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Effects of calorie restriction on insulin resistance: a potential diabetes prevention

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Diabesity, the coexistence of diabetes and obesity, has become a recent pandemic, implying a rising need for preventive approaches. Calorie restriction (CR) is the most robust nutritional intervention known to increase health span. CR improves cardiometabolic risk parameters, boosts exercise insulin sensitivity response, and may have long term benefits on healthy young and middle-aged individuals. Moderate CR can prevent and reverse the harmful effects of the accumulation of excessive body fat and obesity, diabetes, dyslipidemia, and hypertension. Insulin resistance is one of the most significant factors implicated in these results. Metabolic pathways and pathophysiological mechanisms are well known (figure 1). In the CALERIE 2 trial CR resulted in a significant improvement in glucose tolerance, insulin sensitivity index, and metabolic syndrome score. BIOSPHERE 2 and CRON studies showed similar results. Ketosis-inducing diets represent a group of diets that induce the production of ketone bodies, comprising: diets with low carbohydrate content, normoproteic content and high-fat content, such as classic ketogenic diet, fasting mimicking diet, very-low-calorie ketogenic diet and Spanish ketogenic Mediterranean diet; and diets in which the individual restricts the eating period, having intermittent ketosis, such as intermittent fasting. Ketosis-inducing diets have shown promising results on the improvement of insulin sensitivity and fasting glucose, and on the reduction of perceived hunger with weight loss. A consensus paper by the American Diabetes Association concluded that diets with low carbohydrate content (including those leading to physiological ketosis) "have been shown to reduce glycosylated hemoglobin and the need for anti-hyperglycemic drugs". In summary, CR, including ketosis-inducing diets, may play a role in diabesity prevention. Yet, most studies are designed for obese or diabetic individuals, in which dietary approaches have a secondary prevention and treatment goal. Nonetheless, primary prevention is pivotal, and so we must understand how different dietary approaches reduce the long-term incidence of diabesity.

Biography

Ana Napoleão (speaker) is a Medical Student at the University of Lisbon. She is also doing a Master on orthomolecular medicine at the Spanish Society of Precision Health, and recently published about calorie restriction and ketosis inducing diets.