Project Title: Utilising Clinically Relevant Mechanisms to Develop Targeted Neuroprotective Strategies in Glaucoma

Host School/ Institute: Westmead Millennium Institute
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Project Type: Laboratory based

Project Category: Vision, Genetics, Technology

Project Keywords:
1. Glaucoma
2. Neuroprotection
3. Nanoparticle
4. Apoptosis

Project Description:

Synopsis: Glaucoma is the leading cause of irreversible blindness in the world. 400,000 Australians are affected. With current therapies, approximately 30% of people may still lose vision in one eye due to glaucoma. In recent years there have been 2 major studies published in Nature Genetics of Gene Wide Association Studies (GWAS) with multiple funding sources including NHMRC and NIH outlining new genetic loci associated with increased risk of developing glaucoma, particularly advanced glaucoma. In the last year we have been examining the functionality of these genetic loci and how they can be modulated by commonly available FDA/TGA approved medications. They may play a role in developing therapies to prevent the progression of glaucoma independent of intraocular pressure control. This approach to therapy is termed neuroprotection. We use a retinal explant model of glaucoma and apoptosis in a base strain of mouse with application for later gene knockout studies and transgenic mice developed from a rat model we have used for a number of years. We have also developed a novel and very powerful computer program that maps out genetic modulation pathways that can be confirmed with later molecular studies and design gene arrays, nanostrings and rtPCR studies. This program, dubbed ‘Genebunny’ has a wider application in oncology and clinical genetics research and is currently undergoing beta testing.

We already have one postdoctoral researcher and one PhD student working on aspects of this very large project who are familiar with the experimental techniques. A prospective student could work on an aspect of this program that takes their interest. Namely:
1: Investigating that activity of a new genetic loci identified from the GWAS studies
2: Characterising and refining drug delivery to the eye for Angiotensin II blockers
3: Looking at the wound healing properties of irbesartan