

# Pioneers in neuro-ophthalmology



## **The 2015 Barancik Prize recognizes a trio for transforming an optical imaging technique into an exciting new tool for monitoring people with MS.**

by Susan Worley

The recipients of the National MS Society's third annual Barancik Prize for Innovation in Multiple Sclerosis have spent more than a decade examining the complex relationships between the structure and function of the eye and MS disease progression. In the near future, due in large part to research by this team, people with MS may benefit from the regular use of a simple, noninvasive procedure that produces detailed images of the nerves in the back of an individual's eye. When used alone or in conjunction with MRI, the procedure, known as OCT, or optical coherence tomography, could more precisely gauge MS progression and more accurately guide clinical trials and treatment.

This year the prize recognizes a team of three talented researchers who have demonstrated the remarkable power of collaboration.

"We're very pleased to present the 2015 Barancik Prize to a trio of top MS researchers who epitomize scientific collaboration at its best: Drs. Laura Balcer, Peter Calabresi and Elliot Frohman," says Dr. Bruce Bebo, executive vice president, research, at the Society. "This team, the first collaborative team to be recognized with a Barancik Prize, has opened a window to tracking nerve health and degeneration that will speed the search for MS therapies that can protect the nerves and stop progression."

The Barancik Prize, funded by the Charles and Margery Barancik Foundation, is the world's largest award created exclusively for the recognition of groundbreaking MS research. The Baranciks, major supporters of MS research for more than 20 years, established the \$100,000 international prize to reward exceptionally innovative scientific research geared toward treating or ending MS.

“Drs. Balcer, Calabresi and Frohman combined the best of their diverse backgrounds to form a unique team that has augmented our understanding of MS, and they have become a model of the benefits of collaboration,” says Dr. Benjamin M. Greenberg, director of the Neurosciences Clinical Research Center at the University of Texas Southwestern Medical Center. He was among the experts who nominated the team for the prize. “While all three are spectacular clinicians in their own right, Dr. Balcer’s statistical knowledge, Dr. Frohman’s ability to bridge the gap between research and physical exam findings, and Dr. Calabresi’s insights into the immune-related aspects of MS have resulted in outstanding research leading to the practical use of OCT to monitor MS.”

“OCT is a very high-resolution technique that uses near-infrared light to examine all of the layers of the retina, the light-sensitive part of the eye that transmits images to the brain,” says Dr. Frohman. “After the different layers are analyzed, multicolored ‘maps’ are produced that can reveal MS-related changes.”

## Optical Coherence Tomography (OCT)

[OTC-with-MS]

**Mouse over or tap the pink markers to reveal more information.**

This OCT image shows the retinal layers of the left eye of a 42-year-old woman with relapsing-remitting MS and a history of optic neuritis.

[OTC-without-MS]

This OCT image is that of a 46-year-old man without MS or any history of optic neuritis.

The retinal nerve fiber layer is substantially thinner in the person with MS—a biomarker that may become a standard tool for assessing MS progression and the effectiveness of treatments, thanks to the work of the Barancik Prize winners.

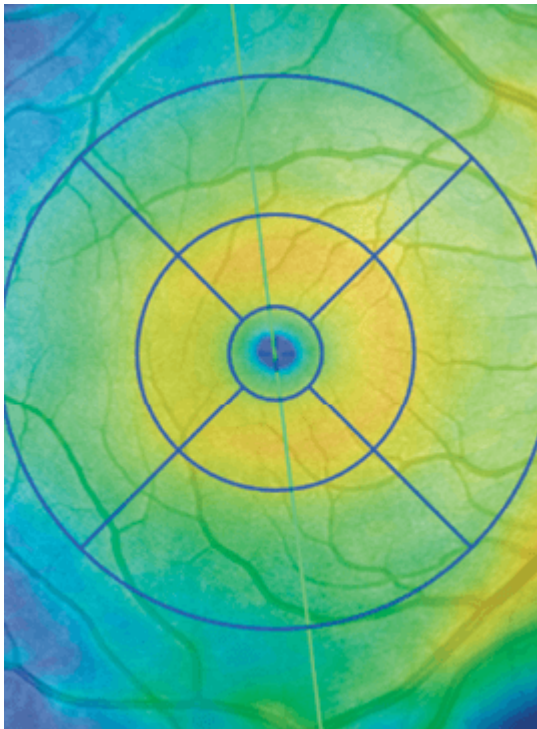
Images courtesy of Rachel Nolan And Lisena Hasanaj, Neurology Vision Research Laboratory, New York University School of Medicine

### Meeting of the minds

What drew this talented team together? Dr. Laura Balcer credits Dr. Steven Galetta, whom she calls a “team builder” and early mentor—first at the University of Pennsylvania and more

recently at New York University—for introducing the three researchers. Dr. Balcer’s early research had involved working with Dr. Galetta to develop a way to more accurately assess visual function in people with MS.

“Back then, we were seeing a lot of people with MS who would say that their vision wasn’t quite right, even when it was 20/20 on a standard black-and-white eye chart,” says Dr. Balcer. “We were looking for a more accurate way to measure visual function in these patients—and get at the nuances in visual deficits that these patients were describing.”



**This infrared image of the macula—the light-sensitive center of the retina—was scanned by OCT, and the colors vary by macular volume, or thickness. Reduction in the macular volume can signify neurological damage to the retina.** Image Courtesy of Rachel Nolan And Lisena Hasanaj, Neurology Vision Research Laboratory, New York University School of Medicine

Dr. Balcer and colleagues were first recognized in 2012 for successfully adapting a low-contrast eye chart—one with shades of gray rather than stark black and white letters—to better gauge the vision of people with MS. Next, they explored the use of OCT to obtain

detailed images of MS-related structural changes and abnormalities in various layers of the retina. Ultimately they were able to use OCT to confirm that changes in the structure of the retina—such as retinal nerve fiber layer (RNFL) thinning—very clearly provide a biological explanation for changes in visual acuity and function experienced by people with MS.

Dr. Calabresi was already engaged in MS-related basic science and immunological research at Johns Hopkins University when he attended a presentation on OCT by Dr. Balcer. Both Drs. Calabresi and Balcer are on the board of directors of the International MS Visual System Consortium.

“When I saw the OCT, it was definitely love at first sight,” says Dr. Calabresi. “Here was a spectacular way of imaging axons [nerve fibers] directly by looking at the back of the eye, without encountering all the difficulties of having to image through the skull. The OCT allows us to look at neurons and axons in isolation, unobscured by inflammation and changes in myelin. Compared with an MRI, it may provide a measure of neurodegeneration that is more pure.”

Dr. Calabresi was subsequently introduced to Dr. Frohman, whose research at UT Southwestern focused on electrophysiological methods of assessing nerve degeneration, and soon the trio began to combine their unique talents in creative and highly productive ways.

### **A vision for the future**

Intricate OCT images are already helping clinicians get a better handle on “silent” disease activity. Eventually they may help explain the frequent mismatch between MRI findings and MS symptoms—for example, the reasons why people with MS frequently have relatively mild symptoms until they reach a certain threshold, after which symptoms can become daunting.

## **The winning researchers discuss their findings and the power of collaboration.**

“One of the great goals of MS therapy is to prevent people from going over these thresholds,” says Dr. Balcer. “We hope OCT can eventually be used to achieve this goal.” OCT has already gained acceptance as a reliable and relatively inexpensive biomarker of MS pathology in research, but it may require more testing before its use in clinical practice becomes widespread. “It takes considerable time and testing before a new technology is fully validated and insurers agree to reimburse its use,” says Dr. Calabresi. “We already regularly obtain OCT measurements of our patients, and we feel that the technology is very close to being ready for more widespread clinical use.”

The winners of the 2015 Barancik Prize emphasize their deep gratitude for the guidance their mentors have provided, for the inspiration and support of their colleagues in the field, and for unique opportunities to influence the next generation of talented MS researchers.

“The real goal of research is to help our patients,” Dr. Frohman says. “It has been an incredible privilege and responsibility to do this work, exchange our findings with those of our colleagues, and prepare others to take up the torch and continue to move this research forward.”

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To learn more about the Barancik Prize, visit [nationalMSSociety.org/Barancik](https://nationalMSSociety.org/Barancik).  
Learn about the research of last year’s Barancik Prize winner, [Dr. Philip De Jager](#).