



Growth Hormone: The 7 facts you need to know

# 7 facts you need to know about GH

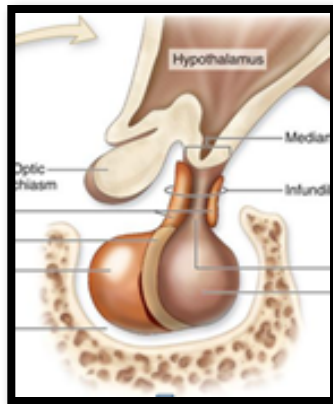
1. **Function:** most important hormone for kids to achieve normal growth
  - High levels during puberty (**stimulated** by E2/Testosterone)



Increased frequency of pulses and magnitude during puberty

# 7 facts you need to know about GH

1. Function: most important hormone for kids to achieve normal growth
  - High levels during puberty (stimulated by E2/Testosterone)
2. GH is associated with **direct** and **indirect** effects (mediated by IGF-1; somatomedins)



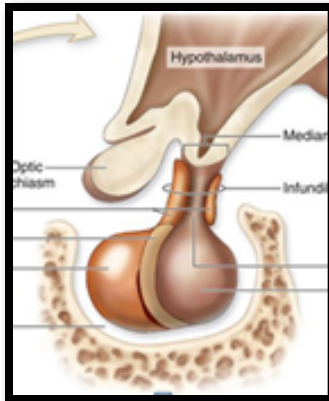
GH



IGF-1

# 7 facts you need to know about GH

1. Function: most important hormone for kids to achieve normal growth
  - High levels during puberty (stimulated by E2/Testosterone)
2. There are **direct** effects from the hormone and indirect effects (mediated by IGF-1; somatomedins)



↑ Protein synthesis  
↑ MM mass  
↑ AA uptake

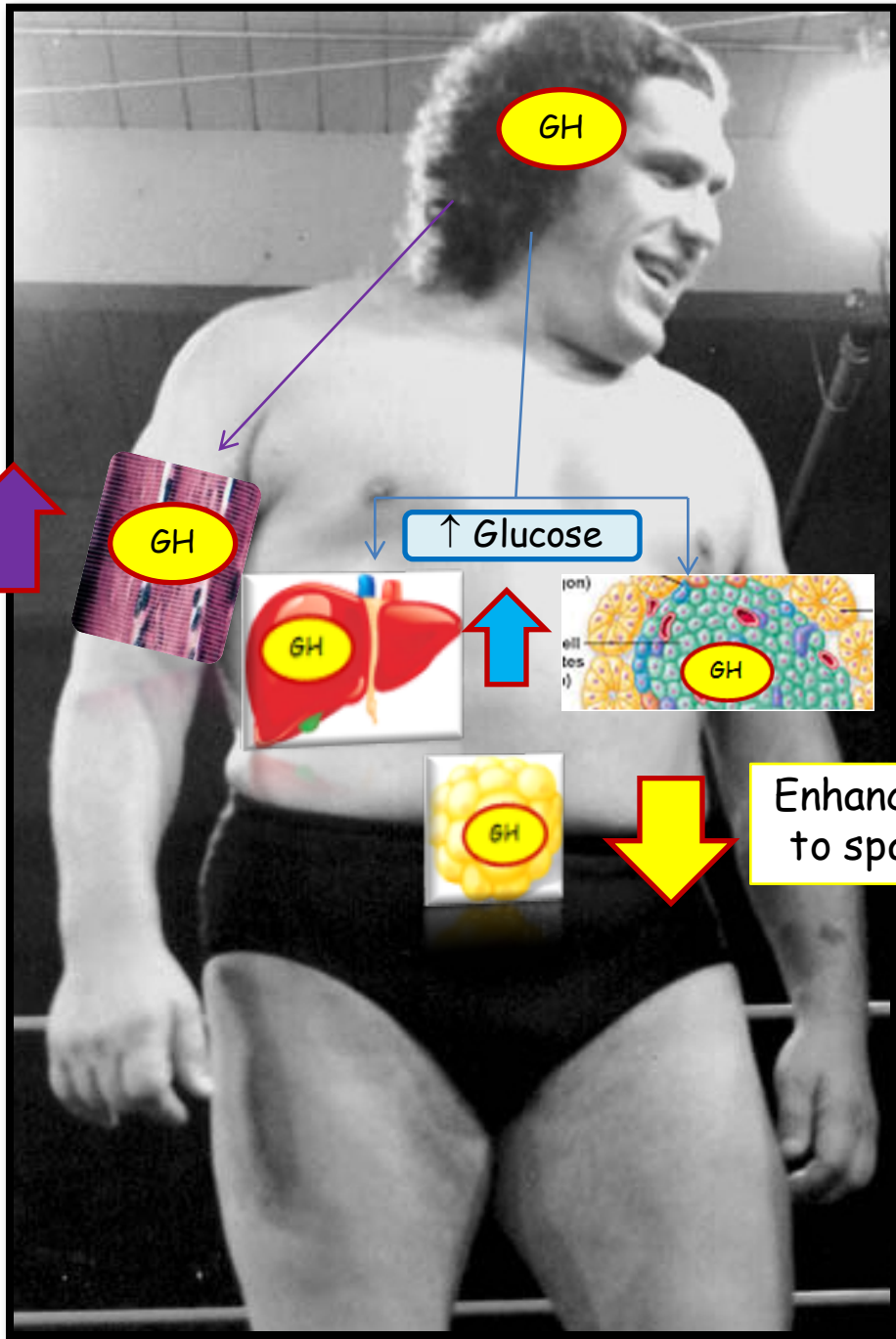
Lipolysis



Gluconeogenesis  
Insulin antagonist

# 7 facts you need to know about GH

1. **Function**: most important hormone for kids to achieve normal growth
  - High levels during puberty (**stimulated** by E2/Testosterone)
2. There are **direct** effects from the hormone and **indirect** effects (mediated by **IGF-1**; somatomedins)
3. **Direct** effects:
  - a) Increases **protein** synthesis/amino acid uptake
  - b) Increases **lipolysis** (to spare proteins)
  - c) Stress hormone → **↑ glucose availability**; stimulated by **HYPO**glycemia
    - Gluconeogenesis
    - Insulin antagonist
  - d) **Stimulates hepatic production of IGF-1**



GH:  
Direct effects

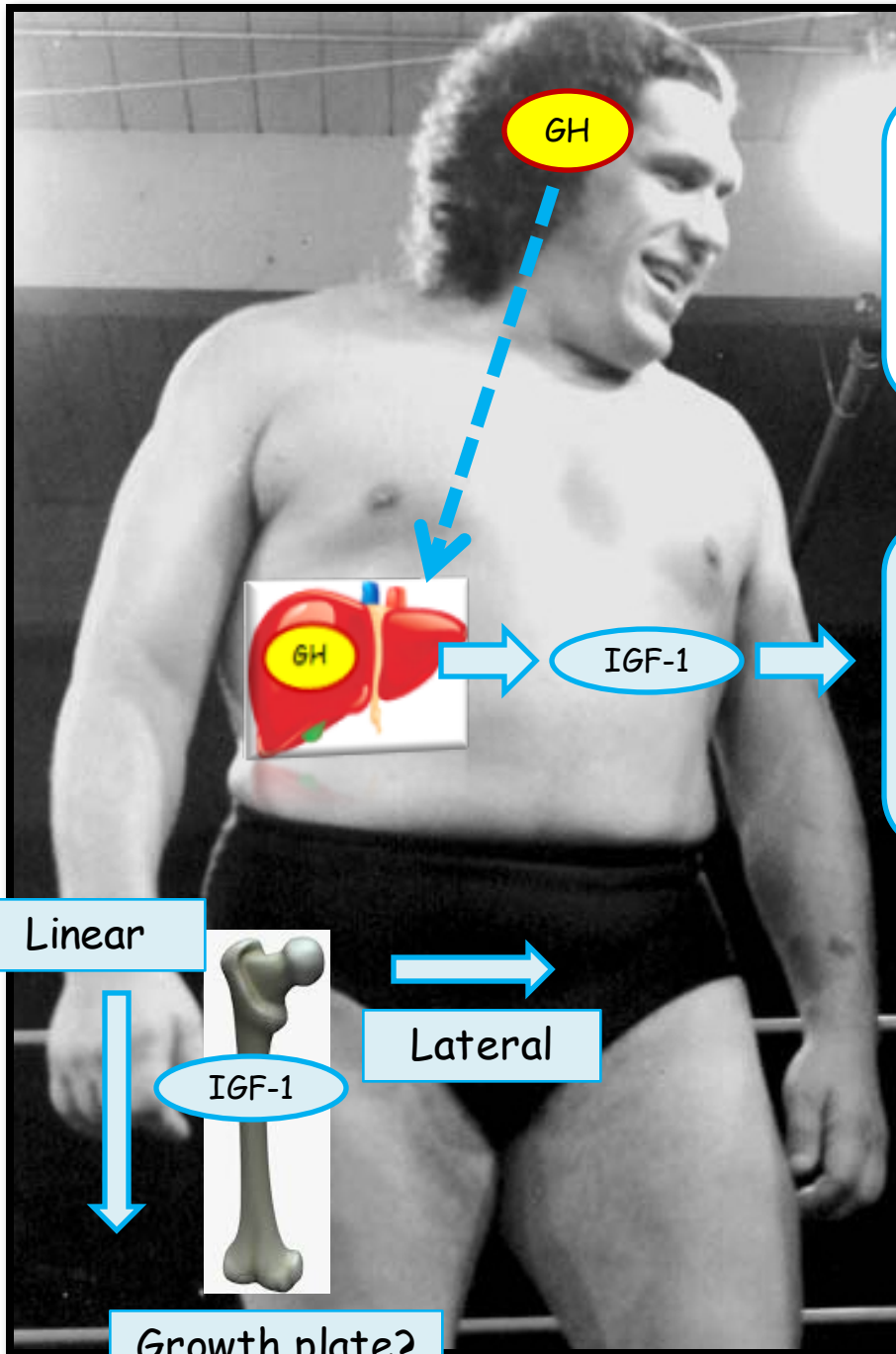
Muscle  
Protein  
Amino acids

↑ Glucose



Enhances lipolysis  
to spare protein





GH

GH:  
Indirect effects mediated by **IGF-1** (hepatic synthesis)



IGF-1

Metabolic/Visceral:  
Skin/↑ Tongue  
Connective Tissue  
Cardiomyopathy  
Organomegaly

Linear

~ IGF-1 ~  
Chondrocyte  
Bone



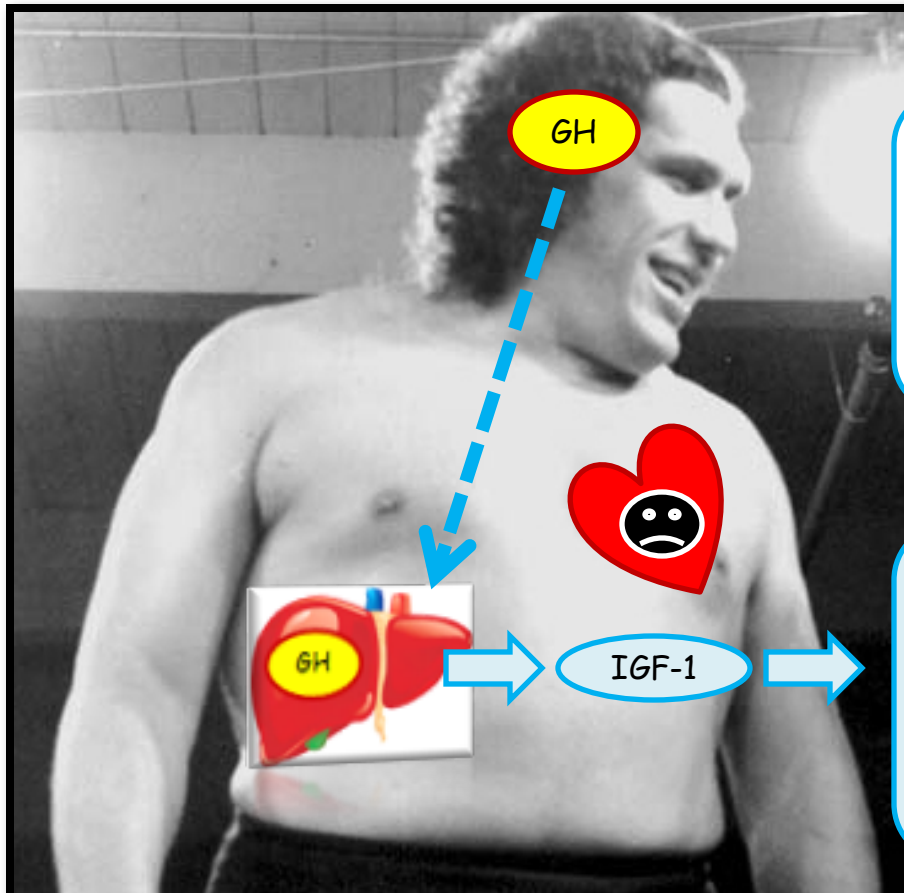
Lateral

Growth plate



Chondrocyte  
Osteoblast

Growth plate?



GH:  
Indirect effects mediated by **IGF-1** (hepatic synthesis)

Metabolic/Visceral:  
Skin/↑ Tongue  
Connective Tissue  
\*Cardiomyopathy\*  
Organomegaly

ANDRÉ RENÉ ROUSSIMOFF  
19 MAY 1946 – 27 JANUARY 1993  
Age 46: Congestive Heart Failure



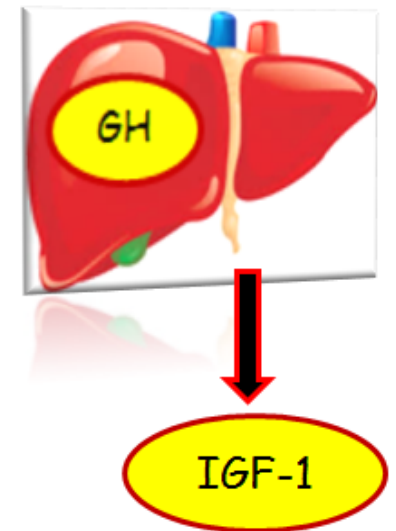
## 4. Indirect effects of GH mediated by IGF-1 (somatomedins)

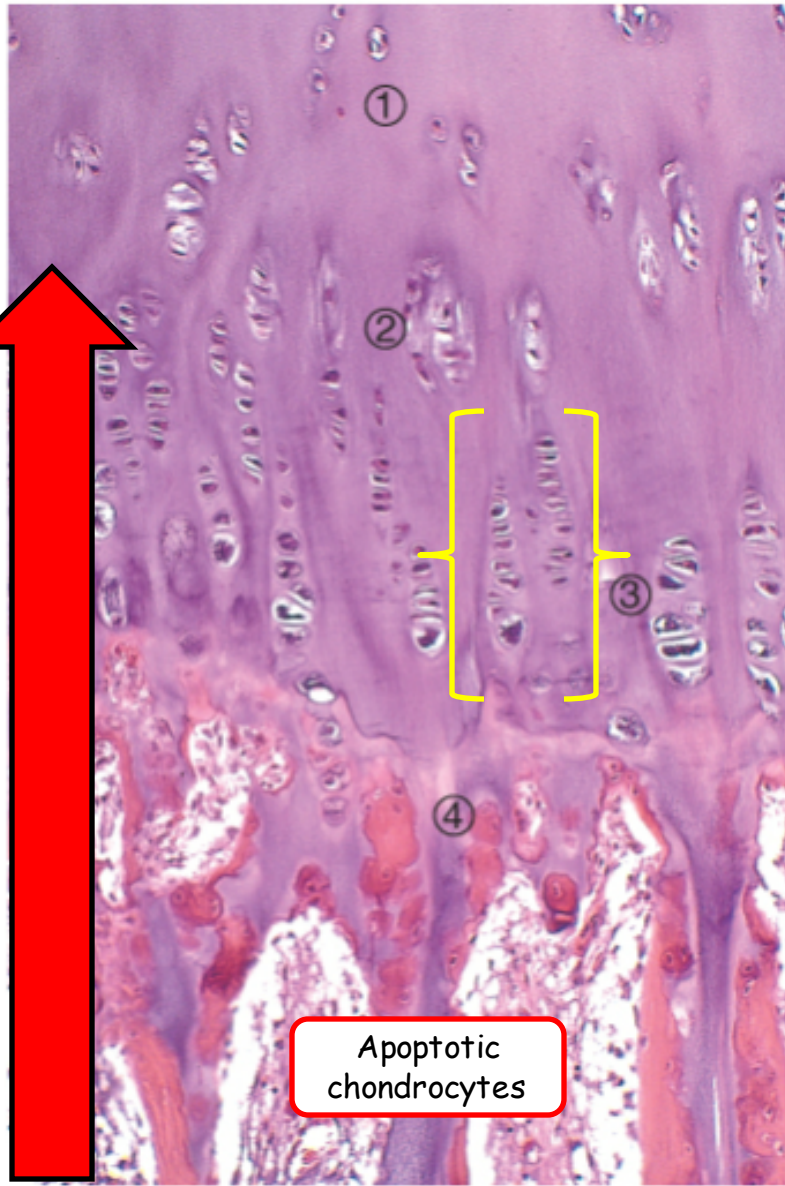
### C. Bone

- iii. Pre-growth plate closure: mitogenic effect on chondrocytes/o'blast → ↑ linear growth (**gigantism**)
- iv. Post-growth plate closure: lateral and periosteal bone growth (hands/feet/jaw) → **acromegaly**

### D. Metabolic/Visceral effects

- v. Diabetes
- vi. CV: cardiomyopathy/HTN
- vii. Connective tissue: tongue (macroglossia)/skin
- viii. Organomegaly (kidney, thyroid...)





## Endochondral Ossification Growth Plate

Regulators of Long Bone Growth:

- Growth Hormone/IGF-1  
(stimulate **chondroblasts**)
- TSH
- Sex Hormones
- PTH

Ossification Center

A

B

C



Reserve Zone

Proliferative Zone

Hypertrophic Zone

Primary spongiosa

Ossification

# 7 facts you need to know about GH

## 5. Diagnostics:

- a) IGF-1 level
- b) Failure to suppress GH with oral glucose load

## 6. Cause of Death: Cardiomyopathy

## 7. Rx:

- e) Octreotide (Somatostatin)
- f) Pegvisomant (GH receptor antagonist)
- g) Surgery: Transphenoidal hypophysectomy