Link identified between Alzheimer's disease and glaucoma

August 6 2007

UK scientists have shown for the first time that key proteins involved in Alzheimer's disease are also implicated in glaucoma, the major cause of irreversible blindness worldwide. Research carried out at the UCL Institute of Ophthalmology and funded by the Wellcome Trust has also shown that novel drugs being trialled for Alzheimer's disease which target this protein may be used to treat glaucoma.

The research team has developed a new technology for visualising nerve cell damage in the retina, known as Detection of Apoptosing Retinal Cells. Using this technology, they demonstrated that the protein beta-amyloid, which causes the so-called "plaque" lesions in the brains of Alzheimer's patients, also leads to nerve cell death in the retina. The research is published online today in the journal *Proceedings of the National Academy of Sciences.*

"We've seen for the first time that there is a clear link between what causes Alzheimer's disease and one of the basic mechanisms behind glaucoma," says Dr Francesca Cordeiro from University College London, who led the study. Dr Cordeiro is also a consultant ophthalmologist at the Western Eye Hospital, London, specialising in glaucoma. "However, this doesn't mean that everyone with Alzheimer's will develop glaucoma or vice versa. Glaucoma has a number of risk factors."

Glaucoma affects over half a million in the UK and as many as 65 million people worldwide(1). Little is know about what exactly causes

the disease, which causes damage to the optic nerve in the eye; although the disease is traditionally attributed to increased pressure in the eye (known as "intraocular pressure", and clinical treatments attempt to lower this pressure). However a significant number of patients continue to lose vision despite their pressure being well controlled. The new research opens up a new avenue of treatment in glaucoma which does not involve treating intraocular pressure.

Dr Cordeiro and colleagues have shown that drugs which work to prevent the build up of the beta-amyloid protein in Alzheimer brains can be used to treat glaucoma in animal models. One such drug, Bapineuzumab, is already being used in clinical trials to treat Alzheimer's patients by pharmaceutical companies Elan in Dublin and Wyeth in the US. However, the UK researchers have shown that when combined with two other novel Alzheimer's treatments, the effects on glaucoma are even stronger.

"We are trying a new approach which has never been tried before, not even to treat Alzheimer's disease," says Dr Cordeiro. "Our success in treating glaucoma in the lab by combining different Alzheimer's treatments represents a brand new treatment strategy."

Research carried out previously by Dr Cordeiro and colleagues and also funded by the Wellcome Trust suggested that the retina can provide a window into the brain, allowing doctors to diagnose Alzheimer's disease by looking for evidence of nerve cell death. Alzheimer's disease is the most common form of dementia. Nearly 700,000 people in the UK suffer from dementia and this is expected to exceed one million people by 2025(2).

"Many even within medicine fail to realise that the retina, commonly examined by high street opticians when they look at the back of the eye, is actually an extension of brain tissue, travelling down the optic nerve

into the back of the eye," she says. " High street opticians have been routinely looking at the brain in a more direct way than has been possible by high tech brain scanners such as MRI and CAT."

Now, Dr Cordeiro believes that this knowledge may mean that the eye could also be used to test potential treatments for Alzheimer's disease.

"Since we have shown that drugs for Alzheimer's disease can tackle glaucoma, then potentially we could use damaged retina to screen Alzheimer's drugs that target beta-amyloid build up."

Source: Wellcome Trust