Insulin-like Growth Factor (IGF)

Insulin-like Growth Factors (IGFs) are peptide hormones structurally similar to insulin, playing a key role in growth, development, and cellular regulation. There are two main types:

IGF-1 (Insulin-like Growth Factor 1)

- Primarily produced in the **liver** in response to **growth hormone (GH)** stimulation.
- Acts as the main mediator of the **anabolic and growth-promoting effects** of GH.
- Essential for **childhood growth** and contributes to **tissue repair, muscle maintenance,** and **metabolic regulation** in adulthood.
- Levels decline with **age** and are influenced by **nutrition**, **exercise**, and **health status**.

IGF-2 (Insulin-like Growth Factor 2)

- More active during **fetal development**.
- Functions largely **independent of GH**.
- Its role in adults remains less clearly understood.

Biological Properties

- **Mitogenic**: Stimulates cell proliferation.
- **Anti-apoptotic**: Promotes cell survival.
- Binds to **IGF receptors**, especially **IGF-1R**, activating pathways such as **PI3K-AKT** and **MAPK**.
- Circulates bound to **IGF-binding proteins (IGFBPs)**, especially **IGFBP-3**, which regulate its bioavailability.

Clinical Relevance

- ↑ IGF-1: Associated with **acromegaly**, **neoplasms**, and **insulin resistance**.
- ↓ IGF-1: Linked to **growth disorders**, **frailty**, **osteoporosis**, and **aging**.