

Growth and Metabolism in Children Born Small for Gestational Age



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KEYWORDS

• Growth • Small for gestational age • Growth hormone treatment • Metabolic health

KEY POINTS

- Growth hormone (GH) treatment effectively induces catch-up growth and improves adult height in most short children born small for gestational age (SGA).
- During GH treatment, fat mass, insulin sensitivity, and blood pressure decrease, whereas lean body mass increases; favorable changes occur in lipid levels.
- GH-induced lower insulin sensitivity is reversible after GH treatment and 6.5 years thereafter it is similar in GH-treated and untreated short SGA adolescents.
- At 6.5 years after GH treatment, body composition, blood pressure, and lipid levels are similar to untreated short SGA adults, indicating that GH-induced catch-up in height has no unfavorable effects on metabolic health.

INTRODUCTION

Growth and development are important and sensitive parameters of health and disease. The most important measure of growth is body length. Several factors influence postnatal growth, including genetics, hormones, and the physical, emotional, and social environment. The growth hormone (GH) axis (GH-axis) is the main hormonal axis involved in human growth, and is very complex (**Fig. 1**).¹ The anterior pituitary gland produces GH in a pulsatile pattern, and secretion of GH is under control of the hypothalamic hormones GH-releasing hormone (GHRH) and somatostatin. GHRH binds to its receptor in the pituitary and stimulates GH secretion, whereas somatostatin inhibits GH release. Most of the effects of GH are mediated by insulin-like growth factors

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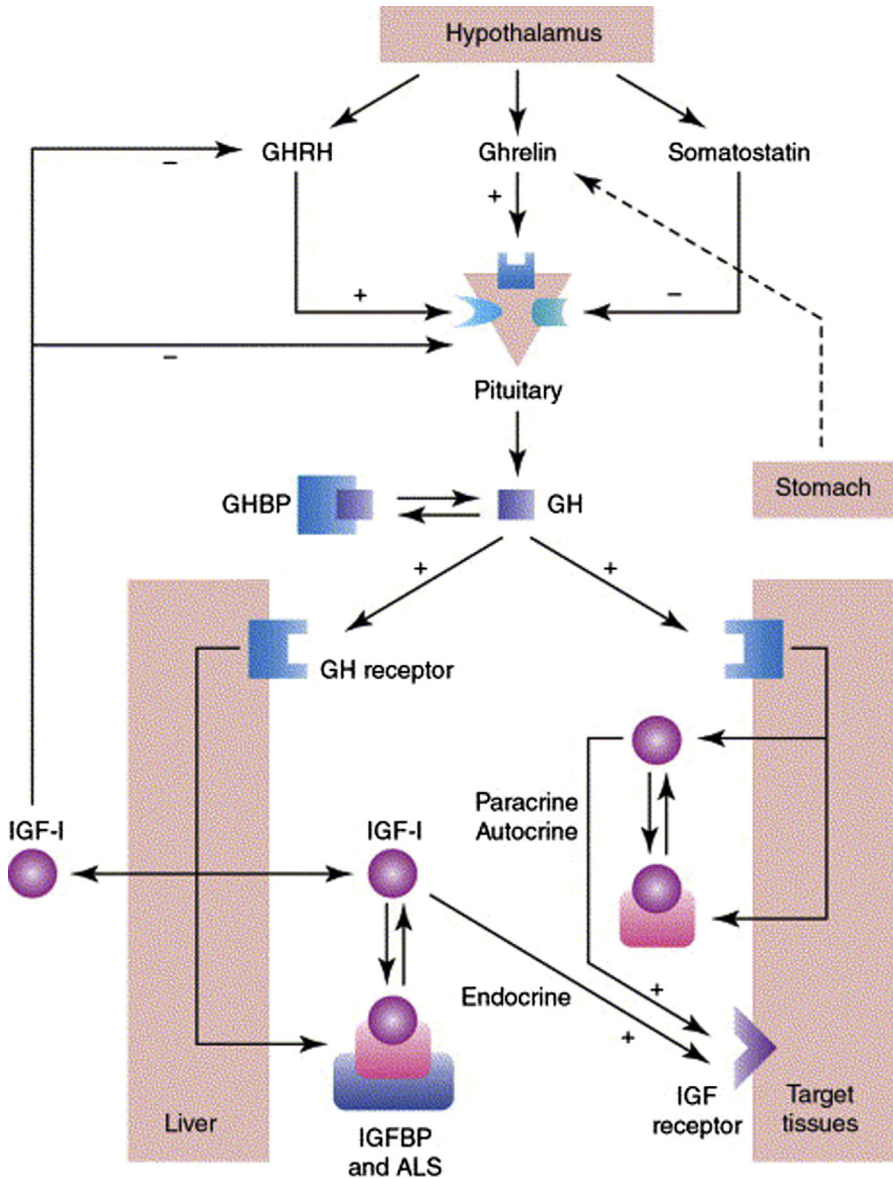


Fig. 1. Physiology of the GH-IGF-IGFBP axis. (From Holt RI. Fetal programming of the growth hormone-insulin-like growth factor axis. *Trends Endocrinol Metab* 2002;13:393; with permission.)

(IGFs). GH has a stimulatory effect on the production of IGF-I, which is synthesized in the liver and secreted into the blood under control of GH, insulin, and nutritional status. Next to growth, IGFs together with insulin and GH, regulate glucose and lipid metabolism and body composition.

Growth assessment requires accurate measurements of height and weight over time, the measurement of parental height, pubertal staging, and the selection of

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