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Effect of Leptin Hormone on the Plasma Growth Hormone Level in Female Rats.

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Abstract

In this work, the effect of leptin hormone on the plasma growth hormone level in the female rats. Six rats were treated with a daily intraperitonial injection of 30 nanogram. leptin for 14 days. After which the animals were bled and killed. Leptin-treated animals had significantly elevated plasma level of growth hormone ($p<0.05$). These observations provide further evidence that leptin stimulate the growth.

الخلاصة

القصد في هذا البحث معرفة إن كان لهرمون اللبتين تأثير على مستوى هرمون النمو في بلازما إناث الجرذان. ولتحقيق ذالك استخدمت ست جرذان , حقنت كل واحدة منهن 30 نانوكرام من اللبتين بمعدل حقنه واحدة يوميا ولمدة أربعة عشرة يوما. ثم قورن مستوى هرمون النمو مع مستوياته في مجموعة سيطرة.. أظهرت النتائج ارتفاعا معنوياً في معدل مستويات هرمون النمو في الجرذان المعاملة و بفرق معنوي ($p<0.05$)

Introduction

The adipocyte hormone leptin, (from the Greek leptos ,meaning thin) also called ob protein is 167-amino acid, 16 kDa protein, product of obese (ob) gene. This gene and its homolog have been cloned and sequenced (Zhang *et al.,* 1994). Its administration to mice reduced their body weight and food intake, increased energy expenditure, and normalized blood glucose and insulin levels (pelleymounter *el al*., 1995). Leptin plays a role in reproductive functions. Mice homozygous for mutation in the ob gene and therefore leptin-deficient are infertile (Levin *et al.,* 1996). Also such mutations (and subsequent lack of leptin production) cause early and rapid onset of obesity - However , this mutation is quite rare in humans (Montague *et al.,* 2001).

Evidences suggest that leptin, exerts a stimulatory effect on growth hormone release in rodents (Montague *et al.,* 2001). This research tries to give a new evidence for the effect of leptin on growth hormone secretion.

Materials and Methods

Twelve adult female rats (initial weight 160-180g)were used throughout this investigation, and divided into two equal groups, a control and a treatment group. They were housed 3 animals per cage. A standard pellet diet and water were available ad libitum.

Each animal in the treatment group received a daily intraperitoneal injection (i.p) of 30 microgram of leptin, dissolved in 0.5 ml normal saline (0,9% Nacl solution) for 14 days. While each rat in the control group was injected a daily intraperitoneal injection of 0.5 ml normal Saline (free of leptin). Leptin is synthesized by Pepro Tech EC (UK)and contained in vials so that each vial contain one mg .

On the 15th day of the experiment blood was collected in heparinated test tubes and centrifuged (2500 rpm) and the plasma stored at -20C$^{\circ}$until the determination of plasma growth hormone level was carried out.

Plasma GH concentrations were determined by using RIA Kit supplied by the National Institute of Digestive Diabetes and Kidney Disease (NIDDK) U.S.A

Statistical analysis

Statistical analysis was carried out by using the statistical analysis system. Student's t test was performed to find the significant difference ($p<0.05$). Snedecor and Cochran (1993).

Results

Our results showed that leptin increased release of growth hormone significantly ($p<0.05$)

figure 1. show the clear differences in plasma growth hormone level between the two groups.

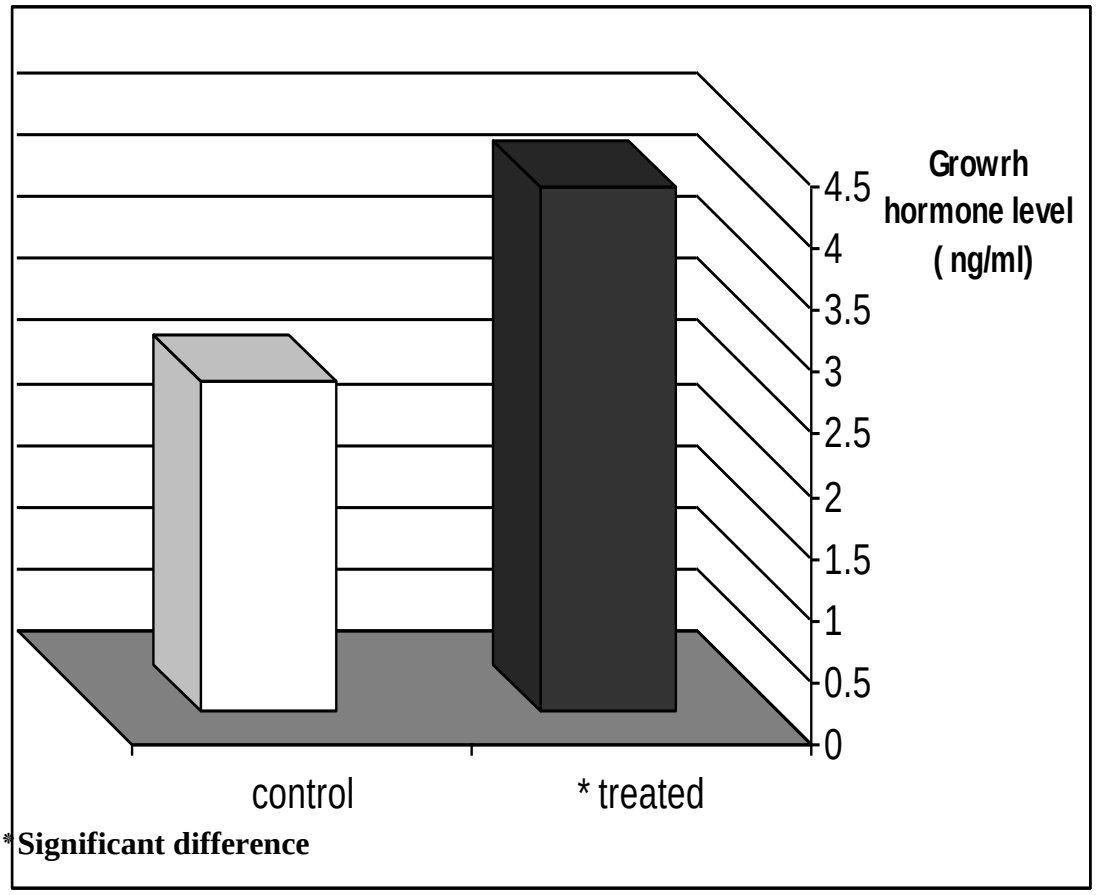

Figure 1- difference between plasma growth hormone levels of treated and control rats.

Discussion

There are several factors known to stimulate growth hormone secretion , like starvation, hypoglycemia. Growth hormone increases during the first period of sleep (Besser and Thorner, 2002). The concentration of growth hormone increases as much 10 fold or more as its normal concentration after depletion of the body stores of protein or carbohydrates (Butler and Le Roith 2001) .

The growth hormone secretion is controlled by two factors secreted in the hypothalamus, and transported to the anterior pituitary gland. The growth hormone-releasing hormone and growth hormone- inhibitory hormone (somatostatin).

According to the above facts and the data presented by this research, there are two hypotheses could be hypothesized to justifying increasing in the concentration of growth hormone.

1- It is known that administration of leptin reduces food intake and increases energy expenditure (Frederick *et al.*, 1995). So , it is suitable to say that caloric restriction caused by leptin administration was followed by increasing in growth hormone release.
2- Also it is known that leptin action in the rat hypothalamus involves altered expression of key neuropeptide genes (Schwartz *et al*., 1996) therefore we can suggest that leptin had stimulated synthesis and secretion of growth hormone-releasing hormone which in turn increased growth hormone release .

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