

ARVO News

Fall 2015

2015
Champalimaud
Vision Award
announced
6

You've just
graduated
with a PhD.
Now what?
9

A look back
at ARVO
2015
28



Continuing Ebola work
Yeh, Shantha and Crozier
go back to Sierra Leone
14



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Cover photo: From left: Brent Hayek, MD;
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Ian Crozier, MD. Credit: Jessica Shantha.



- 3 President's message**
Research: A vision for hope
- 4 Leaders and volunteers**
ARVO's new trustees
Who's on the 2016 ballots
- 6 Around the globe**
2015 Champalimaud
Vision Award
ARVO-Asia 2017
- 8 Women in research**
Elizabeth Vargis, PhD
- 9 Spotlight on members**
You just graduated with a
PhD. Now what?
Advances in OCT products
Beckman-Argyros awardees
- 13 Trending topics**
Sex and gender in preclinical
research

- Ebola and the eye: Back to
Sierra Leone
Inflammatory eye diseases:
What next?
- 18 ARVO Foundation**
Message from the chair
New award to honor senior
glaucoma researcher
Unexpected outcomes
Knights Templar grantees
talk
- 24 NEI director's message**
Audacious Goals and PMI
- 26 Journals**
Transitions
A new era
- 28 Look back at ARVO 2015**
The meeting in photos

Research: A vision for hope

by John I. Clark, PhD, FARVO

While remarkable contributions to civilization have been made in the absence of sight, none have been made in the absence of vision. ARVO members exemplify this as we look into the future, seeking to define the fundamental principles of normal vision and to advocate for clinical advances that can improve the quality of life for all individuals with low vision or blindness.

One of the great advantages of eye research is the opportunity to directly image the structure of a functional retina in a patient. Optical coherence tomography (OCT) was a basic scientific advance in retinal imaging that revolutionized the clinical characterization of the healthy and diseased human retina to provide new knowledge of major diseases like AMD, glaucoma and diabetic retinopathy. ARVO members who are responsible for major developments in these areas have been recognized with significant awards from the Champalimaud Foundation in 2012 and more recently, the Arnold and Mabel Beckman Foundation, which awarded its 2015 Beckman-Argyros Award in Vision Research to David Williams, PhD, FARVO, for his pioneering work in adaptive optics.

Now ARVO is building on this recognition by showcasing the development and potential of OCT in a unique outreach project ("Telling the complete story of OCT") that aims to engage the public and help policymakers and others understand the return on investment in research in vision and ophthalmology.

The project is being guided by an international Advisory Panel of researchers who played critical roles in developing the technology. It includes a series of short videos aimed at a variety of lay audiences (released starting this winter), a special issue of *IOVS* in late spring 2016 (see *IOVS* Call for Papers: Special Issue on OCT, page 26), advocacy events on Capitol Hill (June 2016), stories in the general science press and other components. The aim is to put ARVO members' sight-saving research on the map and ideally to increase funding levels as a result.

Meanwhile, for the third time, in 2016 we will organize a session just prior to the Annual Meeting on vision and traumatic brain injury (TBI). Like previous TBI sessions, this one will be free and open to the public. Our Saturday session in Denver received valuable news coverage, helping

us take another step toward the goal of raising the profile of eye and vision research among external audiences, in particular to educate the public about a serious medical problem that has the potential to be solved through basic and clinical research in vision and visual pathways.

Please take a few minutes to think about the innovative technologies that are providing new knowledge of biological complexity and advances that are outpacing our capacity to analyze and understand the numerous intersecting pathways in vision. Genetics, metabolism, protein chemistry, imaging, patterning, systems biology, big data, microarrays, proteomic, development, epidemiology and many more experimental approaches are represented in ARVO Scientific Sections. We need to take advantage of our combined experimental findings to evaluate and integrate the knowledge of vision in addressing biomedical challenges that include diabetes, cancer and the general loss of function during aging.

Can vision be the link between human biology and behavior that supports scientific creativity and a strong public commitment to prevention of low vision and blindness? Vision loss is one of the most dreaded conditions in humanity and one that has great social and economic impacts on society. Can ARVO find an educational approach to unify our society toward the goal of health and vision for all, not only in the scientific community, but the general community where we live, raise our families and strive to advance our civilization? I believe this is our time, if we can make this happen.



John I. Clark, PhD, FARVO

ARVO/Alcon Keynote Lecture

Allan Jones, PhD

CEO, Allen Institute for Brain Science
Sunday, May 1, Seattle, Wash.

ARVO
2016

RESEARCH: A VISION FOR HOPE
MAY 1 - 5 | SEATTLE, WASH.

Conversations with the new ARVO Trustees

Jennifer J. Kang-Mieler, PhD – Retina Section

*Associate Professor of Biomedical Engineering
Department of Biomedical Engineering
Pritzker Institute of Biomedical Science and
Engineering
Illinois Institute of Technology*



Jennifer J. Kang-Mieler, PhD

What do you look forward to about being on the Board of Trustees?

Kang-Mieler: I am excited to represent the Retina Scientific Section and work closely with other Scientific Sections to promote and advance ARVO and its mission.

I would like to work toward establishing a stronger global presence of ARVO. Applying my background as a biomedical engineer, I would also like to promote and integrate new technologies and ideas to vision science to further our knowledge of ocular disease mechanisms and promote translational research.

Tell us about your research?

Kang-Mieler: My research is focused on retinal vascular diseases such as AMD and diabetic retinopathy. I am interested in both the basic mechanisms of disease process as well as translational aspects of disease treatment. My laboratory focuses on the changes of retinal blood flow and retinal cellular function due to alterations in nitric oxide and VEGF in AMD and diabetic retinopathy animal models. We are also developing non-invasive imaging-based biomarkers of diabetic retinopathy. We have been working on a sustained ocular drug delivery, specifically delivery of anti-VEGF agents. We have established a platform that can release bioactive anti-VEGF agents for over six months' release.

How have you been involved with ARVO since joining?

Kang-Mieler: I have been attending the ARVO Annual Meeting since

joining as a graduate student. I only missed one meeting due to the birth of my daughter! I enjoy our Annual Meeting, as it is a special time to meet old and new friends and colleagues. Over the years, I have participated as a presenter, moderator and program organizer. I've served on the Annual Meeting Program Committee (AMPC) for the Retina Section for three years. I also participated in the Semantic Tagging Working Group to explore and test semantic tagging for the AMPC. Currently, I serve as a member of the Global Pillar Steering



W. Daniel Stamer, PhD

Who's on the 2016 ballot? Trustee candidates for the 2016 elections



CO Section

Stephen C. Pflugfelder, MD
Baylor College of Medicine
Waco, Texas



Penny Asbell, MD, FACS, MBA
Icahn School of Medicine at Mount
Sinai in New York and Mount Sinai
Health System
New York, N.Y.



EY Section

Irene Gottlob, MD
University of Leicester and University
of Leicester Ulverscroft Eye Unit
Leicester, U.K.



LE Section

Allen Taylor, PhD
USDA Human Nutrition Research
Center at Tufts University in Boston
Boston, Mass.



Melinda Duncan, PhD
University of Delaware
Newark, Del.

For more information on the candidates, visit arvo.org/elections.

Committee, whose primary goal is to promote the global presence of ARVO.

The committee established two working groups: Mentorship Working Group (MWG) and External Collaboration Working Group (ECWG). I am the current chair of the ECWG and a member of MWG.

W. Daniel “Dan” Stamer, PhD, FARVO – Physiology/Pharmacology Section

*Joseph A. C. Wadsworth Professor of Ophthalmology
Professor of Biomedical Engineering
Duke University*

What do you look forward to about being on the Board of Trustees?

Stamer: Over the years, I have been involved in helping run other, smaller societies, and now I look forward to participating in the operations and future direction of ARVO, a much larger organization. It is truly a privilege to give back and serve the ARVO membership.

Tell us about your background?

Stamer: I was born and raised in California, and was educated and spent the first 20 years

of my career in Arizona. I moved to North Carolina four years ago, where currently I serve as the Joseph A.C. Wadsworth Professor of Ophthalmology at Duke University. For glaucoma researchers like me, Duke is an amazing place to work. In the eye center, we have 12 fellowship- trained glaucoma specialists (most of whom are clinician-scientists) and five basic scientists with glaucoma laboratories all working together to better understand and develop therapeutics for this blinding disease.

How have you been involved with ARVO since joining?

Stamer: I have been attending and presenting at ARVO’s Annual Meeting for 26 years. I served as a member of the Annual Meeting Program Committee (Physiology/Pharmacology Section) and as a co-organizer for an ARVO/Pfizer Ophthalmics Research Institute pre-meeting. I am presently an editorial board member for ARVO’s journal *Investigative Ophthalmology & Visual Science*. I consider it an honor to be elected as Trustee and serve ARVO at the highest level.

ARVO is listening.*

Help guide the future of ARVO by taking a quick member survey.

The results of this survey will be used to figure out what’s working and what’s not, and to make improvements to the ARVO member experience. Your opinion is important!

Check your email for your invitation to participate. Your prompt and honest responses are appreciated.

*But you have to speak up to be heard.

first-class
SPEAKERS
first-rate
SCIENCE

BIG DATA, HANDS-ON WORKSHOPS

- Image Analysis in Quantitative Microscopy
- Computational Methods for RNA Sequencing Analysis
- Quantitative Analysis and Visualization of Signaling Networks

2015 cell biology
ascb annual meeting
san diego, california - december 12-16

ascb.org/2015meeting

f /ascbiology t @ascbiology #ascb15 in ascb

Kilimanjaro Project to receive 2015 António Champalimaud Vision Award

The 2015 António Champalimaud Vision Award was given to three institutions that have developed a unique collaborative project to achieve the common goal of fighting blindness and poverty in Africa. The Kilimanjaro Project brought together the Kilimanjaro Centre for Community Ophthalmology, the Seva Foundation and Seva Canada.

These three institutions are active in an unusual combination of areas to fight poverty, fight blindness and create economic sustainability through microcredit and microfinance solutions. By combining their resources and know-how they have been able to make a significant impact on the ground. With a focus on equality, the project makes use of clinical, scientific, social and microcredit tools to support sustainable health and finance solutions led by African teams. These microcredit programs open new perspectives and give new meaning to traditional activities such as crafts, putting the outcome of these activities at the service of the people and offering these forgotten communities a new way of life and sustainable development.

The Kilimanjaro Project operates in one of Africa's most dramatic settings, in an area ravaged by extreme poverty, natural disasters, disease and blindness, affecting unimaginable numbers of people.

Award recipients from these institutions will discuss their ground-breaking collaboration at the ARVO/Champalimaud Award Lecture on Tuesday, May 3 at ARVO 2016 in Seattle, Wash. See am.arvo.org for more details.

Champalimaud Vision Award recipients from the Kilimanjaro Centre for Community Ophthalmology (KCCO), the Seva Foundation (SF) and Seva Canada (SC). From left: Penny Lyons (SC), Susan Lewallen (KCCO), Jack Blanks (SF), Ken Bassett (SC), John Minde (KCCO), Paul Courtright (KCCO), Edson Eliah (KCCO), Suzanne Gilbert (SF).



International Chapter Affiliate news



ARVO representatives at the Chinese Congress of Research in Vision and Ophthalmology (CCRVO), an ARVO chapter affiliate, at its 2015 meeting in Shenyang. From left: Justine Smith, MD, PhD, FRANZCO, FARVO, Craig Crosson, MD, PhD, FARVO; Xinyuan Zhang, MD, PhD, and Shikun He, PhD, FAAO.



ARVO and ARVO International Chapter Affiliate members meet at the Pan-American Association of Ophthalmology meeting in Bogota, Colombia. From left: Juan Gallo, MD, PhD; Carlos Medina, MD; Valeria Canto Soler, PhD; Valeria Sanchez Huerta, MD; Guillermo DeWit, MD; and Nicolas Bazan, MD, PhD.

ARVO-Asia 2017: Seeking to broaden reach by “co-locating” meetings



Mark Radford, MD, PhD
CEO, Queensland Eye
Institute

Selecting dates for the next ARVO-Asia meeting, which will take place in 2017 in Brisbane, Australia, proved to be unexpectedly challenging.

Every proposed set of dates seemed to conflict with other key regional and international meetings in ophthalmology or research.

So before settling on Feb. 5 – 8, 2017, organizing chair Mark Radford, MD, PhD (Queensland Eye Institute), and co-chairs Justine Smith, MD, PhD, FRANZCO, FARVO (Flinders University), and Peter McClusky, MD, FRANZCO (Save Sight Institute), reached out to several other regional organizations.

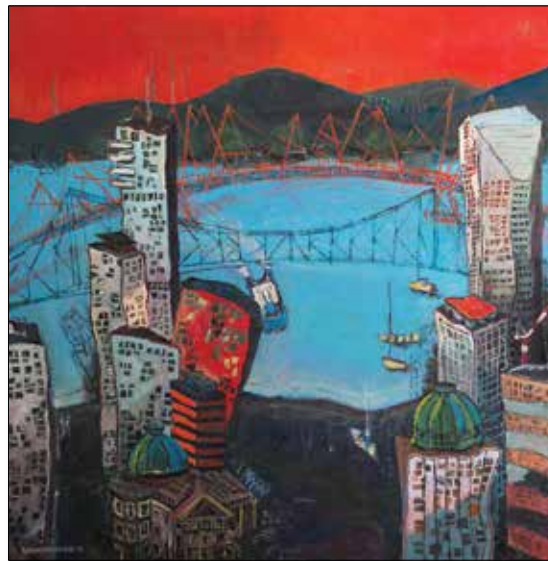
Their aim was to attempt to get buy-in on the timing and avoid conflicts, but also to entice other organizations to co-locate their meetings in Brisbane, either just before or after ARVO-Asia.

“For clinicians and researchers — and those who fill both roles — the proliferation of meetings means people have to choose,” says Radford. “But we saw an opportunity to build synergy and possibly audiences for both smaller organizations and ARVO-Asia attendees.”

ARVO-Asia organizers are in discussion with four - five clinical groups, including those focused on uveitis and inflammatory disease, glaucoma and cornea. “ARVO can provide a broader forum and a different kind of exposure for their attendees,” explains Radford, “as well as the potential to strengthen research and clinical collaboration. Co-locating with ARVO-Asia helps avoid duplication of content in meeting content across different meetings.”

One group that has confirmed co-locating with ARVO-Asia 2017 is the Australia Uveitis Special Interest Group of the Royal Australia New Zealand College of Ophthalmology (RANZCO AUSIG). Says Chair Lyndell Lim, MBBS, FRANZCO (Royal Victorian Eye and Ear Hospital, Melbourne): “The group is comprised of ophthalmologists subspecializing or having an interest in the management of ocular inflammatory diseases.

“As a group, the RANZCO AUSIG holds a business meeting at the RANZCO Annual Congress, but also endeavors to meet yearly to discuss issues and new treatments in the management of patients



Meeting organizing chair Mark Radford procured this Brisbane cityscape from local artist John Garnsworthy to use as the motif for ARVO-Asia 2017.

with ocular inflammatory diseases. The RANZCO AUSIG is therefore delighted to have its annual clinical meeting as part of ARVO-Asia, and welcomes all delegates who may be interested in attending.”

Tim Sullivan, MBBS, FRANZCO (Royal Brisbane and Women’s Hospital and Royal Children’s Hospital), on behalf of the Orbital Society says this group is also exploring co-locating a meeting in Brisbane in early February 2017. “The Orbital Society is a small group of key

opinion leaders in orbital disease and pathology who hold yearly meetings — but every few years we hold a larger open meeting for all interested parties.

“This meeting is seen as a highlight of the oculoplastic/orbital calendar,” says Sullivan. “Both common and rare conditions are discussed, offering an opportunity for a comprehensive update in the field, as well as a look to the future in terms of active and planned research.

“The opportunity to co-locate with ARVO-Asia would allow significant cross-fertilization of ideas at a basic science and clinical research level. Many of the key players in the Orbital Society have roles in the Asia-Pacific Association of Ophthalmology and ARVO-Asia. For these reasons, both our meetings have the potential to be enhanced by co-location.”

Meanwhile, Andrew Apel, MBBS, FRANZCO (Eye Health Centre, Brisbane) explains that the Australia and New Zealand Cornea Society is planning its 34th meeting in 2017. “Traditionally, the meeting has been for ophthalmologists, scientists and optometrists in Australia and New Zealand,” he says, describing the meeting as “a free exchange of ideas with open, frank discussion of surgical technique scientific research, clinical observation, ethics and developments in eye banking.”

“In the past, overseas visitors were quite surprised at the collegial and family-like atmosphere of the society. So the organizers feel [co-locating] will be a great opportunity to change the format to tag onto the beginning of ARVO-Asia 2017 in Brisbane. We’re hoping to attract overseas delegates to take advantage of two meetings at same time.”

Radford adds, “I’m encouraged and excited by the interest these groups have shown, and we’re looking forward to building closer ties between these organizations.”

“Speak up, ask questions,” Vargis advises young scientists

Elizabeth Vargis, PhD, is assistant professor of biological engineering and an affiliate faculty member of the Synthetic Biomufacturing Institute at Utah State University. Vargis, who completed her PhD in biomedical engineering in 2012, was recently awarded the Career Starter Grant from the Knights Templar Eye Foundation. The grant will further her research in retinopathy of prematurity.



Elizabeth Vargis, PhD

ARVONews: What was your inspiration for becoming a researcher in the field of ophthalmology?

Vargis: At my postdoctoral appointment at the Oak Ridge National Lab, I was interested in developing methods to understand normal and disease processes using nanoscale methods like micropatterning and microfluidics. There, I worked with my advisors (Dr. C. Patrick Collier and Dr. Scott Retterer) and our collaborator Edward Chaum, MD, PhD, the ophthalmology researcher and clinician at the University of Tennessee Health Science Center to come up with ways of using *in vitro* models to ultimately research ocular diseases. I spent a lot of time learning about the eye, and I became fascinated with the complexity of such a small organ! When one part does not function properly, the whole organ and our ability to see can be thrown off. I want to figure out why that happens. As an engineer, I approach ophthalmology research unconventionally. I am excited to continue researching retinal diseases at Utah State University.

ARVONews: What have been some of the highlights of your work?

Vargis: My goal is to develop *in vitro* models that realistically depict the retina. We build these models using retinal cell lines and nanoscale methods to direct the growth of cells and structures. We have controlled the growth of retinal pigment epithelial cells to make patterns that mimic varying levels of atrophy. One outcome of

this work has been to understand how atrophy affects vascular endothelial cell growth factor (VEGF) expression. Our results showed that cells that are surrounded by higher levels of atrophy express more VEGF per cell. Since VEGF is one of the major pharmaceutical targets in ocular disease, we demonstrated another important way that VEGF overexpression causes and promotes retinal dysfunction and disease.

ARVONews: What can you tell us about the research project you are working on now?

Vargis: I have received funding from the Knights Templar Eye Foundation and the Oak Ridge Associated Universities' Ralph E. Powe Junior Faculty Enhancement Awards program to develop models of stages of retinal disease. This includes retinal atrophy that occurs in age-related macular degeneration and vascular degeneration that occurs in retinopathy of prematurity. My research group designs patterned surfaces to control retinal and vascular cell growth based on *in vivo* data and discovers small changes that happen, which lead to and heighten these diseases. We are able to control such growth by developing patterns on silicon wafers and using polymer surface chemistry to determine how the cells will grow. We've started by working on creating new, quick and consistent ways of creating these patterns.

ARVONews: Based on your years of professional experience, would you please share your best advice for other young women scientists about moving ahead in the field?

Vargis: Two things have really helped as I've navigated throughout research and my academic position. First, I have a diverse support system, made up of colleagues, friends, family, supervisors, choir members, book club buddies, younger/older, male/female, etc. I have gone to different people for advice, fun, help and activities that put my research and job in perspective. Second, I have been working on speaking up more. As an introvert, I had to start by forcing myself to ask questions at any seminar or discussion I attended in graduate school. Now, speaking up has become second nature.

“As an engineer, I approach ophthalmology research unconventionally.”

Five members in five minutes

You've just graduated with a PhD ... Now what? Members share their best advice

Sarah Xin Zhang, MD

Associate Professor
School of Medicine and Biomedical
Sciences, SUNY University at Buffalo



“My advice is to find the area that you are most interested in, set a broader goal and start to act now.

My interest in ophthalmology originated in my medical school years, and it was further developed and refined by my post-graduate training.

“I have also benefited significantly from attending various professional conferences and serving on scientific committees. To this end, ARVO is a rich and valuable resource that provides tons of opportunities for new PhDs and young scientists to explore different areas of vision research. It also has the largest network of vision researchers where you can find your future mentors and collaborators. So follow your dream, take action and enjoy the journey.”

Tracy Nguyen, OD, PhD

Assistant Clinical Professor
College of Optometry, State University of
New York



“I would strongly advise you to have a clear research path for the near-future before taking up a faculty position

because the tenure-promotion clock starts ticking from day one. If you need more time, then do a post-doctoral fellowship that will allow you to gain more skills and expertise and, at the same time, give you

time to chart out your research goals. Keep publishing, collaborate and get involved in professional activities by serving on committees that focus on areas you are passionate about. By serving on the ARVO Diversity Initiatives Committee, I have met some amazing people and have learned a lot about the organization.”

Daniel Rathbun, PhD

Bernstein Post-Doctoral Fellow, Centre for Integrative Neuroscience
Institute for Ophthalmic Research, University of Tübingen



“Ensure that you will have the funding, equipment and especially expertise and mentorship that you need to ‘hit the

ground running’ in your postdoc research. Beyond that, it’s important to figure out your risk tolerance level: if low, perhaps a steady, well-paying industry job is the right direction; if high, you should be able to survive the ups and downs of academia or a start-up company. If you are relatively unfettered, it’s worth considering a postdoc abroad; the postdoc market isn’t as saturated in Europe as the U.S. And establishing yourself in the E.U. research scene expands your funding opportunities.”

For those who wish to become a clinician scientist...

Randy Kardon, MD, PhD, FARVO

Pomerantz Family Chair in Ophthalmology
University of Iowa Carver College of Medicine

“My advice is that it’s very, very important in the beginning to make sure that you choose a clinical area that you really like so that your daily experience is going to be



fulfilling, and you can’t wait to get to work every day.

“Time is precious to all of us, every day, and it’s very important

to choose research topics that you want to work on and that are going to have an impact and be important to other people. You don’t want to spend your time on a lot of little projects that may not really have much significance. You want to pick topics that will enlighten a new understanding of an area, have applications that will positively impact clinical practice and that will help you get funded — because funding agencies are out to solve problems nowadays.”

Henry Kaplan, MD, FARVO

Director, Kentucky Lions Eye Center
Department of Ophthalmology and Visual
Sciences, University of Louisville



“The first key to success is to obtain the training and education to be successful as a scientist or as a clinical researcher. As

an ophthalmologist, you wouldn’t think of providing eye care without going through rigorous training. And the same sort of education is required if you’re going to be successful as a scientist or a clinician.

“Persistence is necessary. You have to be prepared for disappointments and frustrations, but the rewards can be very great — and certainly intellectually stimulating. My advice is don’t give up and pursue your dream.”

Advances in intraoperative OCT products SBIR grant recipients share their story of success



Joe Izatt, PhD



Eric Buckland, PhD

Joe Izatt, PhD, professor of biomedical imaging at Duke University felt the entrepreneurial itch in 2004. At the same time, Eric Buckland, PhD, was looking to apply his 20 years of experience in the optical communications industry to an optics startup company developing products for the life sciences. Together, they founded Biop-tigen, which specializes in developing optical coherence tomography (OCT) systems for use in the lab and clinic. Izatt and Buckland, chief science advisor and CEO, respectively, of Biop-tigen took a moment to share with *ARVONews* how their company grew from a National Eye Institute (NEI) Small Business Innovation Research (SBIR)-funded startup to recently being acquired by Leica Microsystems.

ARVONews: Joe, you've been involved with OCT since the early 90s. What led you to create an OCT startup in 2004?

Izatt: My first interest has always been to be a faculty member, although I have held an interest in entrepreneurship. In 2003, my group and two others published papers showing that spectral domain (SD)-OCT was a better technology than the existing time domain (TD)-OCT, which was patented by Carl Zeiss Meditec. With those publications and earlier work, sud-

denly there was an opportunity to enter the market. Eric approached me shortly thereafter, and that's how we got started.

ARVONews: Eric, what attracted you to Joe's work?

Buckland: I had spent 20 years in the optical communications industry and decided it was time to do something new. My goals were to do business in North Carolina and in optics involved in the life sciences. I was also interested in being involved in a university spinoff company. Joe's work at Duke with OCT fit perfectly.

ARVONews: What products does Biop-tigen have on the market?

Buckland: We have the lead system for pre-clinical research on living animals, such as mice and zebrafish. In doing optics for small eyes, Cynthia Toth [co-founder and director of grading for OCT at the Duke Reading Center] asked if we could develop the technology to image other small things, like children. So, we developed a handheld probe for pediatric imaging, which is the only FDA-cleared handheld ophthalmic OCT system and the only handheld system anywhere in the world today. Many children are imaged under anesthesia in the operating room, which brought us into surgical space. We've been developing intraoperative OCT systems, which we'll be offering for pre-clinical, surgical methods development and stem cell research involving animal models later this year. I can tell you that every one of those projects was funded at least in part by SBIRs.

ARVONews: What role have SBIR grants played in supporting Biop-tigen?

Buckland: SBIR grants preceded my involvement with Joe by a few months. He filed for three simultaneous SBIR grants and got all three; it was our initial seed funding. Of those three, one has been abandoned, but the other two have been a thread in Biop-tigen for 10 years. While a lot of companies avoid the SBIR process because it can be slow, when used correctly it is incredibly valuable, and it certainly has been to Biop-tigen.

ARVONews: Do you have any advice for aspiring SBIR grantees?

SBIR/SBTR funding opportunities

In addition to NIH, a number of other U.S. government agencies offer SBIR or Small Business Technology Transfer (SBTT) grants, including:

Department of Defense

sbir.gov/agencies/department-of-defense

Department of Health and Human Services

sbir.gov/agencies/department-of-health-and-human-services

National Science Foundation

sbir.gov/agencies/national-science-foundation

Visit www.sbir.gov for more information.

Buckland: The criteria for success in an SBIR boils down to two aspects: do you have an idea that has a demonstrable clinical impact? And is there a real plausible path to commercialization? Those should be the cornerstone of a business in the life sciences anyway. Our program manager at NEI is Jerome Wujak, and his team is very interested in helping companies succeed.

ARVONews: A common stumbling block faced by academic researchers trying to transition to the business world is the change in priorities and skill sets necessary to be successful in the new environment. With your complimentary skill sets, were you able to avoid that?

Buckland: That is the reason why we had success. I think Joe respected my business skills and focus; he wasn't interested in running the business, but interested in participating and working with the business. There wasn't any confusion of roles between us. Also, because I am an optics person, I don't think we had any real miscommunications — in the first two to three years where we were doing the tech transfer, it worked very efficiently. We

were able to build the first prototypes in Bioptigen labs rather quickly.

Izatt: My advice to my colleagues is that there are a lot of valuable things an academic can bring to a business, including original ideas and experience writing grant proposals. But another key component to success is management — finding management that knows what they're doing and staying out of their way.

ARVONews: Having been just acquired by Leica Microsystems, what's next for Bioptigen?

Buckland: Bioptigen is a wholly owned subsidiary of Leica Microsystems, a leader in microscopes for the life sciences and medical surgical applications. They definitely saw a fit for Bioptigen in their portfolio, and it seems like intraoperative OCT will play a large role in the future of ophthalmology surgery. We will continue our operations in North Carolina, and we are integrating rapidly with our Leica team. We will move forward with a host of products over the next few years, which will include the current Bioptigen portfolio, as well as new things coming out with Leica.

“There are a lot of valuable things an academic can bring to a business, including original ideas and experience writing grant proposals. But another key component to success is management.”



EUROPEAN ASSOCIATION FOR VISION AND EYE RESEARCH

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20/09/2015

New award accelerates systems pharmacology research

Over the last year, Krzysztof Palczewski, PhD, has been able to rapidly advance his award-winning work in systems pharmacology — a result of receiving the inaugural \$500,000 Beckman-Argyros Award in Vision Research. Established by the Arnold and Mabel Beckman Foundation, the Beckman-Argyros Award was created in 2013 to recognize a researcher who has made transformative breakthroughs in vision science and to support further research with the half-a-million dollar prize.



Beckman-Argyros award recipient Krzysztof Palczewski, PhD, of Case Western Reserve University, Cleveland, Ohio.

“The Beckman-Argyros Award came at a perfect time to allow us to initiate a new program in systems pharmacology,” says Palczewski, chair of the Department of Pharmacology at Case Western Reserve University, School of

Medicine. “Systems pharmacology is an effort to bring homeostasis to tissues or cells that are under either environmental or genetic distress. We can do that through a combination of genetics and established pharmacology with multiple drugs. It allows us to take a complex approach to complex diseases.”

But the complexity of this type of research requires significant resources, which the Beckman-Argyros Award was able to provide.

His lab utilized the award in three main ways. “First, we were able to recruit back someone who was very well trained in my lab, but had gone back to China for a faculty position. Secondly, we were able to produce a large number of genetically modified mice. The last big expense was the cost of the drugs we need to use in our experiments.”

Palczewski believes the new award can play an important role when it comes to funding science research. “The Beckman-Argyros Award is like a highly advanced pilot grant. It allows you to pursue a direction in which you may not have enough preliminary data to be competitive at NIH or other grant institutions.”

In the end, Palczewski is grateful for the opportunity the 2014 Beckman-Argyros Award has provided and humbled by the recognition of his peers. “There are so many wonderful and extremely capable scientists in vision research. The field is blossoming ... I look forward to seeing many more researchers recognized for their contributions.”

For information on the annual award, visit beckman-foundation.org/beckman-argyros.

 **ARVO** | IMAGING IN THE EYE CONFERENCE

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Beckman-Argyros session

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Congratulations to 2015 award recipient **David Williams, PhD, FARVO**. Attend the Beckman-Argyros session to hear his presentation.

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RESEARCH: A VISION FOR HOPE
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Changing the way scientists think about gender

New policy mandates balance of the sexes in NIH research



Janine Austin Clayton, MD

Two decades after the National Institutes of Health (NIH) created the Office of Research on Women's Health, the issue of sex and gender in preclinical studies

has come to the forefront. New policies will now require NIH-funded researchers to include female animals and cells in preclinical research. The sex as a biological variable initiative is being spearheaded by Janine Austin Clayton, MD, NIH associate director for research on women's health and director for the Office of Research on Women's Health. Clayton shared with ARVO the reason for the new requirements, how they will be implemented and its impact on eye and vision scientists.

A blind spot in biomedical research

NIH is committed to funding the best quality science with taxpayer money. Every research dollar counts. The first thing I'll say is that we have a responsibility to be sure that NIH-funded research is relevant. Half the population is female, and we know that male and female biology can be very different. Although women now make up roughly half of the participants in NIH-funded clinical trials, the same is not true for preclinical research done in model systems such as animals. That's important, because these model studies are done with an expectation that the ideas will be tested later toward developing treatments for people: for women and men, and for girls and boys.

For the most part, looking for differences between males and females has been a blind spot in biomedical research, leaving gaps in our knowledge. We want to fill those gaps.

A central consideration, not an after-thought

Sex is a biological variable that must be considered from head to toe, and in

research spanning everything from cells to populations. We want to better understand female and male biology so we can work on targeted prevention and individualized therapeutics that are sex/gender-appropriate. This is precision medicine in action!

The new NIH policy shift, which will take effect beginning January 2016, intends to provoke meaningful change in the way scientists think. We want to be sure that considering sex as a biological variable is a central consideration, not an afterthought or a box to check. It is part of a larger NIH-led effort to ensure rigor and transparency in biomedical research, and we are working hard across NIH and with all our stakeholders to derive sensible policy that achieves our goals.



Vision disorders disproportionately affect women

On a global scale, two-thirds of those who are visually impaired or blind worldwide are women. These effects are influenced by both sex (biological effects) and gender (sociocultural effects). Beyond disease burden, though, considering sex as a biological variable is a scientific issue that is important for every field. Vision is one of many areas that will benefit from a more balanced research approach.

Think more deliberately about the role of sex in biology

Beginning in January 2016, NIH-funded

applicants will need to consider the role of sex as a biological variable in the Research Strategy portion of their grant applications, and study sections will be reviewing this information. I want to point out that we are not asking people to "start over" in their research. Here are just a couple of ways scientists can get started in thinking more deliberately about the role of sex in biology:

- Consider what is known in your area of interest — do a literature search using the terms "sex" and "gender." As you conduct your research, report the sexes of animals and collect/analyze sex-based data, even if your study is not powered to detect male-female differences.
- Communicate your findings disaggregated by sex so others may benefit from your investigations — or, at the very least, know what has been done.
- Form new hypotheses that consider the possible role of sex in physiological or pathological processes.
- Understand the limited applicability and relevance of single sex studies and do not automatically extrapolate findings from one sex to another. An evidence-based/data-driven approach calls for studying both sexes and reporting results by sex to rigorously build our knowledge base.

Vision researchers stand to gain

As I mentioned, we are aiming to change the way scientists think. That does not happen overnight. But we are confident that once scientists consider sex as a biological variable on a routine basis when they design their experiments, we will all learn so much more. I expect many surprising new discoveries just waiting to happen. Sex is a basic variable that should be considered in all types of biomedical investigations from the very start. Vision researchers stand to gain a lot from looking deeper — the sky is the limit!



How do you follow that up?

The closing keynote address at the ARVO 2015 Annual Meeting in Denver was one of the most talked-about sessions of the meeting — and not just by the 1,000 or so attendees who were there. Ebola survivor Ian Crozier, MD, and the team of ophthalmologists who worked to save his sight after complications set in, received plenty of international media attention as well.

The back story

In August 2014, as Ebola spread through West Africa, Crozier, an infectious disease specialist, flew to Kenema, Sierra Leone to help fight against the outbreak. Within weeks, he contracted the disease and was evacuated to Emory Univer-



Partners mobile eye clinic team in Tonkolili, Sierra Leone

sity Hospital in critical condition. After a month of life-saving care provided by the Center for Disease Control (CDC) and Emory, Crozier became “the sickest Ebola survivor, ever.”

Yet weeks after his blood tests for Ebola came back negative, Crozier developed a severe case of uveitis in his left eye. Testing of the aqueous humor discovered live virus, the first time Ebola had been detected in the eye.

The team in charge of treating the infection and inflammation included ARVO members Steven Yeh, MD, and Jessica Shantha, MD, a professor and senior ophthalmology resident, respectively, in the Department of Ophthalmology at Emory Eye Center. They quickly consulted with ARVO past president and uveitis expert Justine Smith, MD, PhD, FRANZCO, FARVO, professor of Eye & Vision Health at Flinders University, South Australia. Together, they developed a treatment plan to combat the dangerous swings in intraocular pressure and restore near 20/20 sight to Crozier’s left eye.

Having successfully navigated uncharted medical territory, the team proceeded to publish their account in *The New England Journal of Medicine*. The paper’s release was timed with the ARVO closing keynote address, and was picked up widely by news outlets around the world.

A few months after ARVO 2015 — and after the media frenzy had somewhat abated — *ARVONews* caught up with Yeh, Shantha and Smith and learned that all three are still involved with Ebola work.

Yeh and Shantha: The journey continues

For Yeh and Shantha, Crozier’s case was just the beginning of their work related to eye care for Ebola survivors. Along with Crozier and Brent Hayek, MD, assistant professor of ophthalmology at Emory, they traveled back to Sierra Leone in July; Yeh returned again in early August to discuss eye findings in Ebola survivors at a meeting in Freetown organized by the World Health Organization (WHO).

Throughout the first half of the year, explained Yeh, the Emory group had been communicating with several health organizations that cared for Ebola virus disease (EVD) survivors in West Africa. “During this time, we had been talking with ophthalmologists from Sierra Leone about treatment protocols and uveitis as an emerging issue,” he explains. “So by the time we did our symposium at the ARVO meeting, we had set our sights on visiting Sierra Leone to work with local healthcare providers and other organizations leading the efforts on the ground.”

Major supporters of their efforts included the WHO, Ministry of Health and Sanitation in Sierra Leone, Partners in Health, Medecins Sans Frontieres (MSF; aka Doctors Without Borders) and Helen Keller International. Industry partners included Alcon and Santen.

“Our role there was mainly technical guidance,” says Shantha. “We organized a half-day educational symposium in Freetown with lectures and case presentations on Ebola virus-associated eye disease.”

A major part of the trip was the opportunity to work with local clinicians to help develop and set up a mobile eye clinic to screen EVD survivors in rural settings. According to Yeh, MSF was caring for a cohort of EVD survivors that required screening for uveitis. “Partners in Health is doing much of the implementation,” he says. “They will use the mobile eye clinic for patients out of reach of the eyecare facilities in major city centers.”

Yeh and Crozier returned to Sierra Leone in early August for a “Clinical Care in Ebola Survivors” symposium — a gathering of healthcare workers who are involved in survivor care from the three highest transmission countries — Sierra Leone, Liberia and Guinea — that experienced the epidemic. Eye disease was one of the key issues amongst numerous EVD survivor issues, which also included stigma, fatigue, nutrition and psychosocial stressors.

Meanwhile, Shantha has relocated while she completes a Medical Retina clinical and research fellowship with the Retina Consultants of Hawaii. She plans to stay active in the group’s ongoing efforts given her interest in international work in resource-limited settings. “It’s been such a great learning experience — it’s hard to walk away from. But time will tell what role I can play.

“There are so many research questions!” she says. “What’s behind the persistence of the virus in ocular fluid? The phenotypes are still being defined; that in itself is an important clinical and research question.”

Yeh muses on broader topics as well. “This is a region where we see a lot of uveitis in non-EVD patients. Ophthalmic care providers in Sierra Leone have mentioned that the two most common eye conditions were uveitis and glaucoma. My sense is that the incidence of uveitis may be higher than in other areas of the world, but we don’t really know for certain. The last study looking at this topic in

West Africa was published 20 years ago, and it found a relatively high incidence of toxoplasmosis. Is there something about the environment, genetic susceptibility or infectious disease that confers a higher likelihood of developing inflammatory disease in these areas? These questions remain unanswered.”

A key goal of the group is to work with Sierra Leone clinicians to build capacity on the ground and strengthen treatment algorithms for non-EVD patients as well.

Yeh explains that the Emory team has had a great opportunity to build relationships and to work with NGOs involved in the region in acute Ebola care, and now in EVD survivor care. “Being involved in the care of these patients is an incredible opportunity. I see it as a long-term engagement. EVD-associated eye disease, like other types of

inflammation, is a chronic disease, and requires treatment of not just the inflammation but also the complications. Beyond that is the issue of disparities in health care as related to our field of ophthalmology. Entire fields of subspecialty care are missing from these countries.

“The enthusiasm and high level of engagement from local healthcare providers in West Africa is clear, but partners and support for medical

“There are so many research questions! What’s behind the persistence of the virus in ocular fluid? The phenotypes are still being defined; that in itself is an important clinical and research question.”

Did you miss the Ebola and the eye session at ARVO 2015?

Crozier’s keynote lecture is available at <http://arvoconnect.arvo.org/arvoeducation>

See [Sierra Leone](#), continued on page 16

At ARVO 2016: A symposium

Hide and Seek: Is the eye an ideal hiding spot for pathogens or is the immune system just poor at surveillance?

Last year’s successful closing keynote featuring Ebola survivor Ian Crozier, MD, alerted the world that the eye is a potential site for harboring infective organisms and cause diseases like uveitis. Despite the economic consequences of some of these diseases on developing countries in particular, there is less known of their pathobiology than is ideal. This symposia will provide both an opportunity to learn of the huge breadth of organisms from viruses, to bacteria, protozoa and parasitic worms that can invade the eye of humans and other animals. It will also provide an update on recent advances in understanding immune mechanisms that do not always completely serve to protect the eye.

Sierra Leone, continued from page 15

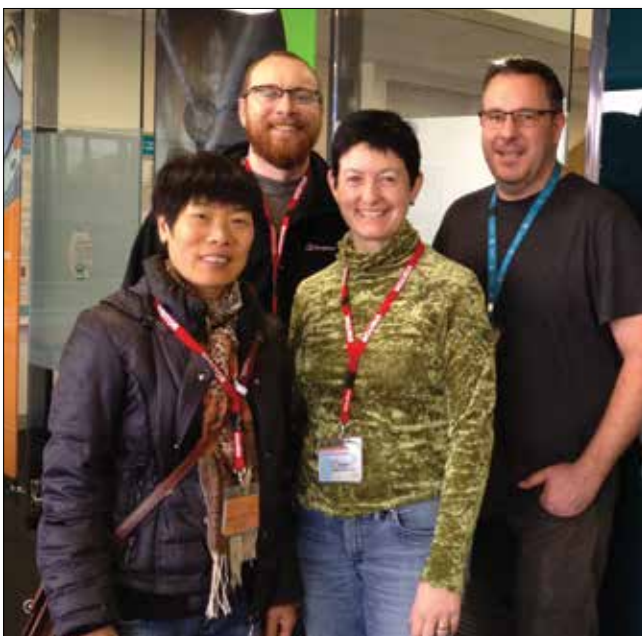
education are needed to strengthen their ophthalmic care systems long-term.

“Before Ian, we didn’t have a clear understanding about the natural progression of post-EVD uveitis,” says Yeh. “We are continuing to work with local eyecare providers to refine treatment protocols, which have had encouraging results thus far although we have a lot of work to do. The WHO, Partners in Health and other groups are working together to provide guidance for this region, and we will all be assessing the impact of these algorithms moving forward for EVD survivor care. We’re excited about the potential for future collaboration.”

Justine Smith: Road trip with an unusual purpose

Smith’s involvement in Crozier’s case sparked her interest, and she too has continued working on Ebola virus disease, although in a very different direction.

Smith’s research has long focused on toxoplasmosis, and she is fascinated by the little-known pathways by which the parasite, *Toxoplasma*, causes human eye infection. “Much of the work is about the parasite,” she explains. “Few groups focus on the eye and on human systems, and in the same way, no one knows how Ebola gets into and persists inside the eye. So I was really intrigued by this.



The Flinders team, from left: Yuefang Ma, PhD; Liam Ashander; Justine Smith, MD, PhD, FRANZCO, FARVO; and Glenn Marsh, PhD.

“But the only way I could continue to work in this area was if I found a research virologist who worked with Ebola virus.”

Enter Glenn Marsh, PhD, senior research scientist and leader of the Dangerous Pathogens Team at the Commonwealth Scientific and Industrial Research Organization (CSIRO) in Geelong, Victoria.

“It was quite fortuitous for us to identify Glenn,” she says. “What was the chance of finding someone who had the expertise and the interest in working with us? What was the chance that we were going to find a virologist who worked with Ebola virus and was set up to do experiments that focused on mechanisms of human infection? Most virologists in Glenn’s area work on bugs that harm livestock and domestic animals. On top of that, CSIRO is close to Adelaide.

“Glenn and his team was the group I was looking for; it was just the perfect fit.”

By “close,” Smith means an eight-hour drive, which is indeed close by Australian standards. The high-level containment facility where Marsh is based is the only one of its kind in Australia. He was eager to work on the project, and the two groups quickly found space in their schedules for an August visit. The Flinders team, which included Liam Ashander, BS, and Yuefang Ma, PhD, prepared and packed a van with “heaps of cells” and drove to Geelong.

The Flinders team did not work directly with Ebola virus. “Glenn’s team was an integral part of the work,” says Smith. “They infected our cells with the virus, and they watched the infection progress. They extracted RNA from the infected cells so the materials they gave us were no longer infectious.” Smith and her colleagues then made the return trip to Adelaide.

“We want to identify the molecules the cells are making during infection,” explains Smith. “This includes deep sequencing, which is the latest in molecular technology, to get a profile of the cells and see how the cells respond to infection. Analysis of the data is complicated and will take some time; fortunately we have an expert biostatistician who will be working with us to do the analysis, and then once we have some clues from the deep sequencing, we’ll need to do some confirmatory studies.”

Smith anticipates the initial work will take six months. She hopes it will help us understand how Ebola virus persists in the eyes of Ebola virus disease survivors, and perhaps also how other bugs come to cause disease inside the eye of EVD survivors.

Treating inflammatory eye diseases

What are the next steps?

In March, a one-day Endpoints Workshop sponsored by the National Institutes of Health (NIH) and the U.S. Food and Drug Administration (FDA) focused on developing better methods to assess new therapies for uveitis. Representatives from NEI and FDA sat down with researchers, clinicians and industry to discuss a path forward. Gary N. Holland, MD, director of the Ocular Inflammatory Disease Center at the UCLA Stein Eye Institute, led the workshop and discussed some of its conclusions with *ARVONews*.

ARVONews: What are the big challenges in developing new treatments for uveitis?

Holland: There are at least two big challenges right now. First, we lack objective markers for monitoring progression of inflammation and its response to treatment, which makes it difficult to determine whether a new drug is effective. Second, the number of patients available for clinical trials is relatively small compared to other diseases, and this patient cohort is not uniform in terms of diagnoses or inflammatory signs. Uveitis is not a single disease, but a category, which complicates design of clinical trials even further.

ARVONews: What techniques is the community developing to quantify inflammation objectively?

Holland: There is substantial interest in the use of optical coherence Tomography (OCT) to count inflammatory cells in the anterior chamber and to quantify inflammatory reactions in the vitreous humor. Another option is laser flare photometry, which quantifies protein levels in the aqueous humor. An important next step is to standardize and validate the results of these techniques.

ARVONews: When it comes to treatment, what's the next step in developing better targeted therapies?

Holland: There is a need to identify biomarkers that can both serve as predictors of disease outcome and inform us about disease mechanisms. A better understanding of the immune processes and genetic basis behind these diseases will be important in helping us

sort patients into an appropriate clinical trial for a potential targeted drug.

We also need a more standardized approach to the evaluation of new anti-inflammatory drugs. Use of standardized study variables and outcome measures, even with variations in clinical trial designs, may allow more rapid approval of study proposals and as importantly, will allow cross-study comparisons. Another goal is to utilize multiple outcome measures within a single trial, assigning a specific measure to each study participant based on the unique features of his or her own disease. This will allow study of heterogeneous populations (all of whom have intraocular inflammation), thereby speeding recruitment and completion of studies and likely providing more clinically meaningful study results.





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Message from the chair

The ARVO Foundation for Eye Research — Working to make a difference for trainees



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J. Mark Petrash, PhD, FARVO

When I think back on events in my training that had the most lasting impact, I realize it was my early exposure to the “big world” of science that really opened my eyes. Being able to observe the thought leaders of the time present their newest ideas and results at an international meeting was both educational and inspirational. It demonstrated to me that the culture of science and medicine was at its best when people openly shared their ideas and data. How can we provide this experience to the next

generation of trainees who are eager to learn and develop as vision scientists?

The ARVO Foundation is opening the door to this opportunity for many of our members. Last year, 119 young scientists were able to attend the Annual Meeting on grants supported by the ARVO Foundation. Attendance at the ARVO Annual Meeting enables young scientists to “live and learn” eye research and to make valuable connections with other trainees and researchers. Generous donors and organizations contributed \$130,000 to make this possible. Almost half, 59 recipients, were funded through a first-time gift from the Knights Templar Eye Foundation — one of the biggest donors to the program in 2015. This was also the first year the ARVO Foundation solicited support from academic institutions for its Developing Country Eye Researcher Travel Fellowships, by having their contributions matched by the Foundation.

Individual contributors often play a big part in supporting the ARVO Foundation and its programs. Last year, the Foundation received a gift from Judge Kevin Holbrook of Kentucky as a way of demonstrating his appreciation for the care he has received from his personal ophthalmologist, Steve Charles, MD, a member of the ARVO Foundation Board of Governors. As shared by Judge Holbrook, “I wanted to give to an organization that has undoubtedly benefitted me through research.” In making this gift, Judge Holbrook has shown how an individual can “pay it forward” by helping the Foundation fulfill its mission of supporting and encouraging the best and brightest in the next generation of vision scientists and eyecare providers.

The ARVO Foundation also administers memorial travel grants created to honor individuals whose work has contributed to the fields of ophthalmology and visual sciences. To be selected to receive a memorial travel grant is a rare honor that provides a young scientist with a lasting connection to the ARVO family.

By sharing in the education and training of the next generation of scientists, ARVO members have the opportunity to contribute to the community of scholars who will be tomorrow’s leaders. Perhaps one of them will make the discovery that preserves your vision. Like Judge Holbrook, some of us may have a reason to be thankful for the skills and talents of a scientist or visioncare professional who received their early inspiration by attending an ARVO Annual Meeting.

David Epstein: Ensuring the science lives on

Longtime ARVO member and former President David L. Epstein, MD, FARVO, of Duke University School of Medicine passed away in 2014 — but his scientific and professional legacy are living on, thanks to the generosity of his family.

Led by Epstein's wife Susan, the family worked with the ARVO Foundation to establish the Dr. David L. Epstein Award. The new award — a \$100,000 prize — will be presented annually to a senior-level glaucoma researcher at the ARVO Annual Meeting. The first award will be given at ARVO 2016 in Seattle, Wash.

“David always valued the ARVO Annual Meeting for the intensity of the exchanges; he and his colleagues talked science all day, every day,” says Susan Epstein. “He always returned inspired and full of new ideas for his work. So we knew this ARVO award was what he would want.

“We hope the award will help David's colleagues make advances in glaucoma research that could one day contribute to effective treatments.”

According to Joel Schuman, MD, FARVO, of the University of Pittsburgh School of Medicine, and many other researchers, Epstein's own scientific contributions were significant. “Dave Epstein was one of the first people to suggest that trabecular meshwork impairment could be related to oxidative stress. He carried out multiple studies on this topic, investigating the effects of an oxidative environment on the trabecular meshwork. He was also among the initial researchers to describe the relevance of the cytoskeleton in TM function and outflow facility.

“Dave was fascinated by pigment dispersion and evaluated the role of perfused pigment on aqueous outflow,” continues Schuman. “He also described the effects of low and high molecular weight proteins on outflow facility, explaining phacolytic glaucoma in the process. Dave explained the effects of abnormal materials on the TM function with carefully designed, well

executed experiments.”

Epstein made his mark outside the lab as well, explains Schuman. “Among the most important aspects of Dave Epstein's research was his focus on translation of discoveries and ideas to actual patient care. He founded Aerie Pharmaceuticals on this principle. His discoveries have led to a novel glaucoma therapeutic drug in phase 3 clinical studies.”

Prior to his passing in March 2014, Dr. Epstein was the Joseph A.C. Wadsworth Clinical Professor of Ophthalmology. He was chairman of the Department of Ophthalmology at Duke University School of Medicine

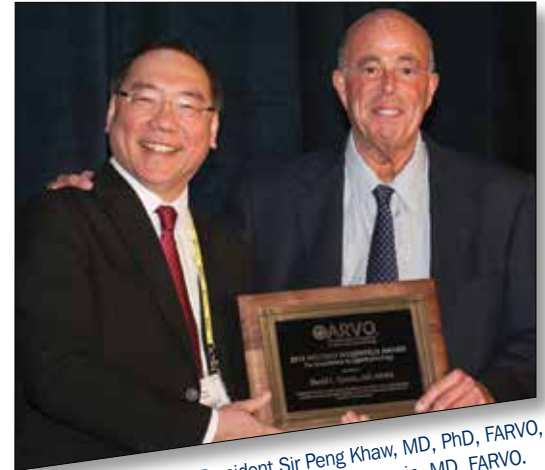
for 22 years.

During his long career, Dr. Epstein was an active member of ARVO, where he served on the ARVO Board of Trustees and as president (1992 – 1993). In 2013, he received the association's Mildred Weisenfeld Award for Excellence in Ophthalmology for his distinguished scholarly

contributions to the clinical practice of ophthalmology.

“David Epstein was a giant in the field of glaucoma research, as well as being an inspiring mentor to young researchers and a valuable leader within ARVO,” says Mark Petrash, PhD, FARVO, and chair of the ARVO Foundation. “The ARVO Foundation is grateful to the Epstein family for allowing us to help carry on his legacy through this award. It demonstrates how enduring a leader's influence can be.”

Applications for the Epstein Award will be accepted through Oct. 30. For more information, visit arvofoundation.org/Epstein.



From left: 2013 ARVO President Sir Peng Khaw, MD, PhD, FARVO, presents the Weisenfeld Award to David L. Epstein, MD, FARVO.

“We hope the award will help David's colleagues make advances in glaucoma research that could one day contribute to effective treatments.”

Unexpected outcomes

Jelena Potic, MD, describes the ARVO Annual Meeting as the biggest and most important conference to attend if you are a vision researcher. “But I always



Potic introducing herself to the Developing Country Eye Researcher Travel Fellowship recipients at ARVO 2014 meeting in Orlando, Fla.

thought it was an unattainable goal,” she says. “I thought it was not for me, that I was too young — and nobody from Serbia was going.”

It didn't take long for Potic to discover she was wrong. In 2014, she was awarded a Developing Country Eye Researcher Travel Fellowship by the ARVO Foundation for Eye Research to attend her first Annual Meeting.

Potic's journey to ARVO 2014 in Orlando, Florida, began a year earlier when she had the opportunity to temporarily leave her ophthalmology residency at the University Eye Clinic, Clinical Center of Serbia for a one-month observership at the University of Lausanne, Jules-Gonin Eye Hospital in Switzerland. During the month-long program she was mentored by Francis Munier, MD, PhD, head of the Pediatric Ocular Oncology Unit. At his urging, Potic submitted an abstract, and months later, she received an email informing her that it had been accepted for a poster presentation.

“I didn't expect it,” she says. “But the problem was that I did not have the finances. It is very expensive to go to the U.S. I was even thinking about not going and asking Professor Munier to present.”

Even more surprising than having her abstract accepted, was learning that she would be able to attend — thanks to the travel fellowship. “It was really something very prestigious. I was shocked.”

As a recipient of the Developing Country Eye Researcher Travel Fellowship, Potic was matched with two mentors to assist her during and after the ARVO Annual Meeting: Haiyan Gong, MD, PhD, of the

Boston University School of Medicine and Poonam Mudgil, PhD, of the University of Western Sydney.

“I had the best mentors,” she says of Gong and Mudgil. “They were with me all the time and gave me lots of good advice about how to organize my agenda and which sessions to attend.”

But it was the instruction on the importance of introducing herself and making contact with different attendees that led to one of her most unexpected outcomes — a collaborative project with Yvan Arsenijevic, PhD, of the University of Lausanne.

“I was shy, and I didn't feel comfortable introducing myself because the science was at a much higher level than in my country, even though the knowledge obtained at the hospital in my country was good, and I was able to follow clinics.” But after listening to a presentation that Arsenijevic gave on his retinal degeneration research, Potic took her mentors' advice and later approached him. “I let Professor Arsenijevic know I was interested in returning to Switzerland and asked about the possibility of collaborating with him.

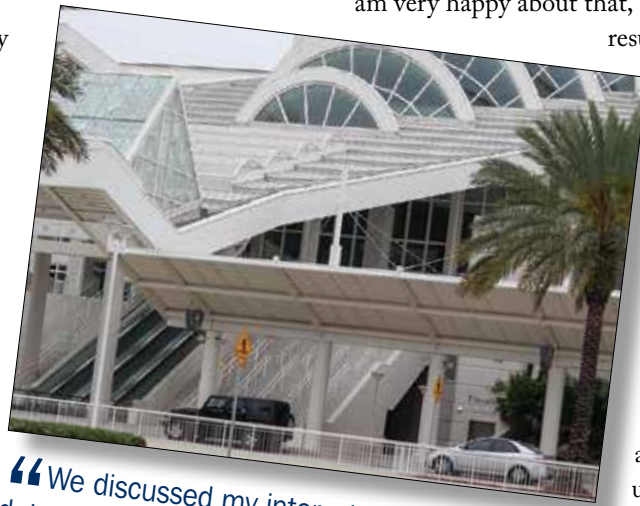
“We discussed my interest — retinal detachment — and we decided on a project while having coffee on the stairs of the Orange County Conference Center. I was impressed!” she says. “Everyone was so open and ready to talk about projects and make collaborations.”

Potic was thrilled when Arsenijevic told her she could start that September. But again, she was uncertain about how she would obtain the funding in order to travel abroad to collaborate on the project. Fortunately, she received a one-year Swiss Government Excellence Scholarship to do projects under the mentorship of three well-known professors in Switzerland: Arsenijevic, Thomas Wolfensberger, PhD, and Munier. As a result, Potic successfully submitted and presented her second abstract, Management of retinal detachment after first-line intra-arterial chemotherapy for advanced retinoblastoma, at an ARVO 2015 paper session.

To her delight, she also was invited to the Developing Country Eye Researcher Travel Fellowship breakfast during the 2015 Annual Meeting, where she shared her story of success during the introductions. What followed was another surprising discovery.

“I was talking about my current position in Switzerland where I'm working on my PhD, and I was explaining the clinical part of the project. I was talking about my research with my mentor Professor Wolfensberger and my mentor in Serbia, Professor Stefanovic. That's when Professor Jeffrey Boatright heard me, and after the breakfast he came over to me and asked, ‘what exactly is your project about?’”

Jeffrey Boatright, MD, PhD, FARVO, of Emory University, who serves on the ARVO Foundation Board of Governors, quickly realized that he and Potic are working on the same project. “My PhD thesis is about retinal detachment. But it is a very complex approach. It has three parts — basic science, clinical and epidemiology,” explains Potic. “One part of the project is analysis of ocular fluids, and that part is led by the director of the Jules-Gonin Eye hospital, Professor Francine Behar-Cohen and Professor Wolfsensberger, head of the surgical retina unit. Professor Behar-Cohen is collaborating on the same subject with Professor Boatright. So we are all connected.”



“We discussed my interest — retinal detachment — and we decided on a project while having coffee on the stairs of the Orange County Conference Center.”

Potic’s one-year appointment was to end in September 2015, but she was invited to stay longer. “I am very happy about that, and I’m hoping to have new results so we can actually have something interesting to submit for ARVO 2016.”

The young resident from Serbia who didn’t believe seasoned researchers would be interested in talking to her encourages other young scientists from developing countries to apply for the travel fellowship. “The program is really amazing. It helps you to understand how to get the best from the ARVO Annual Meeting and to bring science back to your own country. And most of all, don’t be shy. The people at ARVO are open to discussions.”

And who would know that better than Potic?

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I was a Knights Templar Eye Foundation Travel Grantee

Five awardees describe how the funding made a difference in their career

Fifty-nine vision scientists traveled to the ARVO 2015 Annual Meeting in Denver thanks to a first-time grant to the ARVO Foundation from the Knights Templar Eye Foundation, Inc. (KTEF). The grant helped ARVO and ARVO Foundation increase the travel grant program by nearly 25%, for a combined total of nearly 300 grants this year.

According to KTEF Vice President Duane L. Vaught, part of the vision for the grant was to encourage and expedite successful careers advancing the cause of vision. This includes careers like that of Sean Silverman, who began his search for a postdoctoral position this year.

“The opportunity to meet in a relaxed setting to discuss research and career goals with several well-established investigators over the course of a week was possible for me because of ARVO,” he says. “Of course, this is on top of the overwhelming amount of the exciting scientific discoveries being presented.”

The grant helped Silverman attend his third consecutive Annual Meeting, but it also pro-

vided an opportunity to help further the career of another young scientist.

“In the current economic environment, grant funding has become seemingly more competitive than ever. And while my mentor would love to take all of his graduate students to ARVO, we have to be fiscally conscious to maintain productivity in the lab as well,” explains Silverman. “Receiving this travel grant not only alleviated some of that strain, but also ensured that at least one other of my junior lab mates would be able to attend and understand the ARVO experience.”

Second-time attendee and grant recipient Christopher Wanderling appreciated the opportunity to network with and learn from colleagues through presentations that transformed into discussions and collaborations.

“This is an invaluable opportunity to rub shoulders with some of the most influential experts in ophthalmology, especially as a medical student,” says Wanderling. “Not many students in my position have this opportunity, and I am grateful to have experienced this.”



ARVO 2016 Knights Templar Eye Foundation Travel Grant recipients at the student social in Denver, Colo.

His time at ARVO 2015 has given him motivation to continue pursuing research. Like Wanderling, grantee Nicole Khezri also found the experience to be an inspiring glimpse into the future.

“Attending the conference was a great opportunity to envision how I could use my medical degree to contribute to the field of research and help my future patients,” she says. “My favorite part of ARVO was meeting scientists and physicians from different parts of the world who are making scientific breakthroughs that will improve the lives of patients. It was a very humbling experience.”

Receiving the Knights Templar travel grant made it financially possible for Khezri to attend the Annual Meeting for the first time. The connections she made in Denver help to augment the research she did with Robert Ritch, MD, FARVO, and Sung Chul Park, MD, during the summer between her first and second year of medical school at University of Buffalo. “It was amazing to work for two individuals who I greatly admire and who have revolutionized the glaucoma field.”

Another first-time attendee, Rachayata Dharmat, took the insightful comments and suggestions she received during her oral presentation and applied them to her research.

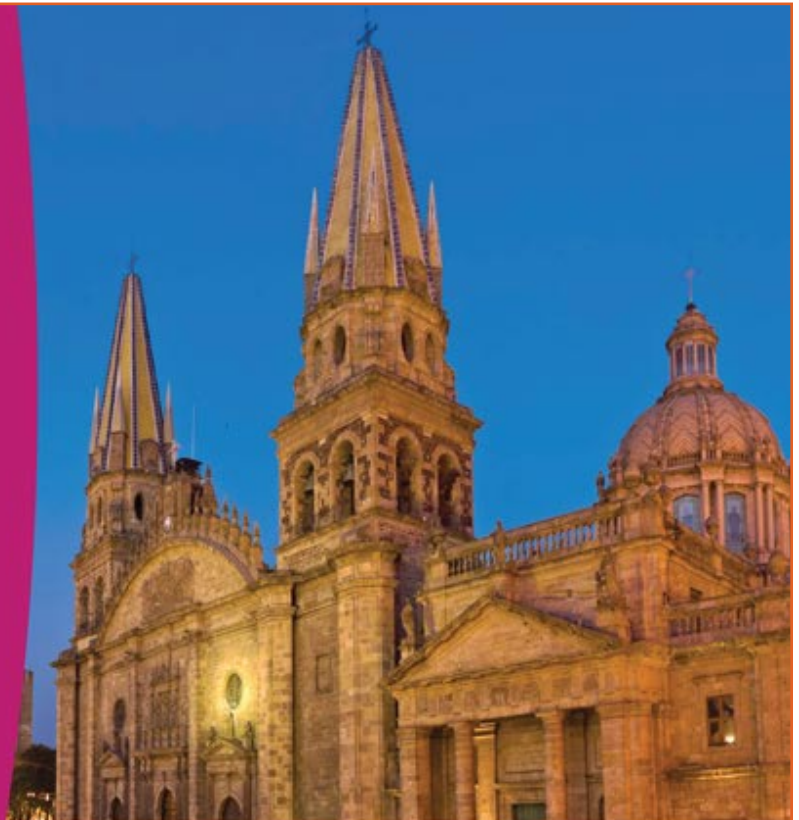
“These suggestions gave me alternative perspective to my research, which is very difficult to obtain in focused group,” says Dharmat. “As my interest in eye research continues to grow as a scientist in training, attendance at this year’s ARVO meeting provided me with vast insight into the field and future directions of vision research. The feedback I obtained from the experts in the field has been very helpful for my current research.”

Like many ARVO attendees, grant recipient Matilda Chan, MD, PhD, established new collaborations and embraced the opportunity to learn from scientists from all over the world. “I enjoy hearing the talks, browsing the posters and learning what is new both inside and outside of my field. But what I enjoy most about ARVO meetings is meeting new colleagues and catching up with old friends.”

Chan also shared how she was able to present results from her research studies and discuss the research with others. She stressed how none of this would have been possible without the travel grant sponsorship. Dharmat emphatically agrees: “I’m grateful to the Knights Templar foundation for their willingness to give young scientists an opportunity to attend such an amazing conference.”

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Moving forward: Audacious Goals and PMI



Paul A. Sieving, MD, PhD, FARVO
Director, National Eye Institute,
National Institutes of Health

This is an exciting time at the National Eye Institute (NEI). We continue the energetic movement forward with the Audacious Goals Initiative, and we are committed to playing a significant role in the recently launched U.S. Precision Medicine Initiative. Please read on for important details.

NEI Audacious Goals Initiative (AGI)

The NEI AGI continues to gain momentum. It began with an open prize competition for the best ideas in vision research, and coalesced into a single goal: to regenerate neurons and their connections in the eye and visual system. With further input from the National Advisory Eye Council (NAEC) and the research community, we are focusing our efforts on regeneration of photoreceptors and retinal ganglion cells. Success would mean new therapies for common, debilitating eye diseases such as age-related macular degeneration (AMD) and glaucoma. Advances in the NEI AGI will serve as a model for neuro-regeneration in the central nervous system.

Over the long term, success in the NEI AGI will require determining the best sources for cell replacement/repair, understanding how new axons navigate and connect to their targets, and identifying patient populations most likely to benefit from regenerative therapies. We also need to know more about the development of the visual system and the plasticity of the adult visual system in humans and preclinical animal models.

In May 2015, we began supporting five research groups to develop state-of-the-art technologies for non-invasive imaging of the retina and optic nerve in vivo. These tools will give us more precise, real-time outcome measures for testing new therapies. They will allow us to see not only structural changes, but functional changes — in circuit connectivity, metabolism and cellular activity — in the retina and optic nerve. Four of the five projects will advance to human testing in five years.

The research teams developing these approaches are based at the University of California, Berkeley; the University of Rochester Center for Visual Science in New York; Case Western Reserve University in Cleveland;

Washington University, St. Louis; and Medical College of Wisconsin in Milwaukee. An external scientific oversight committee has been established to facilitate collaboration and check that milestones are achieved. The committee and the five research groups assembled for the first time at NIH in late June, and the excitement and spirit of collaboration were palpable.

We are holding a series of workshops and symposia to brainstorm ideas for new funding opportunities. The first of these workshops focused on optic nerve regeneration and was held during the 2014 Society for Neuroscience (SfN) meeting in Washington, D.C. Co-chairs Jeffrey Goldberg (University of California San Diego) and William Guido (University of Louisville) led the group in discussion and authorship of a white paper, available at https://nei.nih.gov/audacious/optic_nerve.

Our second NEI AGI workshop, held during the May 2015 ARVO Annual Meeting in Denver, focused on developing strategies to achieve regeneration and rewiring of photoreceptors. The co-chairs, Rachel Wong (University of Washington) and David Gamm (University of Wisconsin-Madison), are writing a white paper to guide future NEI AGI efforts in this area.

NEI has prepared a funding opportunity announcement based on these workshops, and we expect to release it around the time that this *ARVONews* issue is published.

Our next NEI AGI event will be an open symposium on Friday, Oct. 16 in Chicago, immediately preceding the 2015 SfN meeting. This official SfN satellite event will focus on “Reconnecting Neurons in the Visual System,” and will be chaired by Michael Crair (Yale) and Carol Mason (Columbia). For details, please see https://nei.nih.gov/audacious/neurons_visual_system

On a final note, I hope you've had a chance to view our animated video that explains the visual system and the NEI AGI for a general audience (at <https://nei.nih.gov/audacious/>). I encourage you to share it widely. You may find it useful for engaging students who are new to vision science, and for discussing the NEI AGI with experts from other disciplines including chemistry, physics and engineering. Multidisciplinary collaboration will be vital to our success.

U.S. Precision Medicine Initiative (PMI)

The concept of precision medicine is not new. If you wear eyeglasses, which date back to at least the 13th century, then you are wearing precision medicine. What makes precision medicine exciting in the 21st century is that we can now apply it on a molecular scale. We are moving beyond treatment based on the unique shape and size of your eyes (and the cornea and lens within) toward treatment based on your unique genetic makeup and life history.

This new era of precision medicine owes much to the NIH-funded Human Genome Project. With the complete human genome sequence in hand, we are steadily uncovering a vast number of individual genetic variations that contribute to complex, multi-genetic human diseases and conditions. We also have a growing toolbox for precision medicine. Whole-genome sequencing cost about \$22 million 10 years ago, but costs less than \$5,000 today and can be performed in an increasing number of settings. We are also seeing greater use of mobile health technology and electronic health records. This is creating more opportunities for people to engage in their own healthcare and in health research, and more capability for clinicians and researchers to analyze and share health data.

The PMI will leverage these advances to bring targeted therapies to a broad range of conditions and diseases. In its initial stage, anticipated to launch this fall, it will include two components: The PMI for Oncology and a National Research Cohort.

The PMI for Oncology will expand our ability to prevent and treat cancer with molecular therapies. We have identified the abnormal genes — and the resulting abnormal proteins — that drive some cancers, and we are able to target them with custom-designed drugs. However, radiation and chemotherapy are still the mainstay of treatment for the majority of cancers, and even targeted drugs can fail when the cancer becomes resistant.

The National Research Cohort would be a pool of more than one million research volunteers. These people would be able to take a more proactive role in research, with more choices about which studies to join, and when. They would also be able to share an array of health-related information, including genomic data, lifestyle and behavioral data, and biological samples, all linked securely and privately to their electronic health records.

What role will NEI and the vision research community play in the PMI? We are well positioned to contribute to the future of gene-based and other targeted therapies. We know the gene mutations that

cause hundreds of rare eye diseases. Those discoveries have helped move us to the forefront of gene therapy. Seven years after gene therapy was found to restore vision among several young people with Leber congenital amaurosis, it is still considered one of the few successes in the gene therapy field.

We are also steadily unraveling the genetic basis of complex eye diseases. A good example is AMD, for which dozens of risk genes have been identified and characterized so far. As it did for oncology, this genetic information is likely to help us identify unique disease pathways and subtypes, and ultimately to develop targeted drug therapies for AMD. Meanwhile, private and government-funded groups have made remarkable progress toward stem cell therapies for AMD. NEI researchers are working toward a trial of autologous cell therapy using induced pluripotent stem cells (iPS) derived from patients' own skin cells.

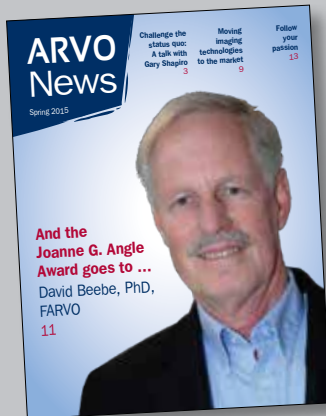
As the PMI and NEI AGI move forward, we welcome your input on where they should lead. To receive updates about the PMI, you can register at <http://nih.gov/precisionmedicine/>. You can check for updates to the NEI AGI at nei.nih.gov/audacious/, or email us at neiagif@mail.nih.gov with your comments and ideas.

A reminder about NIH policy on grant submissions

NIH has changed its policy on grant resubmissions and we are seeing a predictable impact on success rates. Recall that investigators are allowed to submit only one resubmission (A1) to an original grant application (A0). That has not changed. But in April 2014, NIH eliminated a rule requiring that all applications subsequent to the A1 had to be substantially different in content and scope. That means that the research aims proposed in an A1 may be presented again as a new A0 submission (<http://go.usa.gov/tXJ5>).

As one might expect, this policy has led to an increase in new applications and a corresponding decrease in success rates (funded applications/reviewed applications). From fiscal year 2014 to FY 2015, the number of research project grant (RPG) applications to NEI increased by 19%. We project that at the end of FY 2015, the success rate for RPGs will be 20%, compared to 27% for FY 2014. Please be assured that there haven't been major changes in NIH spending on grants or grant review criteria or procedures to account for this drop in success rates. The number of grant awards made by NIH continues to remain relatively stable from year to year, but more applications are going unfunded because more are being submitted.

Transitions



David C. Beebe, PhD, FARVO, who began his term as *IOVS* editor-in-chief in 2013, passed away in March from complications associated with amyotrophic lateral sclerosis (ALS). Six weeks later, his wife, Betsy Beebe, accepted the 2015 Joanne G. Angle Award on his behalf at the ARVO Annual Meeting. Dr. Beebe, who was named the Angle award recipient prior to his passing for his 20-plus years of outstanding service to ARVO, was featured in the *ARVO News* spring 2015 issue.

Betsy Beebe conveys her appreciation to the ARVO community:

I would like to express my deepest gratitude to the ARVO members who sent cards, flowers and personal notes after my husband's death. I would also like to thank the ARVO staff for their care of me before and during the 2015 meeting at which I accepted awards on Dave's behalf.

ARVO was an important part of our life. Dave specifically asked me to relay his pleasure and pride in serving as your editor-in-chief of IOVS. The memories and friendships we made over the past 38 years are precious reminders of Dave and his love of ARVO and commitment to its success.



Betsy Beebe accepts Dr. Beebe's Distinguished Service Award from 2014 – 2015 President William F. Mieler, MD, FARVO, at the ARVO Annual Meeting in Denver.

Interim editor-in-chief



Thomas Yorio, PhD, FARVO

Thomas Yorio, PhD, FARVO, has been appointed interim editor-in-chief (EIC) of *IOVS* by the ARVO Board of Trustees. Yorio's appointment (May 2015 – December, 2017) was made following the illness and subsequent passing of EIC David Beebe.

"I'm committed to improving the experience of contributing authors, expanding the quality of publications and making *IOVS* the journal of choice in the eye research community," says Yorio. "I will look for new opportunities to increase the visibility of *IOVS* and increase its impact in the scientific community. I plan to continue the great progress that Dr. Beebe initiated and ask all of the *IOVS* community for their support as we move forward."

Yorio is provost and executive vice president for academic affairs and professor of the North Texas Eye Research Institute at the University of North Texas Health Science Center. Prior to his EIC appointment, he was one of eight *IOVS* associate editors who worked alongside Dr. Beebe and was also associate editor under Paul Kaufman, MD, FARVO, during his term as EIC. Yorio is also a past member of the ARVO Board of Trustees and served on several ARVO committees.

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- Using OCT of the eye as a window into vascular diseases and other systemic conditions
- Meta-analysis of published OCT literature

Submit your OCT papers to the *IOVS* special issue by Dec. 14, 2015.

The beginning of a new era

ARVO journals move to open access

Since its journals were first published online, ARVO has placed a high priority on making content freely available to the vision science community and researchers everywhere. From their inception, *Journal of Vision (JOV)* and *Translational Vision Science & Technology (TVST)* have been free access. *Investigative Ophthalmology & Visual Science (IOVS)* content, while not free access immediately, was kept behind the subscription paywall for only six months before becoming freely available. ARVO has now committed to free and open access for all the journals — a transition that will begin Jan. 1, 2016.

In addition to making content free, one of the main drivers of the open access movement has been the desire to make data available for researchers to reuse without the obstacles of traditional publisher-owned copyright. Beginning with articles published in 2016, ARVO authors will retain copyright of their articles, and ARVO will offer two possible licenses for publication:

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All content published prior to Jan. 1, 2016 will still be copyrighted to ARVO but will be freely accessible; all papers published on or after Jan. 1, 2016 will be open access, published under a Creative Commons license. Instead of page charges, there will be a new flat article rate for all papers submitted on and after Dec. 1, 2015. The ARVO Board is offering a \$350 discount to all corresponding authors that are ARVO members at the time their articles are accepted. More information is available at <http://arvojournals.org/SS/openaccess.aspx>.

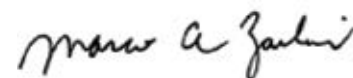
We are looking forward to this new era and what it holds for the increasing submissions, readership and usage of the journals. As always, we are continuously looking for ways to serve our readership and membership, and we feel this new move to full open access will be the next step in this direction.



Thomas Yorio
Interim *IOVS* Editor-in-Chief



Dennis Levi
JOV Editor-in-Chief



Marco Zarbin
TVST Editor-in-Chief

A look back at ARVO 2015



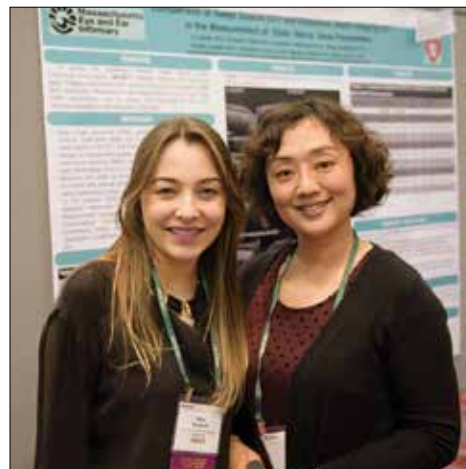
ARVO 2014 – 2015 Board of Trustees. Back row, from left: Executive Director Iris M. Rush, CAE; Peter D. Lukasiewicz, PhD; Megan Elise Capozzi; Executive Vice President Craig E. Crosson, PhD, FARVO; Claude F. Burgoyne, MD, FARVO; President-elect John I. Clark, PhD, FARVO; Vice President-elect Dimitri T. Azar, MD, MBA, FARVO; Raymond A. Applegate, OD, PhD, FARVO; Emily Y. Chew, MD, FARVO; Andrew D. Dick, MBBS, MD, FMedSci; ARVO Foundation Chair J. Mark Petrash, PhD, FARVO; Paul S. Bernstein, MD, PhD, FARVO. Front row, from left: Vice President-elect Linda McLoon, PhD, FARVO; Carol Toris, PhD, FARVO; President William F. Mieler, MD, FARVO; Immediate Past President Justine R. Smith, FRANZCO, PhD, FARVO; Sarah E. Coupland, MBBS, PhD, FARVO.



Photos, clockwise from top left: Members dabble in oils during the Sunday Social at the Denver Art Museum; an attendee looks at imaging equipment at the Ellex exhibit; Visit Seattle staff help attendees with 2016 hotel reservations; gathering at ARVO Central; former Denver Bronco running back Terrell Davis and Global Medical Innovation President Col. Don Gagliano, MD, MHA, participate in the traumatic brain injury and vision session.



Photos, clockwise from top left: Enjoying the Student/Trainee Social; smiling for the camera during ARVO Karaoke; networking between sessions; Ian Crozier, MD, describes surviving Ebola during the Closing Keynote session; eye-themed artwork painted during the Sunday Social was donated to and sold at the WEAVR Silent Auction; presenting research during the Member-in-Training Outstanding Poster Award session; and registering for the meeting at the Colorado Convention Center.



Photos, clockwise from top left: Room with a view at the ARVO Foundation and Dowling Society Gala; Colorado Convention Center's Blue Bear watches over attendees; table discussion at Pizza with the Experts; catching up with colleagues at the Women in Eye and Vision Research Luncheon; and poster presenters at the ARVO Imaging in the Eye Conference.

Recognizing American Academy of Optometry grantees

ARVO joins the American Academy of Optometry in congratulating its 2015 Student Fellowship grantees, as well as honoring its 2014 Ezell Fellowship recipients. The Vision Care Institute, LLC sponsored the Student Fellowships. The travel fellowships were given out at an event at ARVO 2015 sponsored by the American Academy of Optometry and the American Optometric Foundation (AOF).



Ezell Fellows at ARVO 2015 from left: Academy Board Secretary-Treasurer Barbara Caffery, OD, FAAO; Tan Ngoc Truong, OD, MPH, PhD, FAAO; Rose Reins, PhD; William Ngo, OD, FAAO; Julie Mocko-Strand, BS; Wing "Eric" Li, OD, FAAO; and Foundation Board Secretary-Treasurer Wendy Harrison, OD, PHD, FAAO.



Student Travel Fellowship grantees, from left: Academy Board Secretary-Treasurer Barbara Caffery, OD, FAAO; Hendrik Walther, MSc; Srilatha Vantipalli, BSOptom; Jillian F. Meadows, OD, MS, FAAO; Stephanie Marten-Ellis; and Chau-Minh Phan, MSc.

ARVO Achievement Award lectures



Left: Joan W. Miller, MD, FARVO, of Massachusetts Eye and Ear Infirmary in Boston, Mass., receives the Weisenfeld Award from ARVO President William F. Mieler, MD, FARVO. Miller's lecture was *Beyond VEGF*.



Right: Friedenwald lecturer David M. Berson, PhD, of Brown University, Providence, R.I., discussed *Ganglion cells and ganglion-cell photo-receptor*.



Left: Proctor medalist Patricia D'Amore, MBA, PhD, FARVO, of Schepens Eye Research Institute in Boston, Mass., lectured on *Regulation of retinal vascular growth; development, pathology and therapy*.



Anneke I. den Hollander, PhD, of Nijmegen University in The Netherlands, receives the Cogan Award from Trustee Paul S. Bernstein, MD, PhD, FARVO. Den Hollander's spoke on *How the omics revolution transformed ophthalmology*.



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Highlights from ARVO 2015

Access select recordings from ARVO 2015, such as the keynote lecture on Ebola and the eye, Champlimaud lectures, the session on traumatic brain injury and vision, and more.

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