

Development of Improved Animal Models for the Study of Nutritional Interventions Against Retinal Disease

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The xanthophyll carotenoids lutein and zeaxanthin are plant-derived nutrients that are specifically concentrated in the human macula where they act as light screening compounds and antioxidants. The AREDS II study is formally testing in a randomized placebo controlled manner whether or not these compounds help protect against visual loss from age-related macular degeneration (AMD). My laboratory is dedicated to elucidating the biochemical basis for carotenoid uptake and function in the macula, and, most notably, we have recently identified the specific binding proteins responsible for the uptake and stabilization of lutein and zeaxanthin in the retina. Further study of carotenoid function in the eye has been hampered, however, by the fact that non-primate mammals such as mice absorb carotenoids poorly from the diet and do not accumulate appreciable amounts in their eyes. Therefore, we have undertaken a series of experiments to enhance carotenoid uptake into the mouse eye using carotenoids designed for enhanced bioavailability and through the use of transgenic mice expressing lutein- and zeaxanthin-binding proteins in their photoreceptors. These ‘macular pigment mice’ could prove to be important new tools to improve our understanding of the mechanisms by which the macular carotenoids protect against AMD and other blinding disorders.