

Our previously obtained data suggest that bis-retinoid A2E, one of the components of the age pigment in the eye, exhibits an enhanced photoreactivity after conjugation with model protein. Such complex generates harmful reactive oxygen species upon irradiation. This project is based on a hypothesis that adducts of A2E (and other retinoids present in the retina) with certain macromolecules may accumulate in the retinal pigment epithelium where they are able to photogenerate reactive oxygen species. The elevated intracellular level of such highly reactive forms of oxygen leads to oxidative stress and contribute to retinal photodamage. The proposed research will verify if retinoid-adducts have increased photoreactivity and, therefore are toxic to retinal cells upon irradiation. We will also evaluate the protective role of natural antioxidants (carotenoids, vitamin C, vitamin E, and cannabinoids) against photo-induced oxidative stress in the retinal pigment epithelium cells in vitro. It is believed that chronic oxidative stress in the outer retina leads to the onset and development of age-related macular degeneration (AMD). This retinal disease is the main cause of blindness among people over 60 years old in developed countries. The pathogenesis of AMD remains unknown and there is no effective treatment of the disease. Limited medical care is available to slow down its progression. We expect, that the results obtained in our research will provide new data about the molecular mechanisms of the phototoxic action of retinoids abundant in the eye. Such information should lead to a better understanding of biophysical phenomena behind the chronic oxidative stress in the outer retina. Our interest in the protective effect of selected antioxidants against phototoxic processes that occur in the eye may help to find a new antioxidant-based approach for the prevention of AMD. The introduction of a unique combination of antioxidants into a preventive therapy against macular degeneration in the retina may reduce the risk of this disease. In the greater perspective, the results of this study may have a positive impact on the quality of life in the aging population.