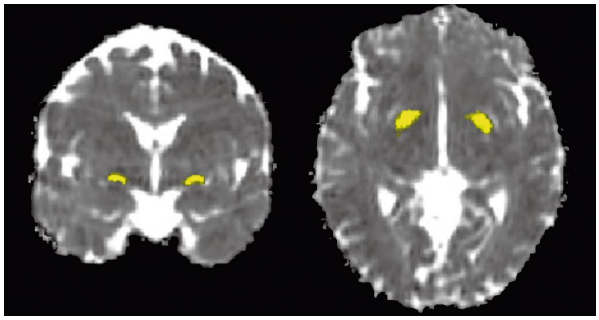


Credit: Nucleus basalis of Meynert (yellow) in a patient with Parkinson disease and cognitive decline, visualized by diffusion tensor imaging. Image courtesy of M. Politis, Neurodegeneration Imaging Group, King's College London.

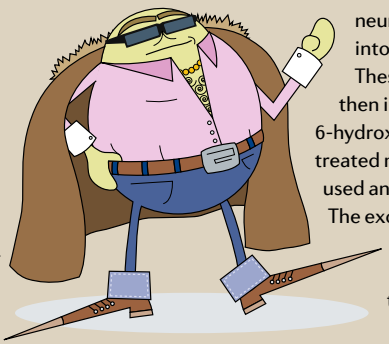
with PD who were cognitively healthy at baseline, showed that changes in the nucleus basalis of Meynert predicted cognitive decline. The structural changes occurred before the onset of cognitive symptoms.

"We have found a way of identifying patients at risk of developing cognitive decline that is realistic, cost-effective, noninvasive and can be done before onset of symptoms," says Politis. "We hope this can improve patient care and outcomes, and provide a screening tool to assign suitable people to trials and new treatments before the development of overt symptoms."

Ian Fyfe

> "structural changes occurred before the onset of cognitive symptoms"

ORIGINAL ARTICLE Schulz, J. et al. Nucleus basalis of Meynert degeneration precedes and predicts cognitive impairment in Parkinson's disease. *Brain* https://doi.org/10.1093/brain/awy072 (2018)



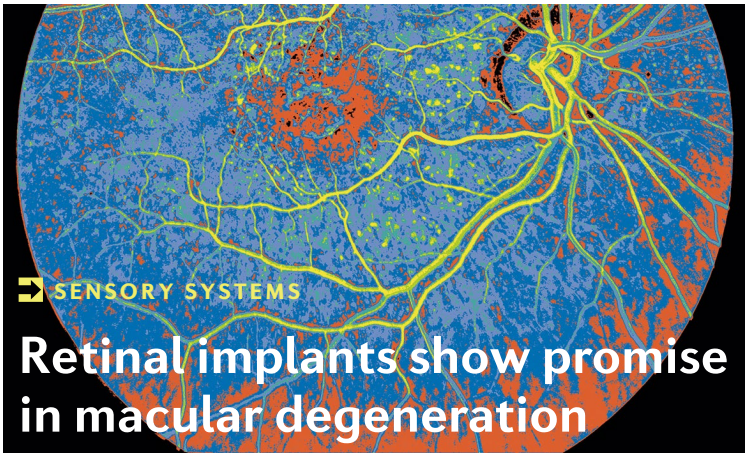
Credit: Philip Patenall/Macmillan Publishers Limited

known to alleviate neuroinflammation, into exosomes. These cells were then injected into 6-hydroxydopamine-treated mice — a widely used animal model of PD. The exosomes crossed the blood–brain barrier, reduced the levels of neuroinflammatory markers and ameliorated neuronal death in the striatum.

"If we can engineer the devices to respond to specific disease marker input, we may be able to realize on-demand exosome-based therapy," explains Fussenegger. The team also note that exosome therapy might have a better safety profile than viral or nanoparticle-based therapies due to the human origins of exosomes.

Charlotte Ridler

ORIGINAL ARTICLE Kojima, R. et al. Designer exosomes produced by implanted cells intracerebrally deliver therapeutic cargo for Parkinson's disease treatment. *Nat. Commun.* **9**, 1305 (2018)



Credit: BSIP SA/Alamy Stock Photo

SENSORY SYSTEMS

Retinal implants show promise in macular degeneration

Stem cell-based retinal implants have the potential to improve vision in patients with age-related macular degeneration (AMD), according to new reports in *Science Translational Medicine* and *Nature Biotechnology*. AMD results from the loss or dysfunction of retinal pigment epithelium (RPE) cells and is a common cause of visual impairment in older individuals.

"Past studies indicate that stem cell-derived RPE cells are a viable option as a cell replacement therapy for macular degeneration," comments Amir H. Kashani, the first author of the *Science Translational Medicine* paper. "Our proposed treatment — a polarized monolayer of RPE cells on a synthetic scaffold — was designed with the intent to replace atrophic or missing RPE cells in patients with advanced dry AMD."

For their trial, Kashani and colleagues recruited five patients with advanced dry AMD. The team used a retinal implant known as CPCB-RPE1, which consists of human embryonic stem cell (hESC)-derived RPE cells on a synthetic parylene substrate. The implantation procedure was successfully completed in four of the five participants.

Postoperative imaging indicated effective integration of CPCB-RPE1 into the retina. Although the trial was designed primarily to assess the safety of the implant, one of the treated eyes showed an improvement in visual acuity and two showed improvements in visual fixation.

"The results presented in this publication are from a small subset of patients with severe and chronic AMD," explains Kashani. "On completion of this trial, our plan is to conduct a multicentre trial with a larger cohort of individuals with more visual potential and less severe disease."

In the second study, reported in *Nature Biotechnology*, a team led by Lyndon da Cruz at Moorfields Eye Hospital, London, UK, tested a different RPE implant in two patients with another form of AMD, known as neovascular or 'wet' AMD. The implant was found to be successfully integrated and well tolerated, and both participants experienced improvements in visual acuity in the 12 months following surgery.

"The results … provide an early indication of the safety and feasibility of manufacturing an hESC-RPE monolayer on a synthetic basement membrane and delivering the patch into the subretinal space as a potential treatment for AMD," write da Cruz and colleagues. "Our data suggest … efficacy, stability, and safety of the RPE patch for up to 12 months in two patients with severe vision loss from very severe wet AMD."

The findings of these two studies support further exploration of stem cell-based retinal implants as a treatment for AMD. As the researchers point out, the implants have only been tested in patients with advanced disease so far, and it will be interesting to see whether earlier intervention is more effective.

Heather Wood

ORIGINAL ARTICLE Kashani, A. H. et al. A bioengineered retinal pigment epithelial monolayer for advanced, dry age-related macular degeneration. *Sci. Transl Med.* **10**, eaao4097 (2018) | da Cruz, L. et al. Phase 1 clinical study of an embryonic stem cell-derived retinal pigment epithelium patch in age-related macular degeneration. *Nat. Biotechnol.* https://doi.org/10.1038/nbt.4114 (2018)