Can Lutein Protect Against Chronic Disease? A Multidisciplinary Approach Involving Basic Science and Epidemiology to Weigh Evidence and Design Analytic Strategies. Introduction[1]

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Lutein and its structural isomer zeaxanthin have recently been added to the list of potentially beneficial nutrients and phytochemicals provided by leafy greens. The body of evidence that lutein and zeaxanthin might contribute to health and the delay of chronic disease was the topic of a 2001 Experimental Biology Symposium, whose proceedings are presented in this supplement. Evidence from multiple disciplines, ranging from basic studies in experimental animals and cell culture to epidemiology is included. The cross-disciplinary presentations and discussions described within not only provide a current view of the "state of the science," but also lay groundwork and provide ideas for future investigations to advance our understanding of potential roles of these carotenoids in the promotion of health and protection against chronic disease, especially those of the eye.

An overview of the scientific evidence for a protective role of lutein in eye diseases and other chronic diseases is presented by Mares-Perlman and colleagues. Then Krinsky presents the state of current biologic evidence for mechanisms by which lutein and zeaxanthin may confer protection. This provides a conceptual framework of possible mechanisms of protection that are needed to conduct future metabolic and clinical experiments in animals and humans and to develop analytic strategies for epidemiologic studies. Zaripheh and Erdman next discuss experimental evidence of factors that influence the absorption and bioavailability of these carotenoids. That bioavailability is variable in different foodstuffs, supplements and in meals that contain varying amounts of fat suggests that lutein exposure is only crudely estimated by summing the absolute levels of intakes from foods. Improved knowledge of factors that influence bioavailability that they describe may be used to characterize lutein availability more accurately in future epidemiologic studies. Rock next describes epidemiologic evidence for the demographic, body size, life style and dietary determinants of lutein and zeaxanthin levels in the blood and correlates with levels in the diet. The results indicate which of these variables are potentially important to measure and adjust for in evaluating relationships of lutein in blood and diet to disease. The results also indicate potential life style, body size or demographic variables that could explain relationships of these carotenoids to disease if not measured and controlled for. Finally, a paper by Curran-Celantano and colleagues describes emerging new techniques to measure levels of lutein and zeaxanthin levels in the retina; their work presents additional tools with which to advance clinical and epidemiologic investigations. Measurement of specific carotenoid levels in different parts of the eye provides direct biomarkers of lutein availability, and offers a unique opportunity to advance our understanding of the importance of these carotenoids in modifying chronic disease risk in the future.

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