Interrittent Fasting Modulates Hypothalamic Control of Feeding and Body Mass

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Intermittent fasting (IF) is known to promote changes in body mass. We studied the effects of 24 hour fasting cycles in rats and found that, in spite of their reduced mass, IF animals have similar caloric intake as ad libitum (AL) animals, indicating a lower efficiency of energy metabolism. The aim of this study was to assess metabolic and bioenergetic effects of short-term IF to uncover the mechanisms involved in the control of feeding and body mass in these animals. After 3 weeks, IF animals showed lower body mass associated with decreased skeletal muscle mass. There was no difference in citrate synthase activity, mitochondrial respiration or coupling, which indicates that the lower muscle weight was not a consequence of alterations in mitochondrial content and function. Epididymal adipose tissue was decreased in IF animals, but only on fasting days. This is probably related to increased lipid oxidation during fasting days, as measured calorimetrically. In addition, high metabolic rates observed in IF animals during feeding days may also be involved in the lower body weight. To test if IF-induced overeating was caused by alterations in hypothalamic function, we investigated leptin signaling pathways and observed that IF animals were more sensitive to this hormone than AL. However, IF animals presented an increased expression of orexigenic neurotransmitters, even on feeding days, that explains overeating. Changes in levels of neurotransmitter THR were also observed, and parallel with feeding-dependent alterations in metabolic rates. Overall, we find that IF promotes functional hypothalamic alterations associated with differences in body weight and appetite.

Key words: Intermittent fasting, Metabolism, Hypothalamus