Going beyond growth with the growth hormone deficiency (GHD) patient

**GHD and the cardiovascular system**

*Glucose/glycated hemoglobin (HbA1c)*

Monitoring of glycemic status is not indicated for GHD and carbohydrate metabolism. A rare cause of growth failure that can be congenital or acquired.

**Affects multiple systems and organs**

- **GH** secretion from the anterior pituitary into the blood activates **GH** receptors on the cell membrane of several cell types and induces insulin-like growth factor (IGF-I) production. 
- GH is a pleiotropic factor that, together with IGF-I, affects multiple systems and organs.
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**GH** is needed for optimal β-cell function, reduces insulin sensitivity, increases lipolysis, and increases gluconeogenesis.

**Impact of GHD on carbohydrate metabolism**

- Reduced insulin sensitivity (mostly modest increase in plasma glucose).
- Fasting insulin levels increase, increased insulin sensitivity, decreased fasting glucose.
- Estimated insulin sensitivity, decreased fasting glucose.
- Impaired memory, cognition, quality of life.
- Increased insulin sensitivity.
- Reduces fasting insulin levels.

**GHD and bone**

Bone mineral and strength via osteoblasts, skeletal growth via growth plate, renal growth and function, bone mineral density, CNS, central nervous system, GFR, glomerular filtration rate.

**GHD and the cardiovascular system**

- Reduced cardiac output.
- Increased markers of bone turnover.
- Increased bone mass secondary to an imbalance in bone remodeling (>2-fold increase in fracture risk).
- Normal bone mineral content and density, when corrected for stature.

**GHD and the cardiovascular system**

- Increased adiposity.
- Unfavorable CVD risk.
- Decreased BMD.

**Characteristics of GHD by age**

- **Infancy**:
- **Early infantile GHD**
- **Late infantile GHD**

Adjustments are based primarily on circulating concentrations of IGF-I and clinical response.

**Some individuals may require lifelong treatment**