Optogenetics Restores Partial Vision in a Patient With Blindness

A recent case report in *Nature Medicine* described a man with long-term blindness in whom experimental optogenetic treatment restored partial vision. The approach uses light pulses to control cells that have been genetically modified to respond to the stimulation.

The 58-year-old man could perceive light but not objects before the therapy. Four decades ago, he was diagnosed with retinitis pigmentosa (RP), a group of progressive inherited diseases in which the light-sensitive cells in the retina break down and are lost. Aside from a gene-replacement therapy for 1 early-onset form of the disease, no approved treatments exist for RP, which affects more than 2 million people globally.

Researchers injected an adenovirus–associated viral vector encoding a light-sensing protein into the man’s worse-seeing eye. He tolerated the treatment well, with no adverse events, eye inflammation, or retinal anatomy changes.

The patient began visual training with light-stimulating goggles a few months after the injection and within 7 months began to report signs of visual improvement. Over time, he gained the ability to recognize, count, locate, and touch objects only with his treated eye while wearing the engineered goggles. The device uses a camera to detect light intensity changes in the environment and then projects corresponding light pulses onto the retina in real time, activating the eye's modified cells.

According to the researchers, this is the first case of partial functional recovery in a patient with a neurodegenerative disease using optogenetic therapy. The technique promises to partially restore vision in patients with advanced RP.

"[T]reatment by the combination of an optogenetic vector with light-stimulating goggles led to a level of visual recovery in this patient that was likely to be of meaningful benefit in daily life," the study’s authors wrote.

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Potential New Blood Biomarker for Myocarditis Detection

Myocarditis—heart muscle inflammation—can masquerade as a heart attack. A diagnosis usually requires cardiac magnetic resonance (CMR) imaging, which may not always be available, and gold-standard endomyocardial biopsies are invasive. Now, researchers have discovered a potential plasma biomarker for the task.

Type 17 helper T (T_{h17}) cells are involved in the development of myocarditis and dilated cardiomyopathy. In the new study, researchers confirmed T_{h17} cell increases in mouse and human myocarditis. They then found that mice with induced autoimmune or viral myocarditis but not myocardial infarction (MI) had specific T_{h17}-synthesized miRNA in their plasma. Based on this finding, they identified the human version, which they named hsa-miR-Chr8:96.

An analysis of plasma from 132 individuals in Spain showed that patients with acute myocarditis had greater expression of the novel miRNA than those with MI or healthy controls. Compared with CMR, the marker distinguished myocarditis from a heart attack with about 93% accuracy and from healthy individuals with almost 100% accuracy. The researchers also validated the miRNA in additional groups that included patients with acute MI with non-obstructive coronary arteries, biopsy-proven myocarditis, and other T_{h17}-related diseases, like rheumatoid arthritis and psoriasis.

The findings suggest that a blood test could one day diagnose myocarditis. The condition is usually caused by a viral infection and has gained increased attention during the COVID-19 pandemic. However, further research is needed to confirm that hsa-miR-Chr8:96 can be used to distinguish myocarditis from dilated cardiomyopathy and other heart problems, the researchers noted in the *New England Journal of Medicine.*

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Artificial Intelligence in COVID-19 Imaging Mismatched to the Clinic

A systematic review of studies on artificial intelligence (AI)-aided lung imaging for COVID-19 revealed a mismatch between what developers focus on and what clinicians need.

The review, which appeared in *Patterns,* included peer-reviewed and preprint manuscripts on AI and lung imaging in COVID-19 where the modality—computed tomography (CT), chest x-ray, or ultrasound—was specified. The researchers identified 463 such articles, as well as 2496 clinical articles that did not use AI.

Comparing the latter clinical articles with the AI articles revealed disparities. While 84% of clinical studies used CT, only 39% of AI studies did. Most AI-aided lung imaging research involved x-ray, which made up only 10% of clinical studies. What’s more, 72% of AI articles centered on diagnosing COVID-19 instead of disease severity or prognosis, even though imaging is not routinely advised or used for this task.

The authors also reviewed the AI articles’ “maturity,” a metric based on peer-review, modeling quality, data quality and scale, experimental rigor, and clinical deployment. Only 12 of the manuscripts—2.7%—rose to the bar of highly mature. A common denominator in these studies was medical professionals and AI experts working together, often in different countries, the authors noted. In publishing their review, they wrote that they “hope to encourage more international collaborations between the AI community and medical experts.” —Jennifer Abbasi

**Note:** Source references are available through embedded hyperlinks in the article text online.