

# RESEARCH DIRECTIONS

## Anti-cataract medications

**Dr Michael O'Connor from the School of Medicine is investigating how stem cells can be used to understand normal development of the eye's lens and how vision can be lost by lens cataract formation. This project is funded by the Medical Advances Without Animals Trust (MAWA).**

'Surgical treatment of cataracts places a large and increasing burden on medical health systems worldwide,' explains Dr O'Connor. 'Because not all patients can access cataract surgery, one-hundred million people around the world currently have reduced vision or blindness because of cataracts. Stem cells offer an opportunity to understand how cataracts form, and also the ability to search for anti-cataract drugs in order to replace cataract surgery. This MAWA-funded project will optimize animal product-free conditions to more efficiently make human lens cells from human pluripotent stem cells (stem cells that can be induced to develop into all cell types in the body). These improvements will enable high-throughput screening to discover anti-cataract drugs, and toxicology studies to assess new drug side-effects. The improved ability to create human lens cells in the laboratory will also allow these cells to replace expensive and imperfect animal models used for lens and cataract research.'

To optimize production of lens cells from human pluripotent stem cells, this project will test a range of growth factors implicated in embryonic lens development. For each optimization being tested, RNA samples will be collected at regular intervals to monitor the expression levels of lens-specific genes. When new growth factor combinations are shown to improve lens cell production, these new combinations will become the standard for further optimization. To complement this strategy, the cells will also be assessed microscopically to determine the relative abundance of lens cells being produced.



This project has the potential to reduce the use of animals and animal products in lens and cataract research, while at the same time producing large numbers of lens cells for use in anti-cataract drug screening and toxicology studies for new drugs and cosmetics.

**Project Title:** Establishment of animal product-free differentiation conditions for generating in vitro human lens epithelial cells from human pluripotent stem cells

**Funding has been set at:** \$30,000

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