Investigating blindness in older people

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What is the problem?

Many older people, about 500,000 in the UK, suffer from blindness due to a disease called Age-related Macular Degeneration (AMD). This causes much distress, disability and a dramatic reduction in quality of life. There is little effective treatment available for the common form of the disease.

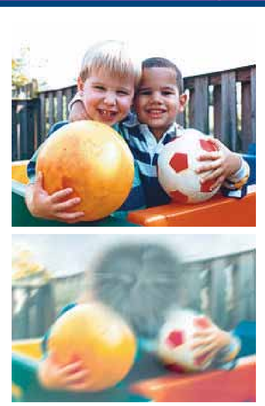

Figure 1:
Images simulating the effect of AMD on sight.

What are we interested in?

The disease seems to be due to a build-up of waste products in the eye which occurs along a layer of cells, the retinal pigment epithelial (RPE) cells. These cells are very important for maintaining the photoreceptors of the eye which are the key cells collecting the light signals for sight (see Figure 2). Early in AMD the RPE cells start to break down. Little is known about the exact processes involved, which makes it difficult to design an effective therapy, so our aim was to investigate this.

We know that an inflammatory protein called C-reactive protein (CRP) is associated with the waste products building up in AMD so we wanted to find out how this protein affected the RPE cells.

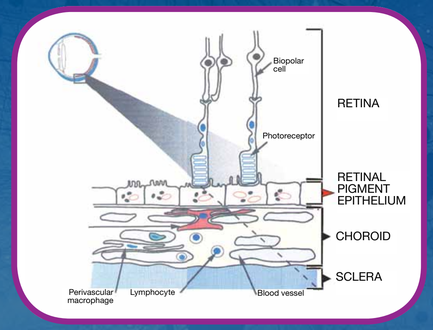

Figure 2

What did we do?

We grew RPE cells from human eyes in culture medium (see Figure 3) and tested the effect of CRP on:

1) Their expression of genes associated with cell ageing and death (senescence) by extracting RNA and doing a polymerase chain reaction (PCR) assay.

2) Their production of other inflammatory proteins, IL-6 and IL-8, using an assay which could detect the amounts of these mediators in the culture medium.

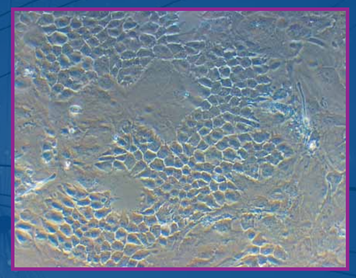

Figure 3: RPE cells in culture

What did we find?

We showed that CRP increased the expression of the senescence-associated gene SM22 (see Figure 4), indicating that CRP may play a role in the death of the RPE cells. However this increase was not statistically significant, so we need to repeat the experiment.

We also showed that CRP could significantly increase the production of the pro-inflammatory mediators IL-6 and IL-8 by the RPE cells (see Figure 5). These mediators can recruit more damaging cells to the site and stimulate the production of further proteins which increase inflammation. Therefore this production of IL-6 and IL-8 in response to CRP is likely to speed up the degeneration of the RPE cells.

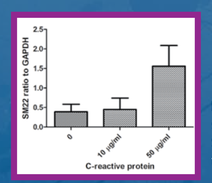

Figure 4: Graph showing increase in SM22 in response to CRP.

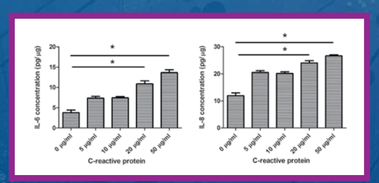

Figure 5: Graphs showing increase in IL-6 and IL-8 in response to CRP

What does it mean?

If these findings are confirmed, preventing the action of CRP could be a useful therapy for AMD, helping to hold back the progression of the disease and reduce its severity so that sight is retained.

Who am I?

I am a 4th-year undergraduate student at the University of Aberdeen studying for a degree in Immunology & Pharmacology. I did this research project during my summer vacation. My career aspirations are to be a medical doctor with a keen interest in Immunology research.

Acknowledgements

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