FLUORESCENCE SPECTROSCOPY OF CRYSTALLINE CONFORMATIONAL CHANGES UNDER UV-RADIATION

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Abstract Cataract eye illness represents itself a great problem – about 60% of people over 60 overcome eyesight difficulties due to it. A complex investigation of cataract must be performed and some novel methods for diagnostics, control and treatment are to be developed. It has been discovered that one of the reasons that lead to cataract is absorption of UV radiation by eye lens. The proposed mechanism of cataract formation includes two stages: absorption of UV quanta by crystallins (eye lens proteins), conformational changes of cristallins and their consequent aggregation.

The kinetics of UV-aggregation of lens proteins was experimentally studied by the means of light scattering. It has been shown that the aggregation process can be described by the system of differential equations and the rates of changes on second range were determined.

However, such experiments do not explain the nature of aggregation – it is not clear what happens to crystallins under UV radiation. In order to investigate aggregation processes on molecular level and to monitor molecular phohtophysical parameters one needs to apply fluorescent spectroscopy.

We propose a novel method of aggregation diagnostics based on the application of laser fluorimetry complimentary with the conventional methods – polarization spectroscopy, FRET-spectroscopy etc. This method includes the determination of singlet-singlet annihilation rate in crystalline complexes. It is expected that its application to eye lens proteins will help to understand the origins of aggregation.

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