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Senile cataract is a highly prevalent age-related disease accounting for 50% of blindness worldwide. In developed countries 15% of the population over the age of 50 years will be confronted with senile cataract and will need surgical intervention to restore ‘normal’ vision; nowadays in the form of extracapsular cataract extraction and implantation of an artificial lens. Because of the high prevalence and increased life expectancy, the costs of cataract extractions and of monitoring and treatment of postoperative complications will become a serious threat to health care budgets even in Western countries. Understanding the causes and risk factors of age-related lens disturbances could give clues for delaying or preventing this highly prevalent disease.

Ageing is accompanied by accumulation of chromophores and aggregation of crystallins to high molecular weight molecules mainly in the lens nucleus. This leads to increased light scatter and diminished transparency. Nuclear changes are slowly progressing and, in very advanced stages, hamper sight to such an extent as to necessitate surgical removal of cataract. The major reasons for urgent surgical intervention are cortical or posterior sub-capsular opacification, i.e. loss of transparency at the level of the outer layers of the lens, which can be associated with nuclear turbidity.

A characteristic of cortical cataracts is that the integrity of the lens fibers is disturbed due to derangement of the membranes limiting the lens fibers. Epithelial and fiber-limiting membranes are, like all cell membranes, very complex entities consisting of a phospholipid/cholesterol bilayer in which specific proteins are incorporated. These membrane-intrinsic proteins represent channels, pores and junctions. Furthermore crystallins, a variety of cytoskeletal proteins and calcium-binding proteins are associated with the membranes. The interaction of these proteins with the phospholipid bilayer per se regulates the proper electrophysiological functioning of the membranes and thus the fine tuning of the homeostasis of ions. The lens-specific electrophysiological functions of the channels and pores, the association of crystallins and cytoskeletal proteins with the membranes, the precise physiological role of junctional proteins and the exceptionally high cholesterol content of lens membranes are of ultimate relevance to understanding the pathological processes leading to vision-impairing cataracts. To pursue this a great diversity of experimental approaches are necessary. In 1993 a group of
European lens researchers combined their efforts in this field and received a grant, in 1994, from the European Union Biomedicine and Health program. Papers presented at the Spring Meeting 1995 of this Concerted Action are bundled in this Supplement of Ophthalmic Research. This supplement clearly reflects the diversity of experimental and technical approaches used to unravel the membrane processes which under normal conditions maintain the transparency of the lens but when deranged lead to cortical opacities. The ultimate goal is to find clues for delaying or preventing this disease. What the papers do not reflect, are the critical and stimulating discussions during the meeting and the atmosphere of friendship so important for a successful open-minded and cordial meeting.

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Editorial
Ophthalmic Research
Teodosi Libondi, Local Organizer
Foreword

During the European Union Concerted Action meeting 1994 in Coimbra it was proposed to have the ‘95 Spring meeting in Naples. I felt very much the responsibility to organize it. It was important not only to prepare a proper site for the meeting, but also to provide a fruitful and friendly atmosphere. The choice of the round table style proved to be a satisfactory one. Discussion was thus facilitated and the active participation of everyone was encouraged. The scientific program was conducted at a high level. Apart from the communications of the members, we were honoured by the presence of invited lecturers: Nick Delamere spoke about the induction of a novel Na, K ATPase in response to modification of lens epithelium ion permeability, while Douglas Borchman presented the results of his recent research on human lens lipid composition. Another invited speaker, Yogendra Sharma from India, illustrated his findings about the possible new role of beta-crystallin as a calcium binding protein. The participants matched the different aspects of lens research the Concerted Action fosters: (a) morphological and structured aspects of lens membranes and lipids; (b) chaperone properties of alpha-crystallin; (c) water and ionic balance in the lens with the special role of Ca2+ plays in this delicate physiologic mechanism; (d) molecular genetics; (e) post-translational modifications of lens proteins, were all subjects of the presentations and of the eventual open and frank discussions. I am pleased to remember the clarity and depth of the talks given by George Duncan, Hans Bloemendal and Gijs Vrensen, whose recent progress constituted an outstanding part of the scientific program. I hope to have succeeded in providing the right environment for the meeting and in filling the time not devoted to scientific work. Naples did the rest. I tried not to leave a minute of free time to the participants. The lack of sports facilities in the center of Naples was fortunately overcome by an ex tempore soccer game played in the center square of Ravello, made possible by the sun which accompanied us during the visit to Herculaneum and the Amalfian Coast. Special thanks are due to Professor Giacin-to Auricchio, who has always encouraged and supported our research in the Eye Clinic of Naples, and to Drs. G. Di Lucca and A. D’Aloia who helped in the organization. Hoping to see you soon back in Naples.
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