

Pro-Inflammatory Cytokines in Glaucomatous Aqueous and Encysted Molteno Implant Blebs and Their Relationship to Pressure

Freedman J, Iserovich P. Proinflammatory cytokines in glaucomatous aqueous and encysted Molteno implant blebs and their relationship to pressure. Invest Ophthalmol Vis Sci. 2013;54:4851–4855.

STUDY OVERVIEW:

Experimental in vivo study involving 60 eyes to assess the presence of pro-inflammatory cytokines in glaucomatous and non-glaucomatous aqueous:

1. 23 glaucomatous eyes undergoing Molteno3[®] surgery
2. 24 glaucomatous hypertensive eyes that underwent Molteno3[®] surgery i.e. aqueous removed from bleb during hypertensive phase (Note: hypertensive phase defined as 6-10 weeks following implantation)
3. 13 control eyes i.e. non-glaucomatous/normotensive

TGF-β2 CYTOKINE:

- This study confirms the well documented presence of TGF-β2 in glaucomatous aqueous and hypertensive bleb aqueous.
- TGF-β2 is a pro-inflammatory cytokine and is responsible for causing changes in the cells of the trabecular meshwork that result in a decrease in aqueous outflow.

CCL2 CYTOKINE:

- This study demonstrates significantly elevated levels of CCL2 in both glaucomatous and hypertensive bleb aqueous.

	Control (IOP 13 mmHg)	Glaucomatous Aqueous (IOP 26 mmHg)	Molteno [®] Hypertensive Bleb Aqueous (IOP 38 mmHg)
Cytokine levels i.e. number of cytokine trace elements detected	15	18	23
Level of TGF-β2 cytokine detected (pg/ml)	6,147	9031	11,589
Level of CCL2 cytokine detected (pg/ml)	40	178	256

STUDY FINDINGS:

- This study indicates that there are five pro-inflammatory cytokines that increase with an increase in IOP. The presence of these pro-inflammatory cytokines may result in fibrosis of the bleb lining, thus decreasing the efficacy of the bleb. The most notable cytokines are TGF- β 2 and CCL2.
- The authors note that the presence of these cytokines during the early formation of a bleb, as is seen in valved glaucoma implants where glaucomatous aqueous reaches the plate surface immediately, may result in a more severe and prolonged hypertensive phase and a more fibrosed, less functioning bleb.
- The study findings support the maintenance of a low IOP during the formative period of bleb formation, in order to decrease the effects of pro-inflammatory cytokines.
- Bleb needling: removing aqueous from the bleb during the hypertensive phase has the dual effect of both removing cytokines as well as the stimulus for their production – and thereby results in less fibrosis and a better functioning bleb.

© 2020, Nova Eye Medical Ltd. E&OE. Patents pending and/or granted.

Molteno[®] and Molteno3[®] are trademarks of Nova Eye Medical Ltd. Baerveldt[®] is a trademark of Johnson & Johnson, Inc.

INDICATIONS: The Molteno3[®] is indicated to reduce intraocular pressure in neovascular glaucoma and glaucoma where medical and conventional surgical treatments have not been successful, to control the progression of disease.

CONTRAINDICATIONS: Patients with the following conditions may not be suitable candidates for the Molteno3[®]: 1. intraocular infection, 2. rheumatoid arthritis, scleritis and immune corneal melt syndromes, 3. Scleral Buckle.

COMPLICATIONS: Possible complications with the use of the Molteno3[®] include, but are not limited to: choroidal detachment, retinal detachment, expulsive haemorrhage, pupillary block, lenticulo-ciliary block, shallowing and flattening of the anterior chamber, intraocular infection, diplopia, loss of central vision, hypotony and corneal endothelial damage.

ADVERSE EVENTS: Possible adverse events with the use of the Molteno3[®] include, but are not limited to: corneal endothelial damage when the tube touches the corneal endothelium, breakdown of the tissues overlying the bleb, diplopia when the placement of the implant interferes with the action of the extraocular muscles, corneal decompensation, progression of lens opacities, cystoid macular oedema, retinal detachment and intraocular infection

PRECAUTIONS: Caution should be taken with supra-Tenon implantation; erosion of the conjunctiva is known to result from the raised edge of the oval pressure ridge (Molteno3[®] G-Series) of surgical techniques, proper use of the surgical instruments, and post-operative patient management are considerations essential to a successful outcome.

