Hormonaly ACADEMY

EVIDENCE MONOGRAPH · FOR LICENSED CLINICIANS

Growth Hormone

Somatropin, long-acting analogues and secretagogues — the evidence, the dosing, and the law

A grounded, evidence-graded reference: who truly has GH deficiency and how to prove it, every daily and weekly GH product with its labelled dosing, what oral and injectable secretagogues can and cannot do, and the regulatory and medicolegal map across countries — stated plainly.

First edition · 2026



191 residues · 22 kDa

FPTIPLSRLFDNAML

Fady Hannah-Shmouni, MD FRCPC
Endocrinologist and biochemical geneticist

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An authoritative reference for licensed clinicians. Educational content and a reference for clinical reasoning — not medical advice for any individual.

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How to use this book

How the chapters are built, what the evidence grades mean, and the limits of this reference.

HOW EACH CHAPTER IS BUILT

- A one-line statement of the clinical idea, then focused prose with inline citations [1].
- Evidence chips mark the kind of data behind a claim: human, regulatory, or mechanistic.
- A letter grade (A to D) rates the strength of evidence for the specific use described — not the elegance of the biology.
- KEY POINT boxes carry the takeaway; CLINICAL PEARL boxes give bedside tips; figures are schematic unless stated; a References list closes each chapter.

WHAT THE GRADES MEAN

GRADE	MEANING
A	Consistent randomized trials or meta-analyses for the stated indication.
B	Lower-quality trials or strong observational data.
C	Limited data; mechanism plus small or uncontrolled studies.
D	Very low: preclinical, in vitro, or anecdotal only.

HOW TO USE THIS BOOK · CONTINUED

SCOPE AND A DISCLAIMER

Growth hormone is an approved therapy with defined indications in children and adults, yet it is widely promoted for anti-aging and performance — uses that are not authorized and, in the United States, not lawful to distribute. Growth hormone secretagogues range from approved diagnostic and niche agents to unapproved research chemicals. This book states where the evidence is strong, where it is weak, and which uses are off-label or unapproved. Evidence grades reflect the evidence for the specific indication discussed, not biological plausibility.

This is educational content for licensed clinicians and a reference for clinical reasoning. It is not medical advice for any individual, does not establish a clinician-patient relationship, and does not replace specialist input or formal guidelines. Approvals, controlled-drug status and compounding rules change quickly and differ by country; statements here were verified to 1 November 2026. Verify current national sources, and confirm every citation against the primary literature, before acting.

BEFORE YOU START

Treatment starts with a proven deficiency or a labelled indication — not with a low IGF-1 alone, a symptom list, or age.

Growth hormone at a glance

The monograph's core facts on one page.

FIELD	SUMMARY
What GH is	Anterior-pituitary peptide hormone acting directly and through IGF-1. Therapeutic products are recombinant somatropin (daily) or long-acting derivatives (weekly).
Diagnosis (children)	Integrates height velocity, bone age, IGF-1/IGFBP-3, pituitary MRI and stimulation testing (PES 2016); no single test is diagnostic.
Diagnosis (adults)	Test only with a reason (pituitary disease, surgery, irradiation, TBI/SAH, childhood onset); never for somatopause. ITT peak ≤5 ng/mL; glucagon ≤3 or ≤1 ng/mL by BMI; macimorelin <2.8 ng/mL. Normal IGF-1 does not exclude.
Diagnosis (GH excess)	IGF-1 first: above 1.3 × the upper limit of normal confirms with typical features. If equivocal, 75-g OGTT (2024 consensus: BMI-based nadirs of 0.4 µg/L if BMI <25 and 0.2 µg/L if BMI ≥25, assay-dependent; older cut-off 1 µg/L), then pituitary MRI. Chapter 8.
Products (daily)	Somatropin with a current US label: Genotropin, Norditropin, Humatrope, Omnitrope (follow-on somatropin; not a US §351(k) biosimilar), Zomacton; Serostim for HIV wasting. Nutropin AQ and Saizen are no longer marketed in the US. Doses per each product's label.
Products (weekly)	Lonapegsomatropin (Skytrofa; children, adults 2025), somapacitan (Sogroya; adults, children incl. ISS/SGA/Noonan 2026), somatrogon (Ngenla; children ≥3 y, not adults in US).

GROWTH HORMONE AT A GLANCE · CONTINUED

FIELD	SUMMARY
Starting doses (adults)	AACE 2019: 0.3-0.4 mg/day if <30 y or on oral estrogen; 0.2-0.3 mg/day 30-60 y; 0.1-0.2 mg/day >60 y, obese or diabetic. Titrate every 1-2 months to IGF-1.
Monitoring	Adults: IGF-1 every 1-2 months in titration, then 6-12 monthly; glucose/HbA1c, lipids, free T4, cortisol axis, QoL. Children: height velocity every 3-6 months, IGF-1, thyroid, glucose, spine and hips.
Key contraindications	Active malignancy; acute critical illness; PWS with severe obesity or airway/respiratory compromise; active proliferative or severe non-proliferative retinopathy; closed epiphyses (for growth).
Secretagogues	Approved only for narrow uses: macimorelin (diagnosis), tesamorelin (HIV lipodystrophy), anamorelin (Japan, cancer cachexia), GHRP-2 (Japan, diagnosis only). Ibutamoren, ipamorelin, other GHRPs, CJC-1295: no FDA, EMA or Health Canada authorisation identified (2 Nov 2026).
Legal status (US)	Prescription, not CSA-controlled, but knowing distribution (or possession with intent to distribute) for uses outside HHS-authorised, physician-ordered treatment (e.g. anti-ageing, bodybuilding, athletics) is a felony under 21 USC 333(e). FDA: HGH is a biological product, not eligible for 503A/503B compounding exemptions.

GROWTH HORMONE AT A GLANCE · CONTINUED

FIELD	SUMMARY
Sport	GH, analogues, GHRH analogues, secretagogues and GHRPs: WADA S2, prohibited at all times; TUE required for legitimate GHD.

Sources: PES 2016; Endocrine Society 2011; AACE 2019; Macrilen PI; Genotropin PI; Skytrofa PI; Sogroya PI and FDA approval letter (BLA 761156, 2026); Ngenla PI; Egrifta WR (2025); Wakabayashi 2021; FDA Category 2 list (Apr 2026); 21 U.S.C. §333(e); DEA HGH fact sheet; WADA 2026 List. Full citations in chapter reference lists.

F P T I P L S R L F D N A M L

PART 01

Foundations

What growth hormone is, how the GH–IGF-1 axis works, how it changes across life, and how it is measured.

IN THIS PART

Growth hormone and IGF-1: the axis

Growth hormone across the lifespan

Measuring GH and IGF-1

01

1 CHAPTER 1

Growth hormone and IGF-1: the axis

Growth hormone acts through pulsatile secretion, a cytokine-family receptor and hepatic IGF-1, which together set both its physiology and its laboratory signature.

HYPOTHALAMIC CONTROL

Growth hormone (GH, somatotropin) is a single-chain polypeptide secreted by somatotroph cells of the anterior pituitary. Its release is governed by two hypothalamic peptides acting in opposition: growth hormone-releasing hormone (GHRH) stimulates synthesis and secretion, and somatostatin inhibits release. A third input, ghrelin, produced mainly by the stomach, acts on the GH secretagogue receptor to amplify secretion. Each pathway has a pharmacological counterpart: tesamorelin is a GHRH analogue approved in the US, per current labelling, only to reduce excess abdominal fat in adults with HIV-associated lipodystrophy [1], and macimorelin is an oral ghrelin receptor agonist approved only as a diagnostic agent [2].

1.1 Pulsatility and feedback

GH is released in discrete pulses superimposed on low, often undetectable, interpulse concentrations, with the largest pulses typically occurring during slow-wave sleep. Secretion is modulated by nutrition, body composition, sex steroids, exercise and stress. Adiposity blunts both spontaneous and stimulated secretion, which is why diagnostic cut-offs for some stimulation tests are BMI-dependent [3]. GH and IGF-1 restrain further release through negative feedback on the hypothalamus and pituitary.