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Modulation of adipocyte function by dietary Omega-3 fatty acids

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Obesity is characterized by enlarged adipocytes producing more pro-inflammatory and fewer anti-inflammatory adipokines. Furthermore, increased immune cell infiltration and cytokine production in adipose tissue contributes to the pro-inflammatory state. Our laboratory has been interested in how plant-derived omega-3 fatty acids such as α -linolenic acid (ALA, C18:3n3) may improve adipose function and reduce inflammation. It has been shown that obese insulin-resistant rats fed diets containing flaxseed oil, a rich source of ALA, have 17% smaller adipocytes, and 5-fold less monocyte chemoattractant protein-1 and 85% less tumor necrosis factor- α in adipose tissue. The ALA-fed obese rats also had fewer infiltrating T lymphocytes, but not macrophages, in adipose tissue. Interestingly, these improvements in adipocyte size and function occurred despite no reduction in adipose mass, indicating that adipocyte function can be disassociated from obesity per se. To further understand how omega-3 fatty acids are modulating adipocyte function, we have been investigating the effects of fatty acid metabolites known as oxylipins. Based on oxylipins derived from C20 and C22 fatty acids it is generally believed that those from omega-3 fatty acids suppress inflammation while those from omega-6 fatty acids promote inflammation. Present studies are investigating the effects of oxylipins derived from C18 fatty acids [ALA and linoleic acid (LA, C18:2n6)] on lipid accumulation and adipokine production using 3T3-L1 adipocytes. The results suggest that inflammation could be modulated by C18 fatty acid-derived oxylipins via their actions on adipose tissue function, specifically through regulatory pathways associated with both adiponectin production and lipid droplet formation.

Biography

Carla G Taylor completed her PhD at the University of Guelph (Guelph, Ontario) and subsequently did postdoctoral studies at the University of Michigan, Ann Arbor, and the University of Washington. She is currently Associate Head of the Department of Human Nutritional Sciences at the University of Manitoba and a Principal Investigator with the Canadian Centre for Agri-Food Research in Health and Medicine. She has published more than 75 papers and has been granted 2 patents. She serves as associate editor for Lipids and for the British Journal of Nutrition.

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