD, FAPS
Professor, Department

of Physiology, University of Kentucky

TEACHING OF PHYSIOLOGY SECTION



Alice R. Villalobos, PhD
Assistant professor, Department of

Medical Education, Texas Tech University Health Sciences Center

HYPOXIA INTEREST GROUP



Kevin J. Cummings, PhD
Associate professor, biomedical

sciences, University of Missouri

PHYSIOLOGICAL - OMICS INTEREST GROUP



Tzongshi Lu, PhD
Instructor in medicine/associate

biologist, Renal Division, Brigham and Women's Hospital, Boston

SEX & GENDER RESEARCH INTEREST GROUP



Mark K. Santillan, MD, PhD (term began November 2022)
Associate

professor of obstetrics and gynecology-maternal-fetal medicine, University of Iowa

TRANSPORT

Meena Madhur Named Division Director at Indiana University School of Medicine

Meena S. Madhur, MD, PhD, has been named director of the Division of Clinical Pharmacology in Indiana University School of Medicine's Department of Medicine. She is currently an associate professor at Vanderbilt University Medical Center in Nashville, Tennessee, and the associate director of the Vanderbilt Institute for Infection, Immunology and Inflammation. Madhur will begin her new post in August. She has been an APS member since 2016.



Patricia Silveyra Appointed Department Chair, Receives Multiple Awards




Patricia Silveyra, PhD, has been appointed the chair of the Indiana University Bloomington (IUB) School of Public Health Department of Environmental and Occupational Health, effective July 1, 2023. She is currently an associate professor and the Anthony D.

Pantaleoni Eminent Scholar at IUB.

In addition, Silveyra is the recipient of IUB School of Public Health's 2022 Outstanding Senior Researcher Award and the 2023 Latino Faculty and Staff Faculty Award. Both honors recognize outstanding contributions and achievements within their respective communities. She has been an APS member since 2011.

Adam Wende Receives University of Alabama at Birmingham Mentoring Award

Adam R. Wende, PhD, associate professor in the Division of Molecular and Cellular Pathology of the Department of Pathology at the University of Alabama at Birmingham, is a 2023 recipient of the Dean's Excellence in Mentorship Award. The honor recognizes faculty who have "demonstrated exceptional accomplishments as mentors of graduate students and/or postdoctoral fellows." Wende has been an APS member since 2013. 



DATES & DEADLINES

AWARDS

Ernest H. Starling Distinguished Lecture of the APS Water & Electrolyte Homeostasis Section (July 1)

Henry Pickering Bowditch Award Lectureship (July 1)

Physiology in Perspective: The Walter B. Cannon Award Lecture (July 1)

APS Fellows (FAPS) (September 15)

Local Undergraduate Research Awards in Physiology (Applications accepted on an ongoing, year-round basis)

More details: www.physiology.org/awards



CALLS FOR PAPERS

American Journal of Physiology-Cell Physiology (September 30, 2023)

- Ketones in Cellular Physiology: Metabolic, Signaling and Therapeutic Advances

American Journal of Physiology-Lung Cellular and Molecular Physiology (July 31, 2023)

- Joint Call for Papers with the Journal of Applied Physiology: Novel Insights into Preterm Respiratory Physiology: Celebrating the 100th Birthday of Dr. Mildred T. Stahlman

American Journal of Physiology-Regulatory, Integrative and Comparative Physiology (July 31, 2023)

- Visualizing Physiology: Using Novel Microscopy Methods to Investigate the Mechanisms Underlying Physiology and Pathophysiology

Journal of Applied Physiology

- Joint Call for Papers with the American Journal of Physiology-Lung Cellular and Molecular Physiology: Novel Insights into Preterm Respiratory Physiology: Celebrating the 100th Birthday of Dr. Mildred T. Stahlman (July 31, 2023)
- Impact of Climate Change on Health and Performance (September 1, 2023)

More details: www.journals.physiology.org/calls



WEBINARS

APS DIVERSITY, EQUITY AND INCLUSION WEBINAR SERIES

Focusing on Recruitment and Hiring for Faculty
July 18, 2023

Careers Outside of Academia
September 27, 2023

More details: www.physiology.org/webinars



Find Your Service ‘Niche’

BY SONNET S. JONKER, PHD, FAPS

We all enter our professions with a love for our primary mission, be it research or education. However, we are often expected to do much more by contributing to the work required to keep our departments functioning. At my institution, service is an essential consideration during promotion and tenure review. But service doesn't have to be a resented waste of time; it can be a vehicle to enrich your career and make a meaningful difference.

I think that the best way to perform service is to find a niche for yourself in a particular topic from the beginning of your career and then continue to develop your expertise, paralleling the growth we go through as scientists. By selecting a topic and developing expertise, you can partially shield yourself from service requests that you find less interesting and develop new avenues to explore.

As a graduate student, I wrote modifications for our lab's Institutional Animal Care and Use Committee (IACUC) protocol because my principal investigator was slow to engage with this administrative burden. I developed a friendly relationship with an IACUC coordinator, Joanie Phillips, who helped me understand the reasoning behind the rules. I was shocked to learn that other scientists had adversarial relationships with their IACUC, as we all share the goal of pursuing high-quality studies while advancing animal welfare.

This introduction to animal research regulation had a major influence on the service I pursued in my career. Following my first faculty appointment, I joined my institution's IACUC.

With that experience under my belt, I applied for and was appointed to the APS Animal Care & Experimentation (ACE) Committee. What a thrill to go to Capitol Hill to talk about animal research on behalf of APS members!

I developed long-lasting relationships with other committee members and the dedicated APS staff, including the wonderful Alice Ra'anana. Via connections made on the committee, I became a consultant for AAALAC International, which accredits animal programs at institutions around the world. Site visits introduced me to more wonderful scientists and lab animal veterinarians. Most

recently, I was appointed chair of my local IACUC, and my APS connections helped me land on the Institute for Laboratory Animal Research (ILAR) Council at the National Academies.

My IACUC service is recognized by my division leadership as being of high importance to my university. I am credited with national-level activity through service with APS and AAALAC and with national-level leadership due to my work with ILAR and as chair of the ACE Committee. When I have turned down other service requests, this work showed

I was already engaged in good citizenship. And when I needed to reduce my workload—when writing grants or during family crises—the relationships I developed through these commitments were a source of understanding and support. And along the way, the people that I met have been a source of friendship, camaraderie and letters of support.

I now serve on my department's promotion and tenure committee, and it shines through when someone has found an area of service they enjoy and in which they are developing expertise—their service is of high quality on meaningful projects. Whether the topic is equity, animal welfare, quality improvement or something else, there's an area of service for you that will bring happiness and advance your career. 🐾

Sonnet S. Jonker, PhD, FAPS, is associate professor of medicine at Oregon Health & Science University. The goal of her career is to help developmentally stressed infants live healthier lives by finding ways to help them grow stronger hearts.



“By selecting a topic and developing expertise, you can partially shield yourself from service requests that you find less interesting and develop new avenues to explore.”

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).

July
1

Ernest H. Starling Distinguished Lecture

\$1,000 honorarium. Recognizes an individual for exceptional contributions and lifelong dedication to water and electrolyte homeostasis research.

Henry Pickering Bowditch Award Lectureship

\$2,500 honorarium. Honors an early-career APS member for original and outstanding accomplishments in the field of physiology. The recipient presents a virtual lecture prior to the APS annual meeting.

July
14

July
14

Physiology In Perspective Walter B. Cannon Award Lecture

\$4,000 honorarium. Honors an APS member in recognition of their original and outstanding accomplishments in the field of physiology.

Solomon A. Berson Distinguished Lectureship

\$1,000 honorarium. Honors a distinguished scientist for their outstanding contributions to the areas of endocrinology and metabolism.

July
31

Have you...

demonstrated excellence in science?

made significant contributions to the
physiological sciences and related
disciplines?

served APS?

Apply for elite member
status as an

APS Fellow

Apply by September 15 at [physiology.org/FAPS](https://www.physiology.org/FAPS).