

Diet, food supplements and intestinal microflora in obesity and diabetes

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Background: Obesity, insulin resistance (IR) and type 2 diabetes (T2DM) are closely-related metabolic disorders with epidemic dimensions. Many studies have revealed gut microbiota contribution to metabolic diseases. Progresses in microbiology DNA and genome sequencing are allowing meta-genomic investigation of human gut microbiome. Affecting nutrient acquisition, energy harvest and metabolism, the gut microbiome is influencing obesity, metabolic syndrome (MS), T2DM, immunity, and general health of their host. Many reports have shown clear interactions between ingested nutrients, nutraceuticals and microbiota, suggesting that high-fat/low-fiber western-style diet, dramatically affects the microbiome, favouring the development of obesity and MS. We have already demonstrated an oral retinoic acid (RA) treatment in ob/ob mice, a model of obesity and diabetes, reduces serum vitamin A (ROL) and its transporter (RBP4), fasting glycaemia, IR, body weight and motor reflexes despite similar calories intake load (Manolescu et al. 2010). These benefits were associated with lower subcutaneous and visceral adipocytes diameter and decreased apoptosis and collagen load in cardiomyocytes, thus preventing abnormal cardiac remodelling (Manolescu et al. 2014).

Goal: This review focuses on intestinal microbiota in association with "*favorable*" and "*unfavorable*" cardio-metabolic outcomes. Scientific evidence shows the gut microbiota can influence both obesity and T2DM, in association with dietary interventions. Given gut microbiota plays a key role in obesity and diabetes outcomes (Serino, Burcelin et al., 2009), we consider of interest to next evaluate the microbiome prints in obese, IR and diabetic mice, before and after RA treatment. A post-RA "*favorable*" shift in microflora profile, would suggest some RA metabolic impacts may occur through gut microbiota.

Discussions/Conclusions: Biocenotic structures of gut microbiota can have both positive and deleterious effects. Food, nutraceuticals and drugs have a big influence both on the enterotype and the host metabolism. Diet and food-supplements could strength immunity and help in prevention and/or treatment of morbid obesity, IR and T2DM, while modulating the immunity inflammatory answer. Better understanding metabolic associations between microbiota, obesity, IR, T2DM physiopathology, diet, drugs and specific nutraceutical intake, may lead to innovative preventive and therapeutic approaches.

Keywords: Gut microflora, microbiota, obesity, inflammation, immunity, insulin resistance, diabetes, nutraceuticals, gram-positive bacteria, gram-negative bacteria.