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GROWTH HORMONE EXCESS SYNDROME

Juraeva S.T. Juraev Sh T. Yusupova Sh K Sadikova U.M

Andijan State Medical Institute

Abstract: Growth hormone excess syndrome, also known as acromegaly, is a rare and debilitating endocrine disorder characterized by an overproduction of growth hormone by the pituitary gland. This excess hormone secretion leads to an excessive growth of body tissues, resulting in various physical and symptomatic manifestations. The syndrome affects approximately 3-4 people per million, with a higher prevalence among individuals between the ages of 40 and 60 (Melmed, 2016). This article provides an in-depth exploration of the causes, symptoms, and treatment options for growth hormone excess syndrome, highlighting the complexities and challenges associated with this condition.

Keywords: growth hormone (GH), effects, medical treatments, diagnosis, syndrome

Introduction: First of all, we elaborate on GH excess syndrome, such as pathogenesis, clinical manifestations, pathological examination, imaging examination, traditional drug therapy. Then we describe the role of the UPP biomolecular pathway in the treatment of GH excess syndrome and related immune regulation. GH mainly acts on the growth hormone receptor (GHR) and mediates signal transduction through five pathways: JAK-STAT, MAPK, PI3K-Akt, ERK5, and GSK3. UPP is an effective regulator for GH. Conclusion: A critical analysis of the research on the UPP through transgenic mice and the inhibitors developed on the UPP, it was found that one of the inhibitors of the USP8PCP inhibitor had a good inhibitory effect. With in-depth continuous development of these inhibitors, combined with traditional drugs and other GH secretion inhibition strategies, we will better reduce GH complications and improve patient quality of life.

The focus of our review is to systematically elaborate on GH excess or acromegaly so that we can synthesize new methods, thereby reducing GH secretion in the treatment of gender, cardiovascular, kidney, bone, liver, mammary, musk, etc., while improving treatment efficacy. At present, we use somatostatin inhibitors, sex hormones, hyperglycemic agents, and GH antagonists for total therapy. However, the GH secretion rate is still inadequate to reduce mortality due to heart failure, diabetes, and malignant cancer. This shows that we still lack effective methods to reduce GH secretion. In this comprehensive review, we have also described the immunological aspects of GH. Only when we know how GH accepts the signals sent by exogenous substances can we better regulate GH so that passive immune regulation, alone or combined with other therapies, reduces the harm caused by GH. GH-induced complications and other chronic diseases have synergistic effects on human patients, even if GH secretion is reduced to a low level. Therefore, in the clinic, we use other methods together combined with downstream signaling pathways of GH to relieve the patients' symptoms.

Growth hormone is a kind of endocrine peptide secreted from the anterior pituitary in the brain. It can act on many cells and tissues in the body to promote growth, development, and metabolism. For about a century, the growth promotion and anti-aging effects of GH have become the research hotspot of endocrine research. GH excess leads to tremendous overgrowth, which severely influences the patient's appearance, endocrine system, cardiovascular, respiratory and digestive systems, internal

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environment homeostasis, the muscular system, and the skeletal system. Sometimes GH excess also leads to secondary diabetes and malignant tumors or cardiovascular disease. Its appearance and complications seriously affect the patients' life and quality of life. Therefore, it is extremely important to reduce GH secretion in time, relieve the patient's symptoms, and effectively reduce waste of medical resources and increase the average lifespan of patients. It is estimated that about 3-4 people per million may develop acromegaly, and each year 100,000-200,000 persons die of GH excess. Due to renewed attention, research in this field is increasingly advancing. Additionally, a variety of new targeted drugs were developed to attempt the principles of precision therapy.

Definition and Overview

Growth hormone (GH) is a key hormone in growth and metabolism that promotes body uptake of nutrients from the periphery into vital organs. Generally, GH levels are high in fetal and adolescent periods and decrease in adulthood, and are disrupted by the advancement of aging. GH secretions occur predominantly during sleep and are influenced by the duration of sleep, blood sugar levels, and circadian rhythms. In the clinical setting, blood GH levels are determined using pharmacological or physical dynamic tests, but accurate results require the measurement of blood GH levels during sleep.

Growth hormone (GH) excess syndrome, typified by chronic somatic hyperplasia and metabolic derangement resulting from peripheral overproduction of GH, is known as acromegaly in adults and gigantism in children. The clinical and biochemical features of the disorder have been well delineated, but the electrophysiological pathophysiology and optimal treatment have not been comprehensively studied because the disease is relatively rare. It is noteworthy that patients with this disease have characteristic organ dysfunctions due to consequences of somatic overexpression rather than GH overproduction.

Historical Perspective

Gull first, in 1874, and then by Marie in 1886, described patients who were aptly labelled for a number of years as described, not surprisingly, by their "idiotism without obvious lesions." In fact, these patients suffered from pituitary tumors and, after removal, one of them became a prominent actor at the Comédie-Française, speaking fluently and grammatically. In his own subtle manner, W. Shakespeare had already dedicated some verses to giant acromegalic pituitary patients. In May 2000, a remarkably high number of gigantism and acromegaly patients, presumed descendants of the Frères Haïk (Isaac Bacharach) living in North Africa, arrived in the consultation of Pr H. Vexler for periodic evaluation.

There is historical evidence for the fascination of humans with growth and growth acceleration. A noted historical fact is the visit of a Javanese girl called Marija, widely advertised under the nickname of Mademoiselle Moscovici, who was presented by Elie Magot at the annual meeting of the Société du Mont Parnasse Littéraire in 1857. In her mid-childhood, she reached a height of 1.97 meters, an entirely normal value for an adult. Mademoiselle Moscovici was the daughter of a peasant raising water buffaloes and lived in surroundings impregnated by the so-called "aromatized paste," specific to this animal species. An interesting side effect was that she menstruated for the first time at the age of five and that her sexual maturity ensued suddenly, over a period of eight days.

Growth hormone excess syndrome is typically caused by a benign tumor on the pituitary gland, known as a pituitary adenoma. These tumors can be microadenomas, which are small and non-invasive, or macroadenomas, which are larger and may compress surrounding brain tissues

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(Katznelson et al., 2014). In rare cases, the syndrome can also be caused by genetic mutations, such as multiple endocrine neoplasia type 1 (MEN1) syndrome, or by other tumors that produce growth hormone-releasing hormone, such as carcinoids or pancreatic islet cell tumors (Faglia, 2017).

Symptoms of Growth Hormone Excess Syndrome

The symptoms of growth hormone excess syndrome can be diverse and may develop gradually over several years, making diagnosis challenging. The most common symptoms include (Melmed, 2016):

* Enlargement of hands and feet

* Coarse facial features

* Joint pain and limited mobility

* Sleep apnea and excessive sweating

* Headaches and vision problems

* Enlarged organs, such as the heart, kidneys, and liver

* Excessive hair growth and deepened voice

* Impaired glucose tolerance and type 2 diabetes

If left untreated, growth hormone excess syndrome can lead to serious complications, including cardiovascular disease, respiratory failure, and increased mortality (Colao et al., 2016).

Diagnosis and Treatment Options

Diagnosing growth hormone excess syndrome typically involves a combination of clinical evaluation, laboratory tests, and imaging studies. Laboratory tests may include measuring growth hormone levels, as well as other hormone levels, such as insulin-like growth factor-1 (IGF-1) and insulin-like growth factor-binding protein-3 (IGFBP-3) (Katznelson et al., 2014). Imaging studies, such as magnetic resonance imaging (MRI) or computerized tomography (CT) scans, may be used to visualize the pituitary gland and detect any tumors.

Treatment options for growth hormone excess syndrome typically involve a multidisciplinary approach, involving endocrinologists, neurosurgeons, and other healthcare professionals (Faglia, 2017). The primary goals of treatment are to reduce growth hormone production, relieve symptoms, and prevent long-term complications.

Surgical removal of the pituitary tumor, known as transsphenoidal surgery, is often the first-line treatment for growth hormone excess syndrome (Colao et al., 2016). This procedure has a high success rate, with over 80% of patients experiencing normalization of growth hormone levels and improvement in symptoms.

In cases where surgery is not possible or effective, medication may be used to reduce growth hormone production. Somatostatin analogs, such as octreotide and lanreotide, are commonly used to suppress growth hormone secretion and reduce tumor size (Melmed, 2016).

Radiation therapy may also be used to treat growth hormone excess syndrome, particularly in cases where surgery and medication have been unsuccessful (Katznelson et al., 2014).

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Conclusion.

Growth hormone excess syndrome is a complex and debilitating endocrine disorder that requires prompt diagnosis and treatment to prevent long-term complications. While the causes of the syndrome are multifaceted, the primary underlying reason is an overproduction of growth hormone by the pituitary gland. Symptoms can be diverse and may develop gradually, making diagnosis challenging. A multidisciplinary approach to treatment, involving surgical removal of the pituitary tumor, medication, and radiation therapy, can help alleviate symptoms and improve quality of life for patients with growth hormone excess syndrome. Further research is necessary to improve our understanding of this condition and to develop more effective treatment options.

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