Implications of leptin in neuroendocrine regulation of male reproduction

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Abstract

Obesity is a major health problem contributing to increased subfertility in males, as well as increased morbidity for diseases related to a decline in testosterone production with aging. Leptin is a hormone produced by adipose tissue whose production increases with the amount of body fat. Several studies have supported a relationship between increased leptin production and regulation of reproductive function. Indeed, leptin acts at all levels of the hypothalamus–pituitary–gonadal (HPG) axis in males. However, most of the obese individuals become insensitive to increased endogenous leptin production and develop a functional leptin resistance. This deregulation of leptin signaling might result in abnormal endocrine and reproductive functions. Altered leptin dynamics may contribute to male infertility in different ways, leading to hypogonadism. These include leptin resistance or leptin insufficiency at the hypothalamus and leptin modulation of testicular physiology. In this review, we address the mechanisms of action of leptin at different levels of the HPG axis. Moreover, the influences of leptin on steroidogenesis and spermatogenesis, as well as seasonal variations of leptin's action on male reproduction are discussed.

Keywords

Adipokines; Leptin; HPG axis; Testis; Spermatogenesis; Steroidogenesis; Testosterone; Leydig cells