

Growth Hormone (GH)

Growth Hormone Function:

- Growth hormone acts **directly** on all tissues in the body, promoting **hypertrophy** (increase in cell size) and **hyperplasia** (increase in cell number).
- It influences the growth of almost **all** tissues capable of growth, including skeletal muscles and soft tissues.

Growth Phases:

- Humans experience two growth spurts: **postnatal** (first 2 years) and **pubertal** (adulthood).
- Continuous net protein synthesis occurs in growing children under growth hormone influence.

Growth Hormone Metabolic Effects:

Protein Metabolism:

- Enhances amino acid transport, RNA translation, and nuclear transcription, promoting protein synthesis.
- Reduces catabolism of proteins and amino acids, aiding in protein deposition.

Fat Metabolism:

- Increases mobilization of fatty acids from adipose tissue for energy.
- Utilizes fatty acids for energy, promoting lean body mass.

Carbohydrate Metabolism:

- Decreases glucose utilization, stimulates gluconeogenesis, and leads to increased blood glucose levels.
- Causes insulin resistance, affecting glucose uptake and production, mimicking metabolic effects of diabetes.

Growth Hormone Regulation:

- Secretion is pulsatile and declines with age.
- Stimulated by fasting, exercise, and stress, and inhibited by glucose and aging, **hypoglycemia**.
- GH levels correlate with insulin-like growth factor levels, influencing growth **indirectly**.

Bone Growth Mechanism:

- GH promotes bone growth in length and thickness through IGF-1 stimulation.
- Osteoblast activity increases thickness, while chondrocyte proliferation at epiphyseal plates lengthens bones.
- GH's effects cease when epiphyseal plates close due to sex hormone influence

Clinical Implications:

- GH deficiency can impair growth and metabolism.
- Excess GH may lead to adverse effects like insulin resistance and diabetes.
- GH therapy benefits include increased muscle mass and decreased fat deposits in specific medical conditions.
- African pygmies (dwarfism) : normal GH and hereditary inability of somatomedin (IGF-1) that's more important for height than GH

