INTRODUCTION

Melan-concentrating hormone (MCH) is an orexinergic neuropeptide that is located in the lateral hypothalamus and regulates the energy balance. MCH increases food intake and adiposity, so we sought to investigate the role of the MCH on adipocyte and hepatic metabolism.

Methods: MCH were chronically administered into the lateral ventricles of rats brain, using osmotic pumps that released the MCH for a week. To study whether the sympathetic nervous system mediates the actions of MCH on white adipose tissue, deficient mice for the three beta-adrenergic receptors were used (triple-knockout mice). To determine whether the central effect of MCH on the liver was mediated through the parasympathetic nervous system (PNS), the vagus nerve was dissected. Adenoviral particles overexpressing MCH receptors (MCH-R) were stereotaxically administered into arcuate and lateral hypothalami (LHA, ARC). Tissues were analyzed to determine the expression of genes and proteins involved in lipid metabolism of liver and fat.

FIGURE 1. Periferal effect of a 7-day ICV MCH (10µg/day) infusion on cumulative food intake, body weight (A), triglyceride hepatic content and fatty free acids in liver and serum (B).

Central MCH infusion increased TG hepatic content and decreases FFA levels, indicating a higher lipid storage and lower lipid oxidation.

FIGURE 2. Effect of a 7-day ICV MCH infusion (2.5µg/day) on epididymal WAT mRNA expression of β1, β2 and β3 adrenergic receptors (AR) (A) and on cumulative food intake/body weight in wild-type (WT) and triple beta-adrenergic receptor knock-out (TKO) mice. Central MCH infusion diminished the expression of the three receptors(AR). The ICV MCH infusion in TKO mice showed an increase in food intake as in WT but body weight gain did not increase significantly (B). Those indicate the important role for SNS in mediating the control of lipid metabolism by the CNS-MCH.

FIGURE 3. Effect of a 7-day ICV MCH (10µg/day) infusion in sham-operated rats and vagotomized (VGX) rats (A) and on red oil staining showing lipid droplets in sham and VGX rats (B). Central MCH infusion didn’t increase cumulative food intake and body weight in VGX rats (A). Staining of lipid droplets was increased in sham MCH-treated rats, but not in VGX MCH treated animals. These findings indicate that the vagus nerve mediates the effects of central MCH on liver metabolism.

CONCLUSIONS

11β hydroxysteroid dehydrogenase
Lipid oxidation

Lipid storage
Lipid uptake
Lipid oxidation


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