IMMUNOCYTOCHEMICAL ANALYSIS OF CELLS OF THE EYE AFTER MONOCULAR DEPRIVATION

A Thesis

Submitted for Partial Fulfilment of The M.D. Degree (Anatomy)

By

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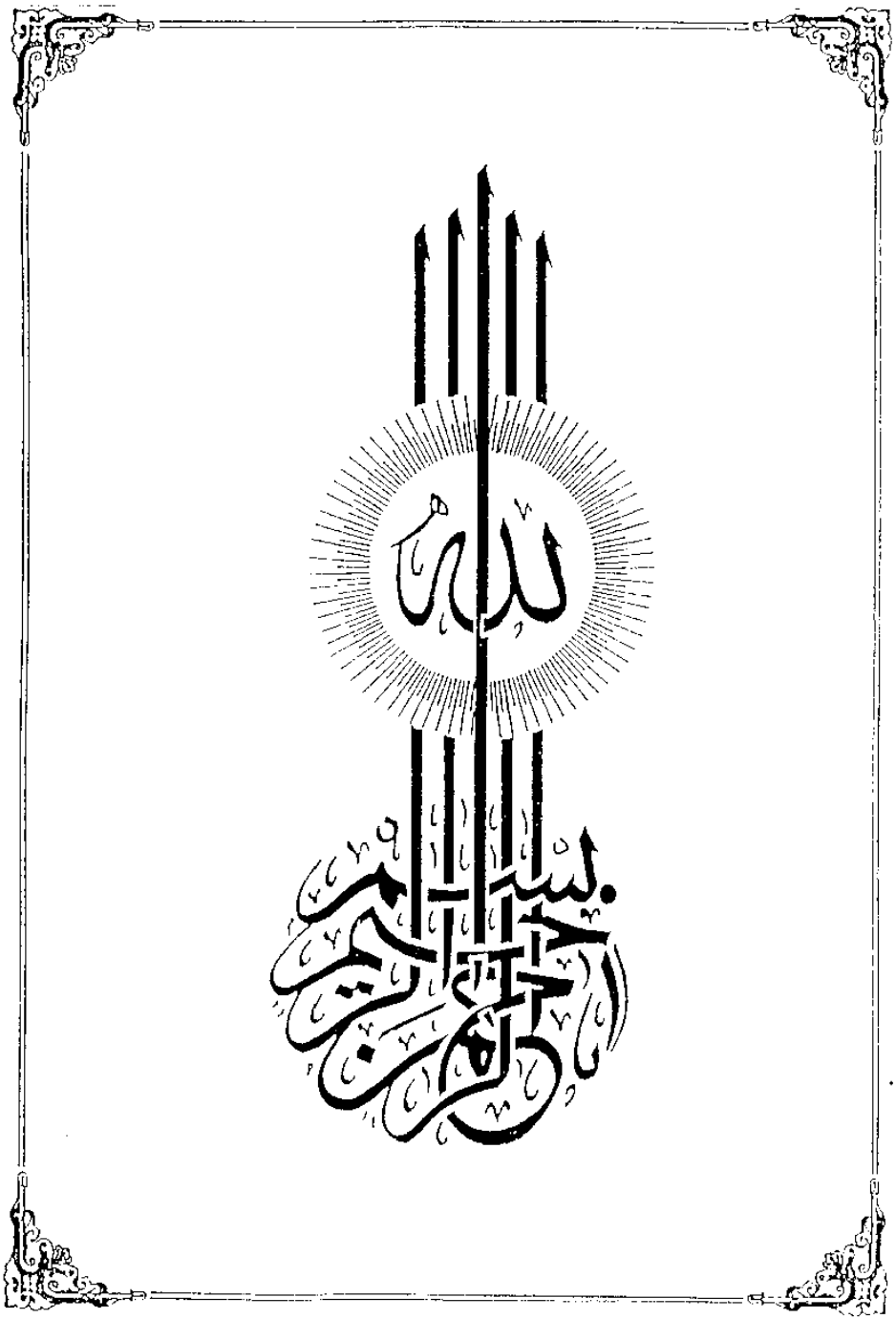

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Introduction & Aim of the work

growth in the eye especially in cases of unchecked scleral growth such as monocular deprivation and newborn myopia. Studies on ocular fibroblasts may provide a better understanding of the regulation of fibroblast proliferation and transformation by the interaction of growth factors with hysiological neurotr-ansmitters and thereby potentially equip us with less toxic harmacological agents for ocular and systemic use.

The second aim is to find a mammalian experimental animal model for myopia research since most of the work that has been done is on the non-mammalian chick eye. The selection of the rabbit as an animal model in the present work is because of the extensive work done on the rabbit eye proving the very close similarity in structure and physiology to the human eye added to the detailed describition present for the rabbit eye in the recent literatures. The third aim is to apply the recently introduced technique of immuno-cytochemical staining using the post-embedding technology since this way was proved to be successful in detecting the intracellular localization of neurotrans-mitters and growth promoting factors in other unchecked overgrowth activities such as in salivary gland tumours and neuromas.

Studies on fibroblast proliferation have contributed extensively to our understanding of oncogens, scleral overgrowth and the mechanisms of tumorigenesis ***(Schor, 1991; and Weinberg, 1991).*** The sclera has been used as a unique system for observation of fibroblast growth in vivo by using scanning confocal microscopy ***(McDonald, 1992; and Underwood, 1992).***

Retinal fibroblast growth in proliferative vitreoretinopathy can cause traction retinal detachment ***(Pulhorn, 1977; Hiscott, 1979; and Topping, 1979).*** The presence and the recurrence after surgery of pterygia also leads to scarring ***(Barraquer, 1980).***

Scleral fibroblast proliferation in glucoma filteration surgery a common cause for failure of the operation ***(Van Buskirk, 1982; andAddicks, 1983).*** Ocular fibroblast proliferation is a grave complication of injury as well as a major cause of failure of many ophthalmic surgical procedures ***(Grirson, 1988).***

Many pharmacological agents have been advocated for the control of fibroblast proliferation in the eye, many of which are commonly employed in cancer chemotherapy. These include mitomycin ***(Tredici, 1979),*** steroids ***(Tano, 1980)***, 5-fluorouracil

and the regulation of tyrosine kinase activity (e.g. transmodulation).

Cyclic adenosine monophosphate (cAMP) has been shown to increase the stability of the fibroblast growth factor (FGF) messenger RNA (mRNA), thereby promoting the expression of FGF receptors. Investigations showed that fibroblast growth factor (FGF) expression in the corneal and scleral fibroblasts correlated well with the proliferating activity of these receptors ***(Chew, 1992; and Lopez, 1992).***

Review of Literature

REVIEW OF LITERATURES

THE SCLERA

The sclera forms the principal part of the outer coat of the eye. It is almost entirely collagenous, relatively avascular and roughly spherical in shape. Except for a turnover of collagen and cells, the sclera has a rather inactive metabolism. The viscoelastic properties of the sclera are of interest in the study of the distensibility of the eye and its relation to the intraocular pressure ***(Lemp, 1976).***

PHYSIOLOGY ;

The sclera and cornea comprise the outer coat of the eye, and one of their functions is to provide constant protection for the intraocular tissues. Ninety-four per cent of the area of the outer coat of the eye is composed of sclera; therefore, the characteristics of the outer coat will be described in terms of the sclera.

The intraocular pressure stabilizes the tissues in the outercoat of the eye in the same way as inflation of a collapsed pig skin makes a resilient football. This pressure and its complex interwoven collagenous structure make the sclera a tough layer that stabilizes the

positions of the structures concerned with normal vision.

The intraocular pressure always creates a certain degree of tension or stretch on the scleral collagen. However, the amount that the sclera stretches when the intraocular pressure increases is not directly proportional to the change in pressure, because it has been seen that the rigidity of the sclera increases with increasing stretch of its collagenous bundles ***(Spitanz, Luciano and Reale, 1970).***

The ratio of change of preesure to a change of volume in the eye is called the "immediate ocular rigidity". In addition to this relation of pressure to volume is the relation of pressure to time.
When fluid is injected into an eye, the pressure immediately rises (immediate ocular rigidity) and then begins to fall. Originally, it was believed that the fall in intraocular pressure was due to removal of fluid from the eye via the outflow channels, but this was seen to happen even if the outflow channels were blocked so. It was suggested to be from relaxation of the tension in the sclera itself for a short period after an initial stretch. This relation is not known to be caused by a decrease in