Dr. Herbert and Nicole Wertheim Leadership in Healthcare and Medicine Lectureship

Carotenoids: Colorful Pigments for Sight and Life

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Date: Wednesday, December 12, 2018
Time: 1:00 pm - 2:00 pm
Venue: AHC2 453

Biography

Dr. von Lintig received his PhD degree (summa cum laude) from the biology department of the University of Freiburg (Germany) in 1993. As post-doctoral fellow, he approached the field of carotenoid research by studying the plant biosynthetic pathway of these pigments. This project employed genetic engineering to increase the β-carotene content of rice to combat nutritional vitamin A deficiency, an effort that eventually succeeded in the establishment of 'Golden Rice'. Through this experience, Dr. von Lintig became aware of how little was known about the genetics and biochemistry of this metabolism in humans at that time. In 1998, he started his own group to bridge this knowledge gap and identified the first genes devoted to this metabolism in animals. In 2008, Dr. von Lintig moved his laboratory from Germany to Case Western Reserve University, and has been a member of the CWRU Medical School community for more than 10 years. During this time Dr. von Lintig has successfully continued and expanded his research program which has been continuously funded by the NIH. As a proud mentor to the next generation of scientists, Dr. von Lintig has nucleated and fostered the careers of his students and postdocs in industry and academia. Nationally and internationally, he helps shape his research field as guest editor of special issues on carotenoids, co-chair and chair of the Gordon Research Conference on Carotenoids, and as President-elect of the International Carotenoid Society.

Abstract

Carotenoids are a class of isoprenoid lipids synthesized by plants, fungi, and bacteria. These pigments affect a rich variety of physiological functions in nature and are beneficial for human health, serving as antioxidants in lipophilic environments and blue light filters in the macula of human retina. These dietary lipids also serve as precursors of a unique set of apocarotenoids, including retinoids (vitamin A and its metabolites). We have molecularly identified and biochemically characterized molecular players in carotenoid metabolism. This discovery set the stage for an in-depth analysis of this metabolism in genetically engineered mouse models. Mice deficient for these proteins accumulate carotenoids in many tissues.

By exploiting these animal models, we showed that intestinal absorption of carotenoids is a regulated process. This regulation is mediated by the transcription factor ISX, which links carotenoid absorption to the body's requirement for vitamin A. Furthermore, we used these mice to study the impact of carotenoids on physiological processes such as vision, immunity, and basal metabolism. This lecture will summarize the advanced state of knowledge about carotenoid metabolism and functions in mammalian biology with a particular emphasis on the role of carotenoids as vitamin A precursors.