

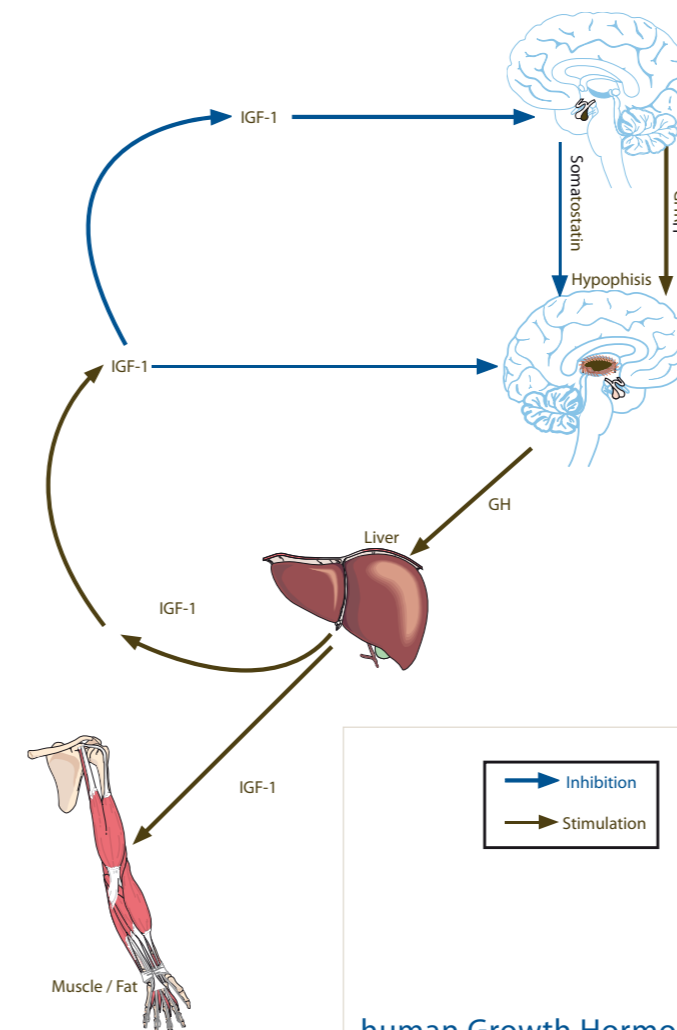
The term **growth factor** refers to a naturally occurring protein capable of stimulating cellular proliferation and cellular differentiation. Growth factors are important for regulating a variety of cellular processes. Assessment of growth in stature is an essential part of the pediatric examination. Growth is an important index of physical and mental health and of the quality of the child's psychological environment; chronic problems in any of these areas may be reflected in a decreased growth rate.

**Growth hormone (GH or somatotropin)** is a polypeptide hormone synthesised and secreted by the anterior pituitary gland which stimulates growth and cell reproduction in humans and other vertebrate animals.

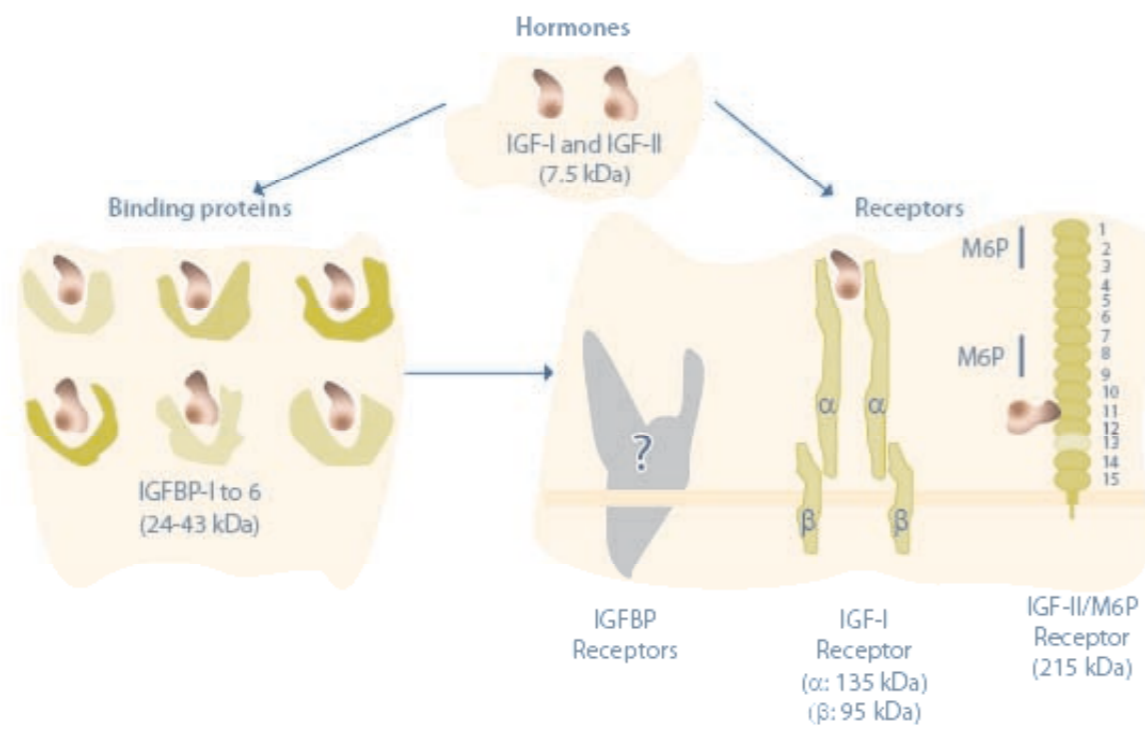
The diseases resulting of GH excess are pituitary tumor, muscle weakness, insulin resistance or even a rare form of type 2 diabetes, and reduced sexual function. GH deficiency produces growth failure and short stature in children while in adults, may include deficiencies of strength, energy, and bone mass, as well as increased cardiovascular risk.

The **insulin-like growth factors (IGFs)** are polypeptides with high sequence similarity to insulin. IGFs are part of a complex system that cells use to communicate with their physiologic environment. This complex system (often referred to as the IGF "axis") consists of two cell-surface receptors (IGF1R and IGF2R), two ligands (IGF-I and IGF-II), a family of six high-affinity IGF binding proteins (IGFBP 1-6), as well as associated IGFBP degrading enzymes, referred to collectively as proteases. IGF-1 and IGF-II are regulated by a family of proteins known as the **IGF-Binding Proteins**. These proteins help to modulate IGF action in complex ways that involve both inhibiting IGF action by preventing binding to the IGF-1 receptor as well as promoting IGF action possibly through aiding in delivery to the receptor and increasing IGF half-life.

**Somatostatin** is a hormone comprising two peptides, one built of 14 amino acids, the other of 28 amino acids. Somatostatin is secreted not only by cells of the hypothalamus but also by delta cells of stomach, intestine, and pancreas. It binds to somatostatin receptors. It is classified as an inhibitory hormone whose main action is to inhibit the release of growth hormone.



**The IGF-system**



- human Growth Hormone (hGH)
- Insulin-like Growth Factor-1 or Somatomedin-C (IGF-1 or SM-C)
- Insulin-like Growth Factors Binding protein-1 / 2 / 3 (IGFBP-1 / IGFBP-2 / IGFBP-3)
- Somatostatin

Human Growth Hormone hGH	Insulin-like Growth Factor-1 (Somatomedine C) IGF-1 (SMC)	Insulin-like Growth Factor-2 (Somatomedine A) IGF-2 (SM-A)	Insulin like Growth Factor Binding Protein-1 IGFBP-1	Insulin like Growth Factor Binding Protein-2 IGFBP-2	Insulin like Growth Factor Binding Protein-3 IGFBP-3	Somatostatin
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## Application

<ul style="list-style-type: none"> <li>Growth retardation hGH hyposecretion is one of the various causes of small stature in children. Serum hGH measurement with a highly sensitive assay, especially following a provocative stimulus (absence of response), is an important way to establish this diagnosis because this group of patients can be treated by administration of hGH.</li> <li>Hypopituitarism Serum hGH measurement is also an index of pituitary function when hypopituitarism (either idiopathic or due to tumour and surgery) is suspected.</li> <li>Gigantism and acromegaly Serum hGH measurement, especially following a provocative inhibitory test (absence of response), is an important way to establish the diagnosis of hGH hypersecretion due to acidophilic pituitary tumour. This results in gigantism in children and acromegaly in adults. Both of these disorders may be treated by surgery or radiation.</li> </ul>	<ul style="list-style-type: none"> <li>In humans, serum IGF-I levels are low during foetal and neonatal life, increase gradually during puberty, peaking at Tanner stages 3-4, and show a decline similar to GH with ageing. In females at each age, average IGF-I plasma levels are slightly higher than in males. There is a significant correlation between IGF-I values and plasma sex steroid concentrations. Sex steroids influence IGF-I levels via an increase in GH secretion. In addition, IGF-I levels are dependent on both caloric intake and protein content of the diet. In nanism due to congenital GH deficiency or GH resistance (Laron dwarf), as well as in later forms of GH deficiency one observes a decrease in circulating IGF-I. This also causes a decrease in serum levels of IGFBP-3 (GH dependent). Elevations of serum GH levels produce an increase of IGF-I, insulin and IGFBP-3, and a decrease of IGFBP-1 and -2. This is typically observed under GH administration and in acromegaly. In obesity, serum levels of insulin and IGF-I are increased, but GH level is decreased. This seems to be due to feedback inhibition by excess of IGF-I.</li> </ul>	<ul style="list-style-type: none"> <li>Insulin-like growth factor 2 (IGF-2) is a protein hormone similar in molecular structure to insulin. IGF-2 plays an important role in fetal growth. It is sometimes produced in non-islet cell tumours, causing hypoglycemia (Doege-Potter syndrome). IGF-2 is an imprinted gene, meaning that it is differentially expressed depending on its allelic inheritance, i.e. maternal or paternal inheritance.</li> </ul>	<ul style="list-style-type: none"> <li>Assessment of insulin production by beta-cells (insulin measurement is more complicated)</li> <li>Prediction of type II diabetes?</li> <li>Assessment of nutritional status.</li> </ul>	<ul style="list-style-type: none"> <li>The IGFBP-2 concentration is age-dependent in blood. Normal values for healthy individuals (1.5 to &gt; 70 years) were evaluated for this assay. Supplementary parameter to IGFBP-3 in the diagnosis of growth disorders (IGFBP-2/IGFBP-3 ratio), IGFBP-2 is an inhibitor of growth hormone action. Progression-dependent tumor marker in leukaemia, astrocytic CNS tumors, prostate-, suprarenal cortex-, hepatocellular and other carcinomas. Anti-aging parameter: IGFBP-2 as a marker of physiological functionality.</li> </ul>	<ul style="list-style-type: none"> <li>A single IGFBP-3 determination is an excellent screening parameter for GHD.</li> <li>IGFBP-3 is a good parameter for monitoring the therapeutic efficacy in both GHD and acromegaly.</li> </ul>	<ul style="list-style-type: none"> <li>Effect of inhibiting secretion of growth hormone from the pituitary gland.</li> <li>Acts primarily in a paracrine manner to inhibit the secretion of both insulin and glucagon.</li> <li>Inhibits secretion of many of the other GI hormones, including gastrin, cholecystokinin, secretin and vasoactive intestinal peptide.</li> <li>Suppresses secretion of gastric acid and pepsin.</li> <li>Lowers the rate of gastric emptying.</li> <li>Reduces smooth muscle contractions and blood flow within the intestine.</li> <li>Has neuromodulatory activity within the central nervous system.</li> </ul>
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## Method

ELISA	IRMA	IRMA (urinary)	ELISA	RIA CT	SM-C RIA CT	RIA	ELISA	ELISA	ELISA (Mouse)	ELISA	IRMA	RIA
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## Kit Size

96 Tests	25 Tests	96 Tests	100 Tests	96 Tests	100 Tests
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## Catalog #

KAP1081	KIP1081	KIP1131	KAP1581	KIP1588	KIP1589	KIPMR30	KAPME01	KAPME05	KAPME08*	KAP1171	KIP1171	KIPERB306*
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## Incubation Time

1h RT	2h	24h / 24h	30min / 1h / 30 min.	30 min / 2h RT	30 min / 18h 4°C	48h / 1h / 30 min.	1h / 30 min. / 15 min.	1h / 30 min. / 15 min. RT	1h / 1h / 30 min. / 30 min. RT	2h / 30 min. RT	2h RT	30 min. / 18h / 18h / 1h / 15 min. 4°C
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## Sample Type

Serum, plasma	Urine	Serum	Serum, Plasma	Serum, Plasma	Serum	Plasma
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## Sample Size

50 µl	10 mL	100 µl	50 µl	100 µl	10 µl	50 µl (diluted 1/16)	10 µl	1000 µl
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## Standard Range

0,45-98 µIU/mL	1-120 µIU/mL	1,65-215 pg/mL	75,2-3132 ng/mL	33-1529 ng/mL	0,45-47 ng/mL	0,4-50 ng/mL	0,1-8 ng/mL	1-80 ng/mL	0,125-8 ng/mL	460-16070 ng/mL	380-13395 ng/mL	3,9-125 pmol/L
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## Detection Limit

0,17µIU/mL	0,42 pg/mL	1,19 ng/mL	3,4 ng/mL	0,25 ng/mL	0,1 ng/mL	0,02 ng/L	0,2 ng/mL	0,04 ng/mL	10 ng/mL	17,3 ng/mL	6 pmol/L
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## Controls

2 levels	3 levels	2 levels	1 level	2 levels
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## Calibration

NIBSC 98/574	NIBSC 87/518	NIBSC 87/518	NIBSC 91/554	Internal Reference	NIBSC 93/560	Internal Reference
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## Shelf Life

60 weeks	9 weeks	60 weeks	6 weeks	12 weeks	60 weeks	12 weeks	11 weeks
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