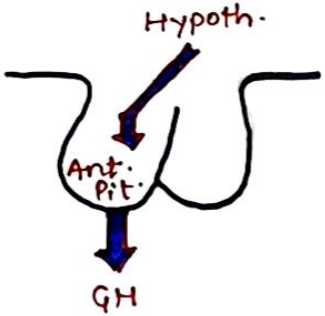
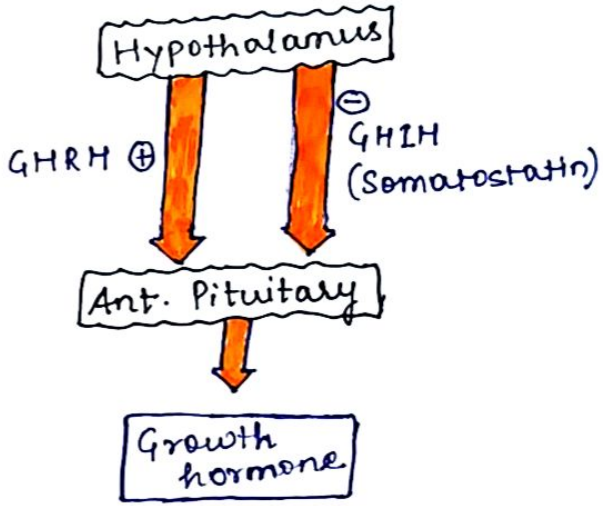
GROWTH HORMONE

➡ Also known as somatotropic hormone / Somatotropin.





GH Functions

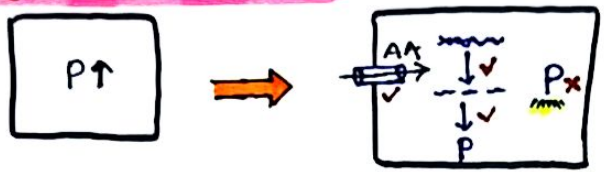
Metabolic Functions

- → On protein metabolism
- → On Fat metabolism
- → On Carbohydrate metabolism

Action on specific tissue

- → On Bone & Cartilage
- → On muscle
- → On organs & soft tissues.

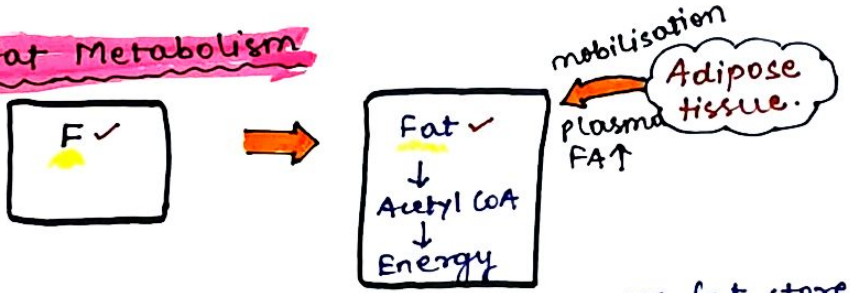
GH On Protein Metabolism



Enhanced protein deposition by :-

(i) ↑ AA transport to interior of cell
(ii) ↑ transcription of DNA to RNA
(iii) ↑ translation of RNA to protein
(iv) ↓ catabolism of protein & AA

GH On Fat Metabolism



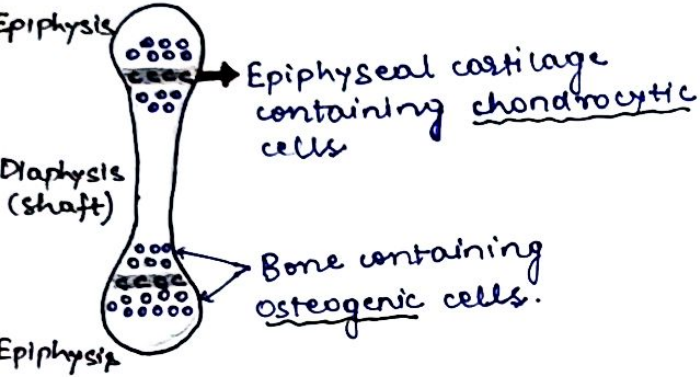
Enhances fat utilisation & decreases fat store :-

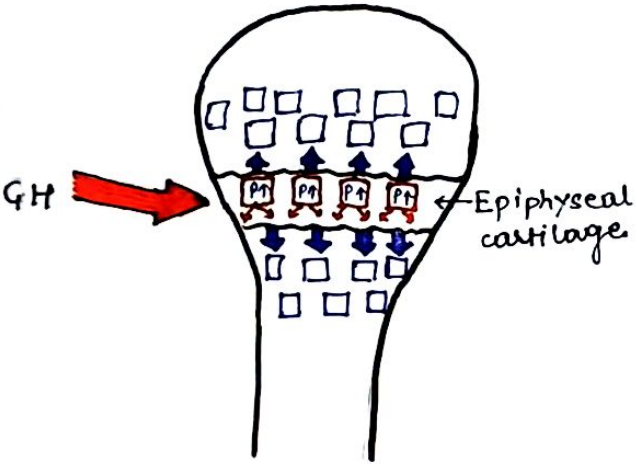
(i) FA → Acetyl CoA → Utilisation of energy.
(ii) ↑ Release of FA from Adipose tissue
(iii) ↑ conc. of FA in body fluids.

Ketogenic effect of excessive Growth hormone.

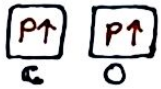
Excessive GH
↓
Fat mobilisation↑↑
↓
Acetoacetic acid formation (In Liver) [Ketosis]
↓
"Fatty Liver"

GH On Bone And Cartilage Growth

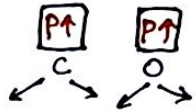




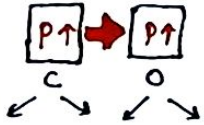
➡ ↑ deposition of protein by chondrocytic & osteogenic cells that causes bone growth.



➡ ↑ rate of production of these cells.



➡ Conversion of chondrocytes into osteogenic cells, causing deposition of new bone.



GH acts on epiphyseal cartilage

↑ New Cartilage Deposition

+

↑ conversion of cartilage to Bone

Cartilage —conv.→ Bone

→ "Shaft Elongation"

[Epiphysis moves farther & farther apart]

Cartilage is used up slowly

By late adolescence,

→ No additional epiphyseal cartilage remaining to provide further long bone growth

Fusion of shaft with epiphysis

No further lengthening of Long Bone occurs.

#

GH (⊕) → Osteoblast → Deposition of Bone

Osteoclast → Resorption of Bone (Removal)

Rate of Deposition > Rate of Resorption ➡ Thickness of Bone ↑s

If,

Lifetime GH secretion occurs.

⬇

Membranous bones grows throughout life (jaw bones)

⬇

- forward protusion of chin & lower teeth
- Thickness of bones of skull ↑
- Bony protusions over eye.

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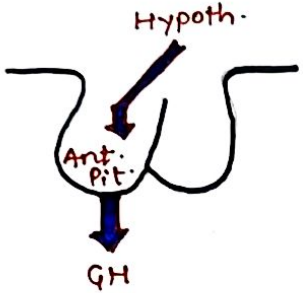

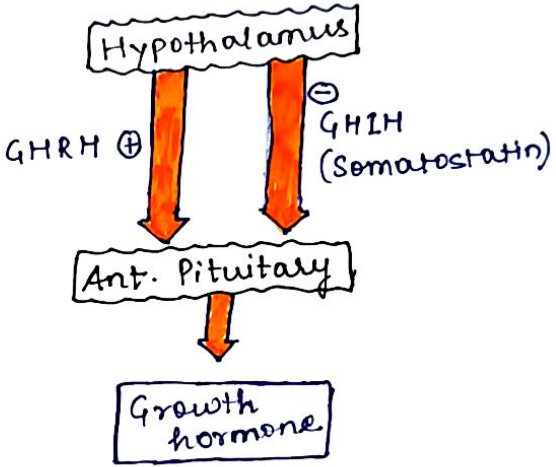

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Somatomedins / IGF / Insulin-like Growth Factors

Effect of somatomedins on growth
Similar to
Effect of insulin on growth
↓
∴ Somatomedins = IGF
Eg:- Somatomedin C (IGF 1)

Action of GH

Some effect → Acts Directly on Tissues
↓
Loosely bound to plasma protein in blood
↓
∴ Released from blood into tissues rapidly.

most effect → Acts on liver

Release of
↓
Somatomedins

Somatomedins → Bone growth

Somatomedins
↓
Tightly bound to plasma protein in blood.
↓
∴ Released from blood into tissues slowly → Prolonged growth promoting effect.

Regulation of GH Secretion

Normal Adult GH plasma conc. = 1·6–3 ng/ml

Child/Aldolescent GH plasma conc. = 6 ng/ml.

Factors stimulating GH secretion

- ↓ Blood glucose
- ↓ Blood Free Fatty Acid
- ↑ Blood AA
- Protein Deficiency
- Exercise
- Trauma, stress, excitement
- First 2hrs of deep sleep
- Ghrelin [Hormone secreted by stomach before meals]

Factors inhibiting GH secretion

- ↑ Blood Glucose
- ↑ Blood Free Fatty Acid
- Aging
- Obesity
- GH ~~stimulat~~ Inhibitory hormone (Somatostatin)
- Exogeneous GH
- Somatomedins (IGF)