

POSTER PRESENTATION

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Modulation of trigeminovascular activity by leptin: a novel antinociceptive mechanism?

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Introduction

Fasting is a recognized trigger of headache in susceptible individuals. Leptin is a peptide hormone encoded by the mouse obese gene (*ob*)[1] and is mainly secreted by white adipocytes. Plasma levels of leptin are regulated to reflect body energy stores: levels of leptin fall in response to fasting and are increased in several models of murine obesity [2]. Leptin signaling decreases feeding and increases energy expenditure by activating the longform of its receptor (LepRb) in areas of the brain[3] including the brainstem, midbrain, hypothalamus, thalamus and cortex[4].

Aim

To study the effect of acute administration of leptin on activity in the trigeminocervical complex (TCC) in response to middle meningeal artery (MMA) stimulation.

Methods

Adult male Sprague-Dawley rats were anesthetized with pentobarbitone (60 mg/kg-1) and cannulated for measurement of blood pressure and intravenous administration of supplementary anesthesia with propofol (15-20 mg/kg-1hr-1). The parietal bone was removed over the MMA for electrical stimulation of the dura mater and electrophysiological recording of second order neurons in the TCC using a tungsten electrode. Rats received either rat recombinant leptin in a dosage of 1 mg/kg-1 (i.v.) dissolved in sterile water, or sterile water alone as the control group. The effects of leptin on TCC activity in response to MMA stimulation were recorded.

Results

Leptin significantly reduced cell firing in response to trigeminovascular activation within the TCC ($p < 0.05$). This effect reached a maximum inhibition of nearly 12%

at 45 minutes post-infusion of leptin. Infusion of sterile water alone had no significant effect on MMA stimulation-evoked firing.

Conclusion

The data show leptin treatment inhibits stimulus-evoked trigeminal activity, which might explain, in part, why fasting, a condition characterized by low levels of circulating leptin, may have a role in headache. Exploring the interaction between feeding physiology and trigeminovascular nociceptive mechanisms may contribute to our understanding of this very common trigger.

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