Mitochondrial uncoupling proteins and neuronal regulation of metabolism

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Nutrient availability is critical for the physiological functions of all tissues. By contrast, an excess of nutrients such as carbohydrate and fats impair health and shorten life due to stimulating chronic diseases, including diabetes, cancer and neurodegeneration. The control of circulating glucose and lipid levels involve mitochondria in both central and peripheral mechanisms of metabolism regulation. Mitochondrial uncoupling protein 2 (UCP2) has been implicated in physiological and pathological processes related to glucose and lipid metabolism. Here, I will present evidence from our work on the relationships between UCP2 and glucose and lipid sensing from the perspective of specific hypothalamic neuronal circuits and peripheral tissue functions. I will focus particularly in melanocortin cells in the arcuate nucleus that regulate energy balance, named AGRP and POMC neurons. I will also present our latest findings on different aspects of cellular biology that govern distinct neuronal populations and how it relates to regulation of energy balance and complex brain function.

Key words: mitochondria, ROS, hypothalamus.