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Team discovers key to preventing blindness and stroke devastation

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Research led by Nicolas Bazan, MD, PhD, Boyd Professor, Ernest C. and Yvette C. Villere Chair of Retinal Degeneration Research, and Director of the Neuroscience Center of Excellence at LSU Health New Orleans, has discovered gene interactions that determine whether cells live or die in such conditions as age-related macular degeneration and ischemic stroke. These common molecular mechanisms in vision and brain integrity can prevent blindness and also promote recovery from a stroke. The paper is published online in *Cell Death & Differentiation*, a *Nature* journal.

"Studying the eye and the brain might hold the key to creating therapeutic solutions for blindness, stroke and other seemingly unrelated conditions associated with the central nervous system," notes Dr. Bazan. "The eye is a window to the brain."

Dr. Bazan and his research team discovered Neuroprotectin D1 (NPD1), which is made from the essential fatty acid, docosahexaenoic acid (DHA). Previous work showed that while it protected cells, the molecular principles underlying this protection were not known.

"During the last few years, my laboratory has been immersed in studying gene regulation," Dr. Bazan says. "We have uncovered a novel control that makes definitive decisions about whether a retina or brain cell will survive or die when threatened with disease onset. The gene mechanism that we discovered is the interplay of two genes turned on by the messenger Neuroprotectin D1."

Age-related macular degeneration (AMD) is a devastating disease that targets the retina of the elderly and destroys cells in charge of receiving photons and transferring light signals to the brain for decoding. The causal mechanisms of this disease remain elusive. The retinal pigment epithelium (RPE) is a single layer of cells that accomplishes multiple functions, such as providing survival molecules that prevent photoreceptors from dying.

The research team worked with human RPE cells and an experimental model of ischemic stroke. They discovered novel mechanisms in cells with the ability to activate pathways that crosstalk one to another and then assemble consolidated responses that decide cell fate. The researchers found that the powerful messenger, NPD1, is produced on-demand in the brain and retina and that it elicits a network of positive signals essential for the well-being of vision and cognition. They showed that NDP1 bioactivity governs key gene interactions decisive in cell survival when threatened by disease or injury. They demonstrated that not only does NPD1 protect photoreceptors, but it also promotes remarkable neurological recovery from the most frequent form of stroke in humans.

More information: *Cell Death & Differentiation*, www.nature.com/cdd/journal/vao … ull/cdd2014233a.html

Provided by Louisiana State University

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