

Derivative of turmeric eye drops could treat glaucoma

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Turmeric. Source: [Pixabay](#)

A derivative of turmeric could be used in eye drops to treat the early

stages of glaucoma, finds a new study led by UCL and Imperial College London researchers.

In the new *Scientific Reports* paper, the researchers report a new method to deliver curcumin, extracted from the yellow spice turmeric, directly to the back of the eye using [eye drops](#), overcoming the challenge of curcumin's poor solubility.

The research team found the eye drops can reduce the loss of retinal cells in rats, which is known to be an early sign of glaucoma.

They are also investigating how the eye drops could be used as a diagnostic tool for a range of conditions.

"Curcumin is an exciting compound that has shown promise at detecting and treating the neurodegeneration implicated in numerous eye and brain conditions from glaucoma to Alzheimer's disease, so being able to administer it easily in eye drops may end up helping millions of people," said the study's lead author, Professor Francesca Cordeiro (UCL Institute of Ophthalmology, Western Eye Hospital and Imperial College London).

Glaucoma is a group of eye conditions affecting over 60 million people worldwide that leads to irreversible blindness in 1 in 10 cases. The condition mainly involves the loss of [retinal ganglion cells](#), a type of neuron located near the surface of the retina. Stopping the loss of these cells early on has not yet been achieved, so it is a key focus of glaucoma research.

Curcumin has previously been shown to protect retinal ganglion cells when administered orally. For the current study, the researchers were seeking to find a more reliable method to deliver curcumin. Oral administration is difficult because curcumin has poor solubility, so it

does not easily dissolve and get absorbed into the bloodstream, and would require people to take large amounts of tablets (up to 24 a day) that may cause gastrointestinal side effects.

The team developed a novel nanocarrier, wherein the curcumin is contained within a surfactant combined with a stabiliser, both of which are known to be safe for human use and are already in existing eye products. The nanocarrier can be used in eye drops to deliver much higher loads of curcumin than other products in development, increasing the drug's solubility by a factor of almost 400,000, and localises the curcumin in the eyes instead of throughout the body.

The researchers initially tested the product on cells that are used to model glaucoma, before conducting trials in rats with eye conditions involving the loss of retinal ganglion [cells](#).

After twice-daily use of eye drops in the rats for three weeks, retinal ganglion cell loss was significantly reduced compared to matched controls, and the treatment was found to be well-tolerated with no signs of eye irritation or inflammation.

Having found an effective way to deliver curcumin, the researchers are hopeful that it could also be used to diagnose Alzheimer's disease, as [curcumin](#) is known to bind to the amyloid beta protein deposits implicated in Alzheimer's, and can be detected in the retina with fluorescence to highlight the malignant proteins.

"We are now researching diagnostic uses for these eye drops alongside other ways to visualise the retina, as eye tests can be an opportunity to detect signs of neurodegeneration with a simple, non-invasive test," said co-lead author Dr. Ben Davis (UCL Institute of Ophthalmology and Imperial College London).

Professor Cordeiro added: "As we live longer, diseases such as [glaucoma](#) and Alzheimer's are steadily increasing. We believe our findings could make a major contribution at helping the lives of people affected by these devastating diseases."

More information: Benjamin M. Davis et al. Topical Curcumin Nanocarriers are Neuroprotective in Eye Disease, *Scientific Reports* (2018). [DOI: 10.1038/s41598-018-29393-8](https://doi.org/10.1038/s41598-018-29393-8)

Provided by University College London

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