The Influence of Immunisation against Eye Lens Protein on the Electrophoretic Picture of Blood Plasma and Eye Lens Proteins

Preliminary Communication

W.F.		Bon
P.C.		Nobel

Amsterdam

Authors' address : Dr. W. F. Bon and Dr. P. C. Nobel, Laboratory of Biochemistry and Laboratory of Inorganic chemistry of the Municipal University, Amsterdam (Holland)

Judging from preliminary experiments, repeated immunisation of rabbits against α -crystallin obtained from bovine eye lenses seems to have a remarkable influence on the protein composition of the eye lens. In Woerdeman's laboratory it was discovered that a rabbit showed turbidity of the eye lens resembling cataract upon repeated immunisation against α -crystallin. At the suggestion of Woerdeman we investigated whether changes in the eye lens protein can be determined by electrophoresis. This appears, indeed, to be possible, as can be seen from Fig. 1. Agar electrophoresis of the periphery of the eye lens of a non-treated rabbit, of a rabbit which received only one series of injections and of a rabbit which had received a second series of injections with α -crystallin after a rest period of six months, shows differences which might be interpreted as 1° diminution of the concentration of α -crystallin and 2° disappearance of the γ -globulin fraction.

Fig. 1. Agar-electrophoresis of the periphery of the eye-lens of rabbits. 0.05 m. NaOAc, 0.025 m. Glycin, pH 8.0 (NaOH), proteinconc. about 6% > , 5 V/cm. 16 hr. Left from origin fast moving α -boundary, right from origin two β -boundaries and only in a) and b) a γ -boundary. Concentration of α -boundary in c) diminished, a) non-treated rabbit; b) once immunized rabbit; c) twice immunized rabbit.

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As a very tentative explanation it might be assumed that the γ -globulin fraction of the eye lens obtained an antibody-capacity against α -crystallin after the second series of injections with the result that the γ -globulin precipitated with α -crystallin. It is known that cataract can occur when the concentration of α -crystallin in the lens is low (Lit. 1, 2).

Another remarkable fact is that the electrophoretic pattern of the blood plasma of the rabbit concerned also differs from the non-treated rabbits.

It seems that a band occurs in the diagram on the place of α -crj'stallin, clearly outlined against the neighbouring albumin band.

Finally it appeared during the extraction operations that the habitus of the eye lens of the twice immunized rabbit was greatly changed: the structure was so loose that even at the beginning of the extraction, which occurred by stirring the eye lens cautiously in a buffer solution, the lens disintegrated into a turbid suspension while normal lenses are converted slowly and layer by layer into a suspension.

These results are surprising considering the investigations by Langman et al. who demonstrated that no influence of anti- α -crystallin serum on the eye lens can be observed in vivo once the stage of embryonic development in which the eye lens is formed has been reached (Lit. 3).

The question may be raised as to how antibody could diffuse through the capsule of the eye lens. It might be possible that, e.g., the barrier action of the lens capsule for the specific antibody protein has disappeared, or that the antibody is not a protein but a peptid of such small dimensions that it can diffuse through the capsule. Naturally these experiments must be repeated on a much larger scale in order to ascertain whether the observed phenomena can be reproduced and if the suggested explanations are warranted.

References

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