

## A BRIEF HISTORY AND PROGRAM IMPACTS: 2016–2020



# Porter Physiology Development Fellowship

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AMERICAN PHYSIOLOGICAL SOCIETY (APS) BRIEF HISTORY

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# A Brief History of APS

Founded in 1887, the American Physiological Society (APS) is a global multidisciplinary community of nearly 10,000 scientists, educators, trainees and students who are solving major problems affecting life and health. Our members are advancing treatments and cures for everything from cancer and heart disease to obesity and addiction. They are also deepening our insight into living organisms, helping us to better understand how issues, such as climate change, affect the world around us.

The Society's membership is composed of senior scientists, clinicians, educators, mid- and early-career scientists, postdoctoral fellows and students (undergraduate, postbaccalaureate and graduate levels) from around the world. The Society's mission is to advance scientific discovery, understand life and improve health.

Additionally, APS is dedicated to education and the understanding and betterment of life. We embrace diversity and create opportunities for growth. The Society provides career and professional development for those in physiological fields, including awards, scientific meetings and 16 scholarly, peer-reviewed journals.

APS values and is devoted to fostering diversity, equity and inclusion (DEI) for our members and staff to ensure a safe and welcoming community for all. APS is committed to creating an environment where individuals can exchange ideas and be safe, accepted and respected.



“ [The Porter Physiology Development Fellowship] stands out as a beacon of the Society's priorities and values ... The Fellowship, one of the largest awards that APS gives, has more than a 50-year history of recognizing and celebrating underrepresented researchers for their work and potential. ”

–APS Executive Director Scott Steen, CAE, FASAE

## PORTER FELLOWSHIP HISTORY

APS has a long-standing relationship with the William Townsend Porter Foundation, formerly known as the Harvard Apparatus Foundation. William Townsend Porter, MD, was the founder of the *American Journal of Physiology* and the Harvard Apparatus Company. When the company was sold in 1921, the resources were offered to APS to provide a fellowship for graduate students in physiology. In 1967, APS updated the criteria for the Porter Physiology Development Fellowship program to support trainees from underrepresented racial and ethnic groups, becoming the Society's flagship diversity program. Since then, the program has provided 299 research fellowships to 169 doctoral students who conduct physiological research and come from underrepresented racial and ethnic backgrounds. In 2003, APS was awarded the Presidential Award for Excellence in Science, Mathematics and Engineering Mentoring, one of the nation's highest honors in STEM mentoring. This is largely due to our expansive and long-term diversity programming, which continues to this day.

## PORTER FELLOWSHIP GOALS AND OBJECTIVES

The purpose of the Porter Physiology Development Fellowship is to encourage diversity among graduate students in physiological science fields and to encourage their active participation within APS. Our program goals are to provide Fellows with career and professional development, mentoring and leadership opportunities that will help them engage in the Society. We also aim to spotlight and support the Fellows as they become emerging leaders in their field of physiology.



## PORTER PHYSIOLOGY DEVELOPMENT FELLOWSHIP

Applicants may be granted multiple one- to two-year fellowships.





## PORTER FELLOWSHIP ELIGIBILITY

Applicants must self-identify as members of racial and ethnic groups that are determined by the National Science Foundation to be underrepresented in STEM fields (we follow those guidelines also used by National Institutes of Health, listed [here](#)); be citizens or permanent residents of the U.S.; and be enrolled in a U.S. doctoral program. Applicants and their advisor or principal investigator must be current APS members to be eligible for this fellowship.

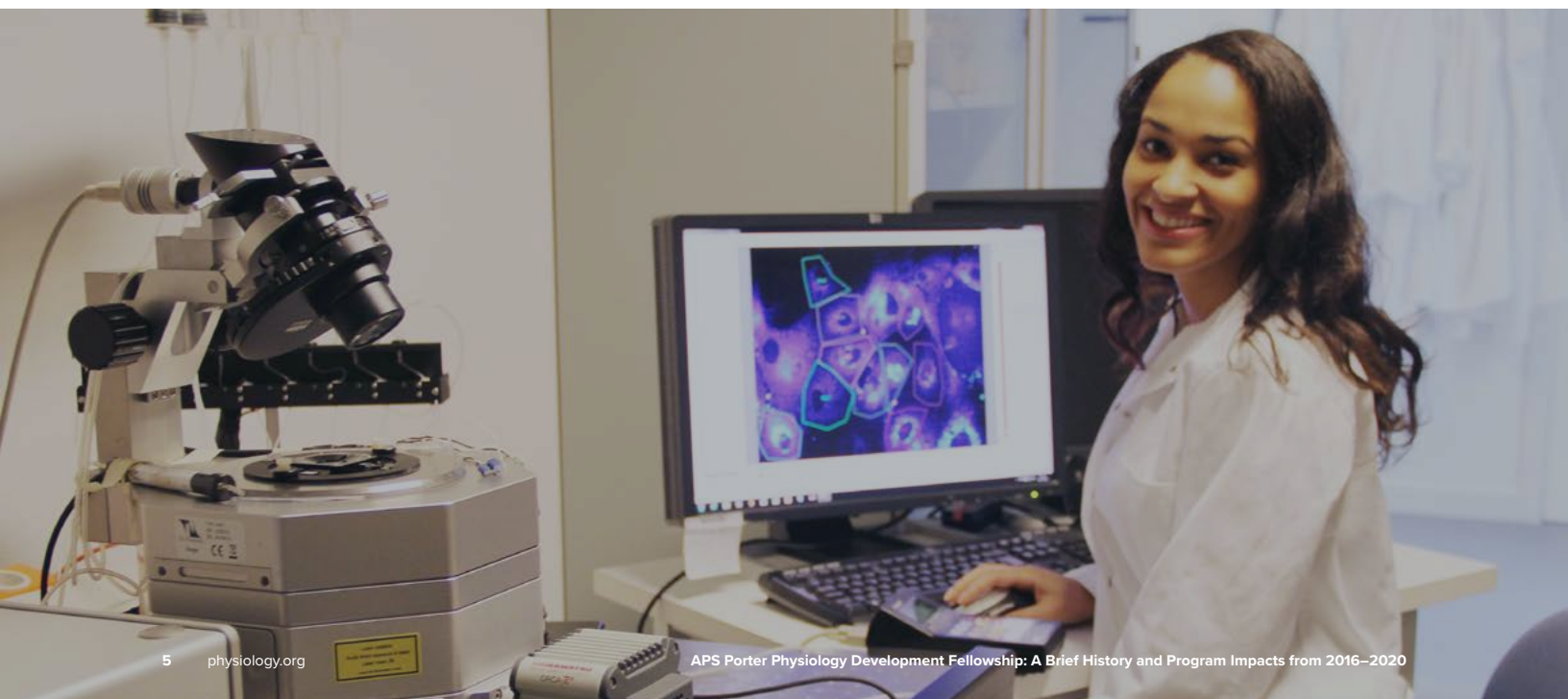
## PORTER FELLOWSHIP CRITERIA AND REVIEW

The Porter Fellowship application requires transcripts, a biographical sketch, including a personal statement that addresses their career aspirations, and a comprehensive research plan that describes the research to be conducted during the fellowship (includes specific aims, significance of the study, preliminary data, research design and methods and expected outcomes). The applicants' advisor or principal investigator also submits their own biographical profile and a research training proposal. This document describes how the advisor will mentor the applicant to facilitate their degree completion. Letters of recommendation are also required. Applications are due January 15 every year and the application review is conducted during the month of February. First-year Fellows may apply for a continuation award for a second year of funding.

Members of the APS Diversity, Equity & Inclusion Committee are responsible for reviewing completed applications. Members score the applications based on a rubric developed for the application materials based on the goals for the program. Applicants who do not receive funding are encouraged to reapply the following year, if they are eligible.

Selected Fellows receive a \$28,300 stipend, paid to their institution in 12 monthly installments. If the Porter Fellowship stipend does not match the level of graduate student's institutional stipend, the institution or principal investigator is responsible for providing supplemental funds to bridge the gap. Fellows may not accept another similar fellowship or take on additional responsibilities; they are expected to focus solely on their research.

**Applicants must self-identify as members of racial and ethnic groups that are determined by the National Science Foundation to be underrepresented in STEM fields.**



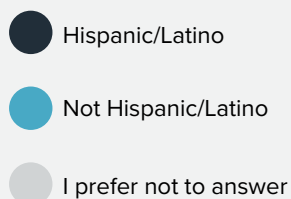
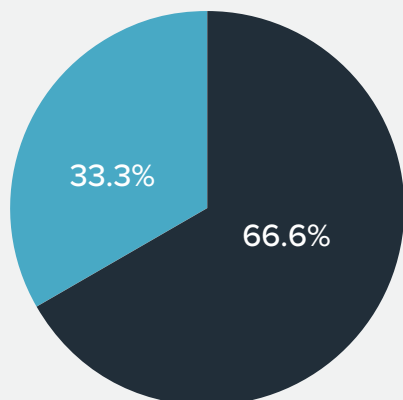
## FELLOWSHIP CONDITIONS OF AWARD AND EXPECTATIONS

During the tenure of the Porter Fellows program, Fellows must remain active members of APS and are encouraged to submit abstracts to APS conferences and apply for the Martin Frank Diversity Travel Awards to offset the cost of attending the conferences. Sharing their research findings and participation at scientific meetings is an important aspect of the Fellows’ professional development. When Porter Fellows present or publish their research work funded by this fellowship, we ask that they cite and acknowledge the William Townsend Porter Predoctoral Fellowship from the American Physiological Society. We also highlight the Fellows through our national APS social media channels and give them the opportunity to participate in the “Mentoring Q&A” section of *The Physiologist Magazine*. At the completion of the fellowship, Porter Fellows submit a final report on their research progress, publications, mentoring and outreach activities, their future research and career advancement plans, and professional development.

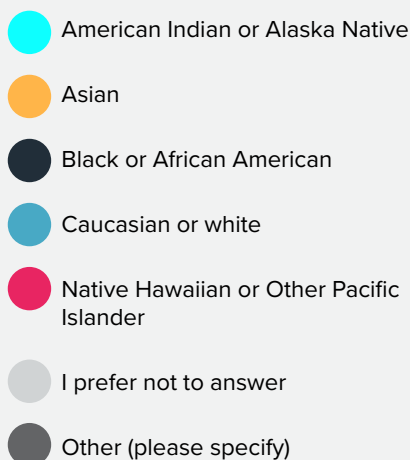
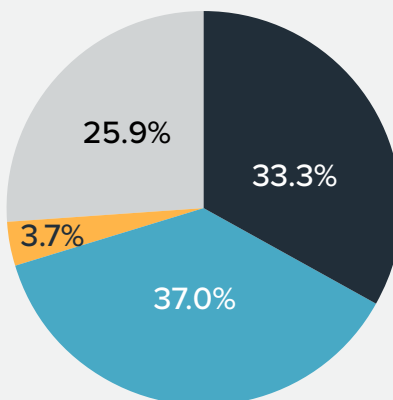
## FELLOW DEMOGRAPHICS: IDENTITY AND CAREER STAGE

The following charts represent the demographics of our 2016–2020 Porter Fellows’ (N=27) ethnicity (Chart 1), race (Chart 2) and gender (Chart 3). Two-thirds of the participants self-identified as Hispanic or Latino. About one-third self-identified as African American or Black, one-third identified as Caucasian or white, and one participant identified as Asian. One-third of our Fellows preferred not to provide their racial background. Most of the Porter Fellows during this time period self-identify as female (59.3%).

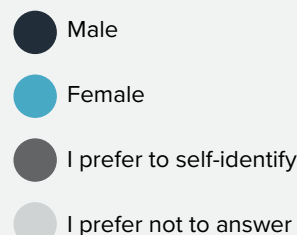
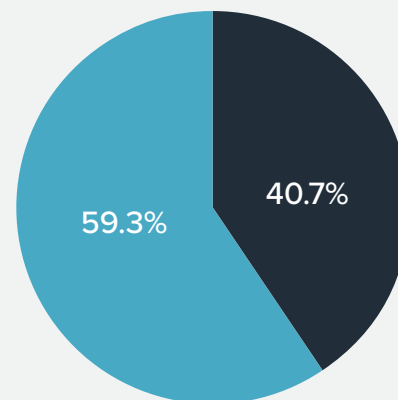
**CHART 1:**  
Porter Fellow Ethnicity



**CHART 2:**  
Porter Fellow Race



**CHART 3:**  
Porter Fellow Gender Identity

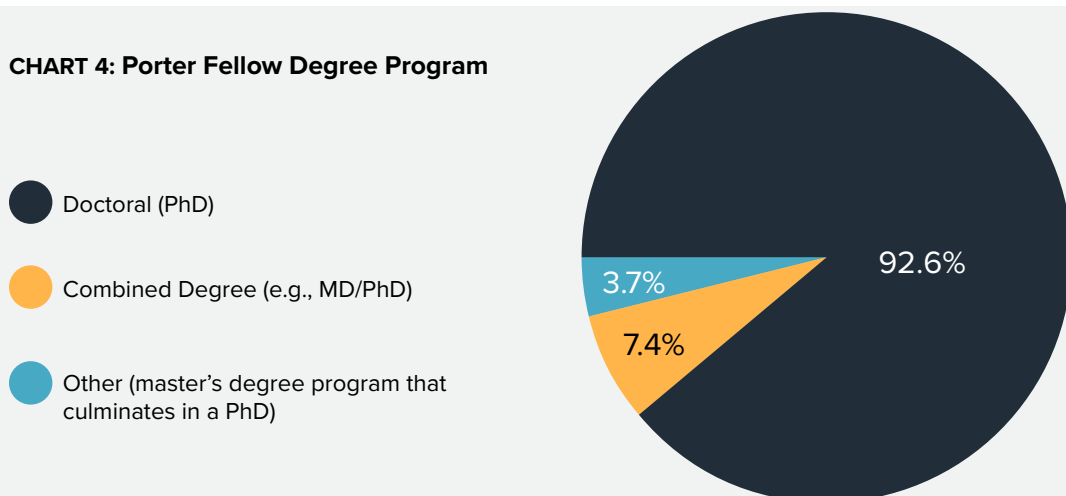


## FELLOW DEGREE PROGRAMS

Additional data demonstrated that 88.9% of Porter Fellows were working towards their doctoral degree (PhD) and two students (7.4%) were working towards a combined MD/PhD degree during the time of their fellowship. Some institutions and departments allow students enrolled in a doctoral degree program to simultaneously earn a master's degree. One Porter Fellow was enrolled in such a program during their fellowship year.

At the time of their exit surveys, 96.3% (N = 26) of Fellows had successfully passed their preliminary exams (sometimes referred to as qualifying exams), and almost one-quarter of the Porter Fellows had passed their thesis defense (29.6%; N=8).

CHART 4: Porter Fellow Degree Program



## FELLOW SECTION AFFILIATION

APS membership is organized into **12 disciplinary sections** that are smaller communities with a central research theme. APS members may select up to three sections closely aligned with their research areas to affiliate with. Sections provide opportunities for awards, networking and leadership positions, and drive the scientific content of the APS annual meeting.

The majority of our Porter Fellows between 2016 and 2020 conducted research in cell and molecular physiology (66.7%; N=18), almost one-third of the Fellows conducted endocrinology and metabolism research (29.6%; N=8) and 18.5% conduct either cardiovascular, gastrointestinal and liver, renal, or environmental and exercise physiology research (N=5). In the last five years, none of the Fellows' focus was on the central nervous system or teaching in physiology.

TABLE 1 2016-2020 Porter Fellow Section Affiliation

Section Affiliation	Percentage	Number (N) of Fellows
Cell and Molecular	66.7%	18
Endocrinology and Metabolism	29.6%	8
Cardiovascular	18.5%	5
Environmental and Exercise	18.5%	5
Gastrointestinal and Liver	18.5%	5
Renal Physiology	18.5%	5
Comparative and Evolutionary Physiology	11.1%	3
Water and Electrolyte Homeostasis	11.1%	3
Neural Control and Autonomic Regulation	7.4%	2
Respiration	7.4%	2
Teaching	0%	0
Central Nervous System	0%	0

## PORTER FELLOWSHIP ACTIVITIES

Porter Fellows participate in a career and professional development course during their fellowship year. APS aims to increase career and professional knowledge and skills, and has developed course activities to address the following topic areas:



### Networking:

Fellows to interact with each other, APS staff and members by connecting at the APS annual meeting. Fellows share their biographical sketches to get to know one another, their research areas and career aspirations.



### Research Design:

Fellows read research articles and discuss ways to successfully structure and design experiments.



### Ethics in Research and Publications:

Fellows learn about issues in research, including plagiarism and publishing, by reading published papers, watching informative videos and through discussion.



### Career Comparison:

Fellows share what attracted them to science, the type of careers they are considering and why, and what education/skills are needed for those careers.



### Individual Development Plan:

Porter Fellows focus on their short- and long-term career goals and what is needed to accomplish them.

## METHODS

To measure the effectiveness of fellowship activities, APS has developed entry and exit surveys that the Fellows take at prior to and at the conclusion of their fellowship year. For the purposes of this publication, the data includes five cohorts of Porter Fellows from 2016 to 2020, totaling 36 people. Three Fellows did not complete an entry or an exit survey, leaving us with data from 33 Porter Fellows. Of these, we had 27 unique Fellows (six of the fellowships were the same Fellows continuing for a second year of fellowship). Their pre- and post-fellowship responses were analyzed using SPSS Statistics, a statistical analysis software suite. The surveys ask questions about many aspects of the program to give APS formative data to help improve the fellowship, and allowed Fellows to self-assess their skills in six major areas, including:

- ✓ Research skills
- ✓ Data analysis and presentation skills
- ✓ Networking in general
- ✓ Networking at a scientific meeting
- ✓ Scientific ethics and responsible conduct of research
- ✓ Scientific career understanding and planning



## METHODS (CONTINUED)

These career-critical areas are the basis for the development of the program and measurable objectives were created for the coursework. The surveys use a seven-point scale, (7 was considered “expert” and 1 was defined as “novice”) to allow Fellows to gauge their skills in each of the six areas. We include a page that defines the extreme ends of the scale as listed below:



### EXPERT

Think of your principal investigator or advisor. An expert is an experienced researcher who can do work independently without help and has the knowledge to guide or teach these skills to others.



### NOVICE

Think of a “first-timer” in the lab. A novice has very limited lab experience, needs assistance or guidance in doing their work and does not yet have the knowledge to teach these skills to others.

To prevent any potential skewing of respondents’ answers, the survey instructions remind Fellows that there are no correct or incorrect answers and that their information is confidential. To ensure that Fellows have thoughtfully responded to all questions, there are also some “attention check” questions (e.g., please mark this question with a 2). If a Fellow incorrectly followed instructions on these questions or marked the same answer or the same pattern of answers for most questions, we asked the Fellow to review their responses. Fellows were allowed to make changes or keep their answers before they were included in the analysis. The subscales were analyzed for both reliability and validity. Reliability was established using Chronbach’s alpha test (range: 0.69 to 0.92), and reliability was established using confirmatory factor analysis (factor loadings from 0.51 to 0.96). Each matrix proved both reliable and valid for the constructs measured.

We calculated a score for each Fellow in each skill matrix of the entry and exit surveys by adding their response (from 1 to 7) for each question in the matrix and then totaling them. The scores from the entry surveys were then compared to the scores from the exit surveys using a paired samples t-test, with a significance set at  $p < 0.05$ . Reported means are an average of all Fellows’ scores for the matrix.

Due to the COVID-19 pandemic, we made some changes to the exit survey for the 2019–2020 cohort, as well as for the entry and exit surveys for the 2020–2021 cohort, to reflect the virtual format for the APS annual meeting at Experimental Biology (EB) in 2020 and 2021. The question “how effective networking can positively affect your career path” was revised to “how effective networking (in-person or virtual) can positively affect your career path.”

**We calculated a score for each Fellow in each skill matrix of the entry and exit surveys by adding their response (from 1 to 7) for each question in the matrix and then totaling them.**

## RESULTS

The summary of results is based on a five-year analysis of entry and exit surveys from 2016 to 2020 representing 33 fellowships, and 27 unique Fellows. APS continues to work towards creating a welcoming and inclusive space where Porter Fellows feel part of a supportive research community, particularly during our annual meeting. Based on our analysis, the APS Porter Development Fellowship provides Fellows with tools and skills to prepare them to be successful in their graduate programs and beyond.

Between 2017 and 2019, 19 Porter Fellows attended the APS annual meeting at EB. They had the opportunity to network with each other and interact with other APS members, invited guest speakers and with APS leadership and staff. Despite the many changes to interactive activities that became necessary due to the COVID-19 pandemic, APS has continued to offer community-building activities in a virtual setting. In 2020, two of the Porter Fellows attended the APS Live: EB Featured Topics event and three attended the virtual Institute on Teaching and Learning conference. Five Porter Fellows attended the 2021 virtual APS annual meeting at Experimental Biology.

The main objective of the professional development portion of the Porter Fellowship is for each Fellow to improve in the six major skill set areas (see above). This is achieved through participating in the online professional development course activities, fruitful discussions and networking at our annual meeting and virtually. We ask Fellows to self-report their skills with six matrix questions.

**APS continues to work towards creating a welcoming and inclusive space where Porter Fellows feel part of a supportive research community, particularly during our annual meeting.**

**Table 2: 2016-2020 Porter Fellow Increased Skills**

Scale		# of Items	Max Score	Alpha	Average	Standard deviation (sd)	T-test (t)	Significance probability (sig)	Degrees of freedom (df)
Research Skills Understanding	Entry	6	42	0.905	30.4	6.3	1.903	0.084	11
	Exit	6	42	0.825	33.6	3.3			
Data Analysis & Presentation Skills	Entry	11	77	0.898	50.6	9.2	5.430	<0.0001*	11
	Exit	11	77	0.850	60.0	5.4			
Networking	Entry	6	42	0.892	26.6	6.3	4.737	<0.0001*	32
	Exit	6	42	0.779	31.5	3.9			
Networking at a Scientific Meeting	Entry	9	63	0.926	26.5	10.9	4.107	0.005*	7
	Exit	9	63	0.690	44.4	4.2			
Scientific Ethics & Responsible Conduct of Research	Entry	6	42	0.851	26.2	6.4	5.810	<0.0001*	32
	Exit	6	42	0.849	32.7	4.9			
Scientific Career Understanding & Planning	Entry	9	63	0.911	41.1	9.0	5.910	<0.0001*	32
	Exit	9	63	0.883	48.5	6.8			

\* Indicates statistically significant result (p<0.05)

## RESULTS (CONTINUED)

The entry and exit survey analysis was completed for all matrices using each fellowship as a different entry point. Each second-year Fellow had a unique entry reflecting their updated entry skill levels. Therefore, the baseline N for this analysis is 33, representing the number of fellowships in the 5-year cohort and not the number of unique Fellows. There was a significant difference from their entry to exit surveys in data analysis and presentation skills, in networking (in general and in scientific meeting), scientific ethics and responsible conduct of research, and scientific career understanding and planning. This represents a self-reported gain in skills for six of the seven skills objectives of the Porter Fellowship as a result of their coursework, with scores that are statistically significant to a  $p < 0.05$  (and were all significant to a  $p < 0.005$  level as well). However, though the analysis shows significance, it is of course limited by the low number of Fellows during this 5-year timeframe.

Nevertheless, the trend remains positive for all matrices. Note that “Research Skills and Understanding and Data Analysis” and “Presentation Skills” were added to the 2019 survey, therefore,  $N=12$  for those matrices. The lower N may be why the “Research Skills Understanding” matrix failed to show significance, however we won’t know for certain until more time passes and we can increase our N. In addition, because of the COVID-19 pandemic, the “networking at a scientific meeting” question was updated to reflect the realities of our new virtual meeting environment. There wasn’t enough similarity in wording to past years to analyze the matrices together, therefore we could only analyze this skill matrix for the past year, leaving us with an N of 8. However, there was still a positive trend from entry to exit.

Fellows were also asked what their plans were for their professional training after they earn their doctoral degree. They rated several options on a seven-point scale, with 7 being “My top choice—I am committed to pursuing this” to 1 being “I am not at all interested in pursuing.” Overall, participants did not show significant changes in their career plans after their Porter Fellowships. This may be because career goals vary and are specific to each individual. Before and after the fellowship, the majority of Fellows plan to pursue postdoctoral work (average score before the fellowship: 5.2; after the fellowship: 5.3). For those that do not wish to pursue this path, participants show middling interest in a variety of full-time positions in academia and research (scores range between 3.3 and 4.6 before and after fellowship for all “full-time position” options). There is little interest in a dual degree, such as an MD/PhD (average score before the fellowship: 2.2; after the fellowship: 2.1). The Porter Fellowship exposes students to various science career paths and the opportunity to network with other scientific professionals outside their home institutions.

**There was a significant difference from their entry to exit surveys in data analysis and presentation skills, in networking (in general and in scientific meeting), scientific ethics and responsible conduct of research, and scientific career understanding and planning.**

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## TESTIMONIALS

Below are selected sentiments from Porter Fellows pertaining to the importance on how this fellowship has impacted their careers and why they are recommending it to other students:



The APS Porter Fellowship is a unique opportunity to develop and strengthen your scientific and professional skills. They will understand your background as a minority trainee and will help you step-by-step in your career to become a successful scientist.

- Mariano Colón-Caraballo, PhD Postdoctoral Researcher (supported by NIH-F32 grant) at University of Texas Southwestern Medical Center, (Porter Fellow 2012–2017, Ponce Health Sciences University)



The Porter Fellowship program provides a valuable network including faculty mentors, doctoral students, and administrators who will support and guide you to achieving your scientific career goals.

- Lindsey Stavola, PhD, Medical Student at Florida International University Herbert Wertheim College of Medicine (Porter Fellow 2015–2017, Yale University)



At the end of this fellowship, I am more confident to embark on my next position.

- Ijeoma Obi, PhD\*, ORISE Postdoctoral Research Fellow at United States Army Institute of Surgical Research (Porter Fellow 2015–2017, University of Alabama at Birmingham)



I have developed many skills that can be applied to any career and will help me to pursue all of my career goals. This program has enhanced my confidence in completing my PhD.

- Victoria Parker, PhD, Associate Manager at Research Program Management at Regeneron (Porter Fellow 2016–2018, University of Iowa)



I would not have a PhD without the Porter Fellowship!

- Olubusayo Awe, PhD, Senior Clinical Research Associate at Qiagen (Porter Fellow 2016–2018, Johns Hopkins School of Medicine)



The Porter Fellowship is an excellent professional development opportunity. In addition to conducting research throughout my term as a Porter Fellow, I prepared research presentations, completed a teaching skills training course, joined the steering committee for my APS section and mentored undergraduate students. These activities expanded my professional network, as I met and engaged with physiologists working in a variety of academic and industry settings, including many former Porter Fellows.

- Cesar Meza, PhD Candidate at Florida State University (Porter Fellow 2020–2021, Florida State University)

\*Deceased

## IMPORTANT TAKEAWAYS

During a 2019 evaluation of the Society offerings by our consultant, Impact Consulting, LLC, APS members were surveyed to provide feedback on the importance of and their satisfaction with current Society programming. Programs advancing diversity in the sciences such as the diversity travel awards and **Porter Fellowship ranked second-highest** for importance and satisfaction, and thus will continue to be a high priority. In 2020, the Society prioritized DEI as a goal-level item in the APS Strategic Plan. APS' long-term objective is to champion DEI within the APS member community and the discipline of physiology by creating an environment in which all individuals are encouraged to join, thrive and lead. The APS Porter Fellowship continues to provide new opportunities to doctoral students by preparing them to become the next generation of physiologists.

Feedback collected in the last five years has allowed APS to identify specific areas for program improvement to better serve our Fellows, particularly during the ongoing COVID-19 pandemic. Based on this data, in 2021, APS worked with members of the Diversity, Equity & Inclusion Committee to fully revamp the professional development course assignments. Newer, more relevant topics and “soft skills” will serve the Fellows well in their careers as we move away from discussion board conversations to live, virtual discussions.

### *The new professional topics include:*



identifying and cultivating relationships with advisors, mentors and sponsors



justice, equity, diversity and inclusion (JEDI) in academia



publishing your work



project management skills



interviewing skills



coaching

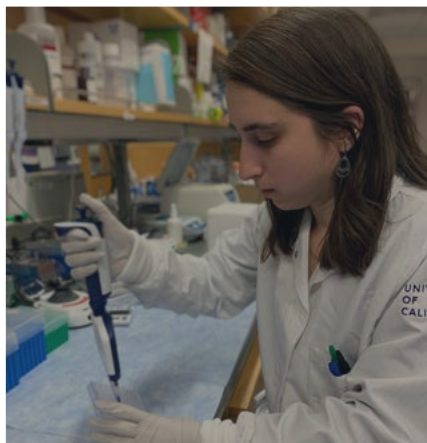
These changes were implemented for the 2021–2022 cohort and have been well-received. Furthermore, the new virtual discussions allow Fellows to interact more with each other, APS staff and invited guest speakers since we have not been able to see each other in person. APS is also piloting a coaching experience for the Fellows to develop confidence and effective communication skills for emerging leaders.

Next steps for the Porter Fellowship are to:

- ✓ Evaluate the survey responses for the new activities,
- ✓ Continue cultivating program alumni,
- ✓ Identify additional sponsorship opportunities to fund more Fellows each year, and
- ✓ Provide individualized and group coaching to help Fellows become more prepared for the next steps of their scientific careers.

APS will continue to promote and increase number of applicants from minority-serving institutions, including historically Black colleges and universities, tribal colleges and Hispanic-serving Institutions, to increase awareness and diversity among our Porter Fellows. The Porter Fellowship's importance is paramount.





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



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