NeuroScientific
BIOPHARMACEUTICALS

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EmtinB Can Become a Revolutionary Treatment for Glaucoma with Disease-Modifying Potential

- **New data demonstrates the ability of EmtinB to penetrate the retina and optic nerve of the rabbit eye with no side effects**
- **Previously shown that Metallothionein (EmtinB is modeled on Metallothionein) is a powerful promoter of axonal regeneration of the completely severed mature optic nerve in rat model**
- **Next study will aim to demonstrate that EmtinB can effectively protect the astrocytes in the optic nerve and retinal ganglion cells from damage associated with elevated intraocular pressure. These experiments will be completed in pig model with efficacy data available by the end of the year**
- **EmtinB could be the first available disease modifying treatment of glaucoma due to its capacity to promote optic nerve regeneration. The potential for reversing the glaucoma-induced damage to the optic nerve is being heralded as a major potential health breakthrough by ophthalmologists**
- **Data from rabbit study also indicates that EmtinB could be developed into a disease modifying eye drop formulation.**

Perth, Australia; 1 October 2019: Drug development company NeuroScientific Biopharmaceuticals Ltd (ASX:NSB, "NSB" or the "Company") is pleased to report first pre-clinical results of the Company's ophthalmology program, using EmtinB as potentially disease-modifying therapy for glaucoma.

The ophthalmic market within the biotechnology sector has recently experienced strong growth and significant attention from pharmaceutical companies. Ophthalmic or ocular drugs used to treat eye conditions such as cataracts, retinopathy, and glaucoma are valued at $25B per annum and expected to grow as companies involved in the sector are introducing new ocular drugs into the market to effectively treat these disorders.

Current glaucoma drugs do not reverse vision loss, just slow down disease progression

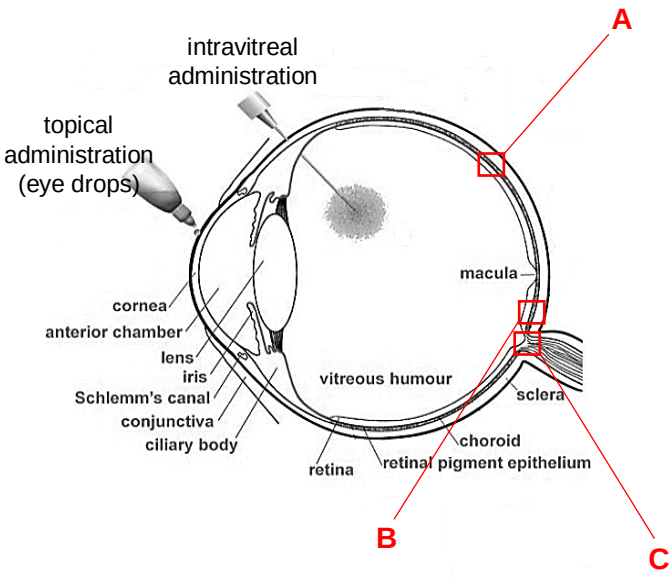
Glaucoma is an eye condition that causes damage to the nerve that connects the eye to the brain (*optic nerve*). It is one of the leading causes of blindness globally, with at least 60 million sufferers worldwide and affects 300,000 Australians. Current treatment options can help, but glaucoma cannot be cured, and vision loss is irreversible. The glaucoma pharmaceutical field is projected to grow to $5.3B per year worldwide during the next three years.

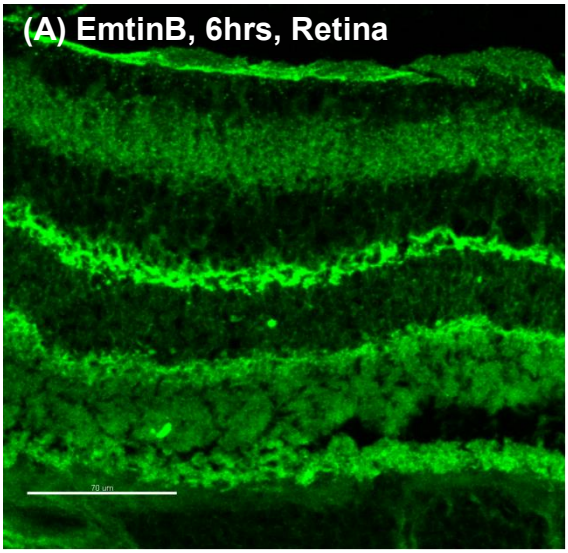
Glaucoma is caused by changes to the flow of fluid (*aqueous humor*) within the eye. Under normal circumstances, fluid is continuously produced and flows out of the eye, maintaining a steady ocular pressure. Most cases of glaucoma are due to increased pressure within the eye (*intraocular pressure*) caused by problems with drainage of the fluid. Ultimately pressure-driven damage to astrocytes (*neuron supporting cells*) and degeneration of neural cells (*neurons*) is responsible for vision loss in glaucoma.

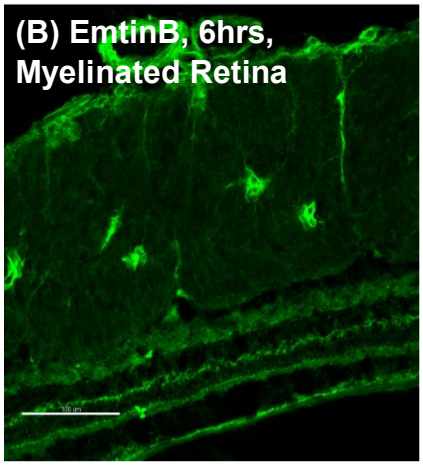
Current treatment options help reduce intraocular pressure and slow down further vision loss and disease progression. Unfortunately, correcting the eye pressure alone does not guarantee that there will be no further loss of vision. With current therapies, vision that has already been lost cannot be recovered.

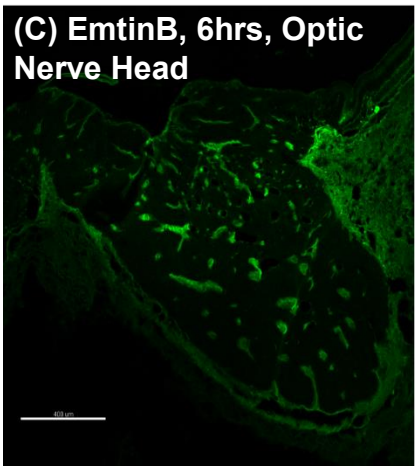
There is unmet medical need to develop a new treatment product that will have the potential to stop disease progression and reverse vision loss.

EmtinB Distribution Study in Rabbit Ocular Model (shown in green)









EmtinB is modelled on a specific sequence of metallothionein-II A; a neuroprotective protein produced as part of the innate immune system. EmtinB activates intracellular signal transduction pathways associated with the survival-promoting functions of neurons and glial cells.

EmtinB has exhibited neuroprotective and neuroregenerative effects in multiple in vitro (*cell cultures*) and in vivo (*rats*) models. Thus, in combination with data showing the ability of EmtinB to penetrate the retina and optic nerve (*shown above*), we are confident that EmtinB could become a potent agent able to protect the astrocytes and retinal ganglion cells of the optic nerve from damage associated with elevated intraocular pressure and therefore completely stop and potentially reverse progression of Glaucoma.

Fluorescence labelled EmtinB was injected into the vitreous of the right eye of an anaesthetised rabbit to assess the ability of the dendrimer to penetrate the retina and optic nerve (*see picture above*). The results have clearly demonstrated that EmtinB can penetrate and reach the retinal ganglion axons, retinal neurons and glial cells after intravitreal injection as evidenced by fluorescence labelled EmtinB being detected at 3, 6, and 9 hours after injection into the vitreous. There was no fluorescence labelling found in the retina and optic nerve in the control treated left eyes.

EmtinB showed no cytotoxicity for the retinal ganglion axons, retinal neurons or glial cells as evidenced

by TUNEL at 3, 6 or 9 hours after intravitreal injection of EmtinB.

Initial results also showed accumulation of EmtinB in the sclera part of the eye after 9hrs, indicating that EmtinB molecules can penetrate through all ocular layers. This data is suggestive that EmtinB could be developed into topical (*eye drop*) formulation.

“This data is the first set of experiments in our ophthalmology program. Having had ten years public company experience in in the Ophthalmology space, I am very excited at the enormous potential of a topical eye drop disease-modifying therapy for Glaucoma patients”, said Brian Leedman, Chairman of Neuroscientific Biopharmaceuticals.

Next Steps in the Glaucoma Program

NSB’s pre-clinical Glaucoma Program is conducted by the research team at the Lions Eye Institute that have more than 30 years of experience in animal based ophthalmic research and have developed models which are able to be used to assess any protective effects in the optic nerve under conditions of raised intraocular pressure, the major risk factor in glaucoma.

In the next part of the program the Company will use a pig model to assess the protective effects of EmtinB as pigs have an optic nerve head structure very similar to that in humans. Previous work by Lions Eye Institute in pigs has established the baseline data for the effects of raised intraocular pressure in the pig eye. The research that will be undertaken builds on a large body of work from the Lions Eye Institute team that has been published in the highest ranked journals in ophthalmology.

Short term elevation of intraocular pressure has been shown to produce neuronal and astrocyte damage after only a few hours. The main thrust of the Company’s next study is to test the ability of EmtinB to eliminate or ameliorate such changes in the pig model. Success in this regard would be a major outcome in ophthalmology and would present a major potential commercial opportunity in the glaucoma field.

"Glaucoma is a vision-threatening disease that requires lifelong treatment and patient compliance”, said Matthew Liddelow, CEO and Managing Director of Neuroscientific Biopharmaceuticals. "Our Company is on the cusp of developing a new innovative treatment that will have the potential to address concerns with patient compliance, to increase efficacy and to potentially preserve sight for glaucoma patients."

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About NeuroScientific Biopharmaceuticals Ltd

NSB (ASX:NSB) is a drug development company focused on developing peptide-based pharmaceutical drugs for the treatment of neurodegenerative conditions with high unmet medical need. The Company’s product portfolio includes EmtinB, a novel therapeutic peptide most advanced as a treatment for Alzheimer’s disease; and other related peptides (EmtinAc, EmtinAn, and EmtinBn) which have demonstrated similar therapeutic potential as EmtinB. For more information, please visit www.neuroscientific.com

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