Scientists discover gene tied to profound vision loss

January 16 2015

Working to prevent blindness at The University of Texas School of Public Health from the left are Lori S. Sullivan, Ph.D., Sara J. Bowne, Ph.D., and Stephen Daiger, Ph.D. Credit: The University of Texas Health Science Center at Houston (UTHealth)

An exhaustive hereditary analysis of a large Louisiana family with vision issues has uncovered a new gene tied to an incurable eye disorder called retinitis pigmentosa, according to an examination led by scientists at The University of Texas Health Science Center at Houston (UTHealth). It is

a family of eye diseases that affects more than 200,000 people in the United States and millions worldwide.

The retina converts images into electrical signals that can be processed by the brain. It acts much like the film in a camera. Retinitis pigmentosa damages this film (the retina) and its early symptoms include decreased night vision and peripheral vision. Once it starts, the loss of vision is relentlessly progressive, often ending in blindness.

In the journal *Investigative Ophthalmology & Visual Science*, UTHealth's Stephen P. Daiger, Ph.D., and his colleagues report their discovery of a new gene tied to retinitis pigmentosa, which brings the total of genes associated with this sight-threatening disease to more than 60. The gene is called hexokinase 1 (HK1).

This information is important because it helps affected families cope with the disorder, helps explain the biologic basis of these diseases and suggests targets for drug treatments and gene therapy, said Daiger, the report's senior author and holder of the Thomas Stull Matney Ph.D. Endowed Professorship in Environmental and Genetic Sciences at UTHealth School of Public Health.

"The challenge now is to block the activity of these mutations and clinical trials are underway to do just that," he said.

"Dr. Daiger is trying to make a breakthrough in potentially blinding diseases with no known treatments," said Richard S. Ruiz, M.D., professor of ophthalmology and holder of the John S. Dunn Distinguished University Chair in Ophthalmology at UTHealth. "Right now, we address the symptoms of the disease and help patients make the most of their existing vision."

For approximately three decades, Daiger, a member of the Human

Genetics Center at the UTHealth School of Public Health, has been following the progress of hundreds of families across the country with retinitis pigmentosa. "We've found the cause of disease in 80 percent of the families we have studied," Daiger said. "Our goal is to find the cause in the remaining 20 percent."

Equipped with the genetic profiles of family members, Daiger's team has identified differences in the genetic makeup of those with the disease. The researchers also use family histories and DNA tests to glean information about the condition's hereditary nature.

There are different types of retinitis pigmentosa and Daiger's laboratory is focused on the autosomal dominant type. This means that only one parent needs the mutation in order to pass the disease to a child. This type accounts for about a third of all cases and many of its disease-causing genes have been discovered, several by Daiger's research group.

"The story of the HK1 mutation is itself interesting. What we found is a mutation present in families from Louisiana, Canada and Sicily. Our evidence suggests the mutation arose in a common ancestor who lived centuries ago," Daiger said. "The mutation spread in Europe and North America, and may be common among Acadians in Louisiana. This is called a founder mutation."

More information: *Investigative Ophthalmology & Visual Science*, www.iovs.org/content/55/11/714 … e7-855d-1ee876d87637

Provided by University of Texas Health Science Center at Houston