Lens Ageing and Development of Senile Cataracts

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Lens Ageing
and Development of
Senile Cataracts

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O. Hockwin, Bonn

In cooperation with
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Lens Ageing and Development of Senile Cataracts

This volume contains 30 papers presented at the Workshop on Ageing of the Lens, held after the 18th Meeting of the Association for Eye Research, Bonn 1977. Selected papers from the Meeting are published as 'Gerontological Aspects of Eye Research', forming Vol. 13 in the series Interdisciplinary Topics in Gerontology (for contents see pages VII and VIII).

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With ageing, the crystalline lens is subjected to two different kinds of changes which affect its functional capacity. These changes have been realized by the ophthalmologist for centuries:

(a) Loss of accommodation ability. This means a reduced capability to change the lens shape according to distance for exact focusing.

(b) Morphological lens changes which each ageing individual develops. In this respect it is remarkable that only in some patients do circumscribed opacities progress to mature cataracts, the time of occurrence with respect to the patients' age varying widely.

Age-related changes show different morphological manifestations. In some patients the opacification of the normally transparent lens is more intense in the anterior cortex or periphery, while with others it is in the nucleus or the posterior subcapsular region. Changes in the nucleus leading to decrease or loss of vision are more often due to intensified coloration than to opacification.

There is no doubt that senile cataracts are the result of multifactorial events. Among the many influences possibly leading to the different types of senile opacities the ageing of the lens is the most important and most serious factor.

For a long time lens research has been involved with changes induced by increasing age. Recent results obtained from human and animal material in longitudinal studies or investigations on certain age groups showed that the ageing of the lens leads to changes in: cell physiology; protein synthesis; protein composition; electrolyte balance with disturbances in water content; carbohydrate and energy metabolism in quantity and quality.

At the Workshop on 'Ageing of Lens Metabolism' in Bonn in July 1977, scientists in the various fields of lens research have reported their latest findings and have discussed their effects on future research projects. Thus the present volume represents an all-time review on age problems of the lens. Its publication coincides with a new phase of research in this field. In 1978, a cooperative research programme on 'Cellular ageing and decreased functional capacities of organs' was started in the EC member states, which is supported by the European Community. Ageing of the lens and senile cataract formation is one of the three key programmes. In the United States, too, a special project on senile cataract research has been started, and the exchange of experiences on an intercontinental level has already been agreed on.

Considering that in the United States, for instance, only 5 other surgical operations are performed more frequently than cataract extraction, and that in
the year 1958 in England and Wales about 24,000 cataract extractions were performed, and further that in countries like India (Punjab district) 22.5% of the population between 50 and 59 years of age and 31% of the age group over 60 suffer from lens opacities, the benefit lying in the advance in our knowledge of the ageing processes of the crystalline lens is evident. If we succeed in elucidating the mechanisms responsible for age-related opacities, as has already been possible with certain experimental cataract models, we shall probably find the means to slow down or even prevent the rate of cataract formation.

The final scope in this field of age research is not a question of restoring transparency to already opacified lenses, which we know is impossible despite the promising statements of certain pharmaceutical firms. The aim should rather be to stop in time certain initiating factors before they start off the multifactorial processes leading to opacification, which slowly but surely causes the loss of vision. All over the world, scientists in the field of lens research have this goal in mind. It may be assumed that their results on the cellular, molecular and organ level hold also true for ageing problems of other cells and organs. For several basic problems such as the posttranslational protein changes, the lens represents the ideal model, and more and more teams in other fields than eye research take advantage of its properties. Let us hope that the progress in research on lens ageing and development of senile cataract, as demonstrated at the Congress in Bonn, will be widely propagated through this book and will invite scientists to cooperate in this fascinating project.

The Workshop, held at the Congress Centre of the German Red Cross in Meckenheim-Merl, has been made possible through grants from Bayropharm, Cologne, Boehringr, Ingelheim, Chauvin-Blache, Montpellier, Grünenthal, Stolberg, Janssen, Düsseldorf, Knoll, Ludwigshafen, Dr. Mann, Berlin, Martinistiftung der Medizinisch-Pharmazeutischen Studiengesellschaft e.V., Frankfurt, Rodenstock, Munich, Sharp & Dohme, Munich, Schwind, Aschaffenburg, Titmus-Eurocon, Aschaffenburg, Dr. Thiemann, Lünen, Dr. Thilo, Sauerlach, Topcon-Europe, Rotterdam, Dr. Winzer, Constance, Zeiss, Oberkochen, Zyma-Blaes, Munich, whose liberal support is gratefully acknowledged.

Preface XI

The staff of the Division Biochemistry of the Eye, Institute of Experimental Ophthalmology, University of Bonn, was glad to learn that the participants of the Workshop have appreciated their efforts to make their stay agreeable, and that a repetition of the meeting would be welcome.

On behalf of the organizers I want to express our thanks to S. Karger Publishers, Basel, and to Priv. Doz. Dr. von Hahn, Basel, Editor of the series Interdisciplinary Topics in Gerontology for accepting the papers of the International Workshop on Ageing of the Lens for the present volume.
0. Hockwin