'Petri dish lens' gives hope for new eye treatments

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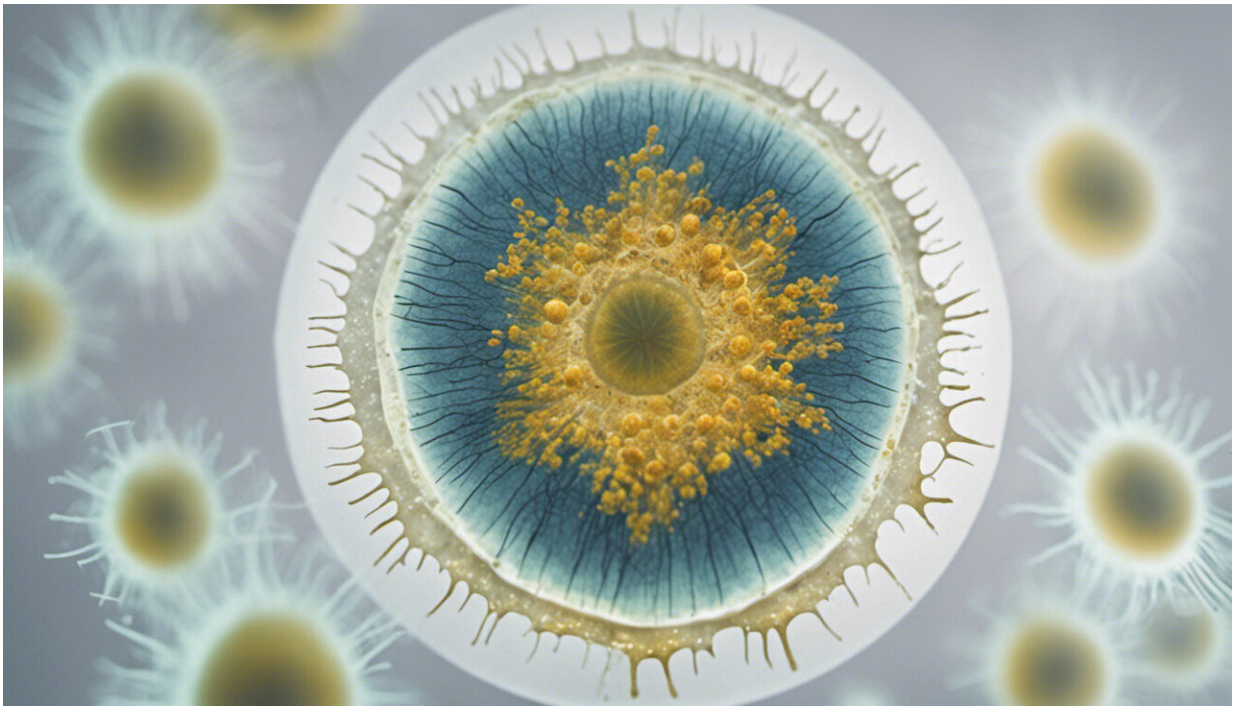

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(Medical Xpress)—A cure for congenital sight impairment caused by lens damage is closer following research by scientists at Monash University.

Associate Professor Tiziano Barberi and Dr Isabella Mengarelli from the

Australian Regenerative Medicine Institute (ARMI) at Monash University are closer to growing parts of the human eye in the lab. They have, for the first time, derived and purified lens epithelium - the embryonic tissue from which the lens of the eye develops. The purity of the cells paves the way for future applications in regenerative medicine.

Further, the researchers caused these precursor cells to differentiate further into lens cells, providing a platform to test new drugs on human tissue in the lab.

Pluripotent stem cells have the ability to become any cell in the human body including, skin, blood and brain matter. Once the stem cells have begun to differentiate, the challenge for researchers is to control the process and produce only the desired, specific cells.

Using a technology known as fluorescence activated cell sorting (FACS), Associate Professor Barberi and his team were able to identify the precise combination of protein markers expressed in the lens epithelium that enabled them to isolate those cells from the rest of the cultures. Most markers are common to more than one type of cell, making it challenging to determine the exact mix of markers unique to the desired cells.

Associate Professor Barberi said this breakthrough would eventually help cure visual impairment caused by congenital cataracts or severe damage to the lens from injury, through lens transplants.

"The lens has to some extent, the ability to heal well following surgical intervention. However, with congenital cataracts, the fault is wired into the DNA, so the lens will re-grow with the original impairment. This problem is particularly prevalent in developing countries," he said.

Combined with advances in producing pluripotent stem cells from fully-

differentiated adult cells, the research will also progress treatments for eye diseases.

"In the future, we will be able to take adult skin cells, for example, and turn back the clock to produce stem cells. From there, using processes like we have developed for lens epithelium, we will be able to produce diseased cells - an invaluable asset for medical research," Associate Professor Barberi said.

The researchers will now focus on creating a lens more closely resembling a human eye in the lab.

"The lens cells that we created in the petri dish are organised differently to those in a human eye. The next challenge is mimicking nature more perfectly," Associate Professor Barberi said.

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Provided by Monash University