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Diabetic blindness: Team IDs best source of stem cells to block vision loss

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University of Virginia School of Medicine researchers have taken a significant step forward in their efforts to use stem cells to block vision loss caused by diabetic retinopathy, a condition that affects millions of people with diabetes. The researchers have evaluated the best potential sources for adult stem cells to be used for that purpose, determining that cells taken from donors who do not suffer diabetes likely will be more effective than cells taken from patients' own bodies.

The work is a critical step toward the goal of injecting stem cells into patients' eyes to stop or even reverse the vision loss. The findings also establish a crucial framework for evaluating stem cells to be used in potential future treatments for diabetic retinopathy.

"It answers a vital question: If we're going to carry this therapy forward into clinical trials, where are we going to get the best bang for the buck?" said UVA researcher and ophthalmologist Paul Yates, M.D., Ph.D. "The answer seems to be, probably, taking cells from patients who aren't diabetic. Because the diabetic stem cells don't seem to work quite as well. And that's not terribly surprising, because we already know that this cell type is damaged by diabetes."

The researchers hope to use fat-derived stem cells—harvested during liposuction procedures—to stop the vascular degeneration that leads to blindness in patients with diabetic retinopathy. To do that, they must understand the best source of those cells, and UVA's new research provides those important answers. "We now know what to look for when

we harvest a patient's cells, because we know what distinguishes good quality cells from poor quality," said researcher Shayn M. Peirce, Ph.D., of the UVA Department of Biomedical Engineering. "We almost have a screen to determine quality control. We're essentially establishing quality-control criteria by understanding what works and why."

New and better treatments for diabetic retinopathy are needed desperately, the researchers noted, both because of the growing number of people with the condition and because of the limited effectiveness of existing treatments. More than 100 million people are estimated to suffer from diabetic retinopathy and related conditions; current treatments either destroy much of the retina with a laser or require patients to receive injections directly into their eyeball as often as monthly for the rest of their lives.

"There's huge room for improvement on the standard of care, and the number of patients in this demographic is increasing by the day, dramatically, so the need is only going up," Peirce said. "So I think there are three pieces working together—UVA's strengths in this area, the FDA's encouragement [of stem cell research in the eye] and the clinical realities—to drive this cell-based therapy toward the clinic."

While much more work needs to be done, if all goes well, the researchers hope to begin clinical trials in humans within the next few years. "This is not science fiction at all," Yates said. "The idea that you can take cells from somewhere else and inject them into the eye to treat disease is here today."

The findings have been published in the scientific journal *Stem Cells Translational Medicine*.

Provided by University of Virginia Health System