

LIPIDS AND EYE DISEASE

Fatty acids and the prevention of ocular pathologies: where do we stand?

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Aging is the main risk factor for the development of Age-related Macular Degeneration (AMD). AMD is a multifactorial chronic disease that specifically affects the photoreceptors in the macular region of the retina. The macula is highly enriched in cones that are involved in the vision of details and colors. Visual field defects of AMD patients encompass the loss of central vision, and therefore affect their daily life by impairing their capabilities to reading, watching television or driving a car. AMD is the leading cause of visual loss in the Western populations after the age of 50 years. With the improvement of life expectancy, the number of patients with AMD is therefore expected to increase in the next decades, and to strengthen the socio-economic burden associated to the medical and social care to the patients.

A new light has been shed on nutrients in ophthalmology since epidemiological studies reported a reduced risk for AMD in subjects consuming diets rich in omega 3 long chain polyunsaturated fatty acids (LC-PUFA), and poor in linoleic acid from the omega 6 series of fatty acids. The mechanisms behind this association remain largely unresolved. Comprehensive experiments have been carried out, especially in vitro, to delineate possible pathways for omega 3 LC-PUFAS effects. Among them, the conversion into active metabolites, including the formation of neuroprotectin D1 (NPD1) from DHA, has been suggested. Such metabolites may be more potent than their precursors to reduce oxidative stress, inflammation or prevent neovascularization. The findings of Age-Related Eye Disease Study 2 (AREDS2) have been published, and discredit the benefit of omega 3 LC-PUFA in preventing the progression to advanced AMD. On the contrary, AMD patients with early signs of maculopathy or neovascular AMD in one eye were supplemented with EPA and DHA for three years in the NAT2 study. In this interventional study, individuals who had the higher red blood cell levels of omega 3 fatty acids had reduced incidence of AMD, compared to patients with low omega 3 or from the placebo group.

Beyond the nutrients and their incorporation into retinal tissues, further mechanisms may be suggested in retinal aging and AMD prevention, including modulation of gene expression.