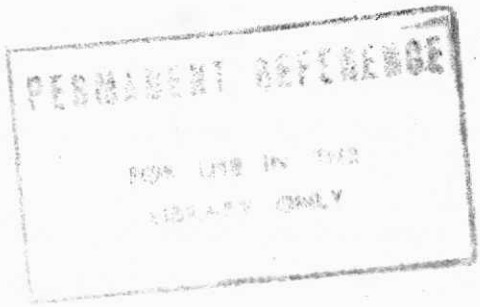
THE AETIOLOGY OF CATARACT AND THE EFFECT OF PREDNISOLONE ON THE DEVELOPMENT OF CATARACT



INDRA IRANGANIE ANGUNAWELA

M.B.,B.S (Ceylon), D.A (London)

Thesis submitted for the degree of

Doctor of Philosophy in the Faculty of Medicine

University of Peradeniya

September 1983

ABSTRACT

Investigations were carried out to clarify the role of auto immune phenomena in the pathogenesis of cataract in the adult human lens. Studies were carried out to determine the presence of serum antibodies to lens protein in patients with senile cataract, in patients with diabetes mellitus with and without cataract and in healthy adult (non-diabetic and free of cataract) control subjects.

The sera from these subjects were investigated for the presence of antibodies to lens protein using the interfacial test and the gel diffusion technique. Non-specific antibodies were removed by adsorption of sera in homogenised rat liver. A high proportion of healthy adults were found to have anti-lens protein antibodies (44.4% by the gel diffusion method). In contrast, the patients with cataract and the diabetic patients with no cataract demonstrated double this incidence, while all diabetic patients with cataract showed the presence of antibodies.

The antigenicity of the lens protein was found to be weak, and this feature is discussed in relation to the proteins of normal lenses as well as cataractous and diabetic lenses. The possible methods by which lens antigen is released to evoke an antibody response is also discussed.

The auto antibody status and the role of lens protein antibodies in healthy humans is discussed. The possible causes for the higher incidence of anti-lens protein antibodies in the patients with cataract, and in the diabetic patients with no clinical evidence of cataract are considered, in relation to cataract formation.

Homogenates of cataractous lenses when investigated for the presence of immunoglobulins, revealed the presence of both Ig G and Ig M immunoglobulins, the former probably to a greater extent.

Fluorescent microscopy, on cryosections of senile and diabetic cataractous lenses, revealed the presence of immunoglobulins within the lens.. The role of immune complexes within the lens in relation to the pathogenesis of cataract is discussed.

The antigen in the immune complexes isolated from homogenized lens was characterised by the SDS-polyacrylamide-gel-electrophoresis method. A single band was consistently obtained and the molecular weight of the protein was estimated to be between 35,000 and 40,000.

An animal model was used to determine the effects of anti-human lens protein antibodies on the lens, andto ascertain the effects of prednisolone on the production of antibodies in immunized animals. Ten rabbits were immunized with human cataractous lens homogenate in Freund's adjuvant according to a schedule. Half the immunized animals were treated with prednisolone. Only one out of the five animals that were treated with prednisolone produced antibodies.

On slit lamp examination of the lenses of all 12 rabbits under investigation, two out of the six rabbits who produced anti-lens antibodies showed cortical lens opacities at the end of 16 weeks. The strong possibility of auto-antibodies to lens protein being of aetiological significance in the pathogenesis of cataract is discussed.