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Sexual dimorphism in obesity: The vitamin A contribution

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Women's susceptibility to obesity is rooted in a "thrifty" metabolism which offered evolutionary advantage during starvation; however, on a Western diet or after menopause, women store fat in visceral fat depots, which increase risks for premature death, type 2 diabetes, cardiovascular disease and cancer in women. Mechanisms responsible for "thrifty" metabolism in females are not well understood. Recent studies suggest that vitamin A metabolism controls fat formation by regulation of key transcriptional and signaling pathways. Using a mutant mouse model, we show that visceral fat formation in female mice depends on the processing of vitamin A in the body. A vitamin A-derived hormone, retinoic acid, is produced in human and rodents by the aldehyde dehydrogenase 1 (Aldh1a1, a2, a3) family of enzymes. Aldh1 enzymes are expressed in a fat depot- and sex-specific manner. The deficient production of retinoic acid, in mutant Aldh1a1-null female mice helps them to withstand visceral obesity and glucose intolerance induced by both diet as well as by estrogen deprivation, resembling postmenopausal changes in women. Many clinical studies suggest that diseases should be treated differently in women and men. Aldh1a1 enzyme, generating retinoic acid in mice, also produces retinoic acid in women and could represent a potential therapeutic target for treatment of visceral obesity in a sex-specific fashion.

Biography

Ouliana Ziouzenkova is an Assistant Professor at The Ohio State University (OSU), Department of Human Nutrition. After receiving a bachelor's and master's degree from The State University "Schewtchenko", Kiev, Ukraine, Dr. Ziouzenkova completed her Ph.D. at the University of Graz, Austria in 1997. She performed her post-doctoral studies at the University of Southern California, Los Angeles, CA from 1997 to 1999 and at Brigham and Women's Hospital (BWH), Boston, MA from 1999 to 2003. She was an Instructor in Medicine from 2003 to 2007 in the same institution. Dr. Ziouzenkova has been honored with the Louis and Norman Katz Basic Science Award by the American Heart Association in 2002, the Lerner Young Faculty Award at BWH in 2004, and the New Investigator Award by the Organization for the Study of Sex Differences in 2007. She holds four patents and authors 36 publications and book chapters. She serves on an editorial board of 'Vitamins & Trace Elements'. Dr. Ziouzenkova leads a research team fostering innovative approaches in gender-specific anti-obesity therapies that are based on metabolic products of vitamin A.

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