Chapters 22 and 23
Metabolism

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Energy Balance

Based on First Law of Thermodynamics:
- Energy input = Energy output (work)
- Energy stored as glycogen and fat

Work = transport, mechanical, chemical

Unit of Measure: Kilocalorie (Calorie)
- Raise 1 L of $H_2O$ 1°C.
- calorie = 1 gram of $H_2O$ 1°C

Basal Metabolic Rate (BMR) in kcal/day
Metabolism = sum of all chemical reactions in the body

- Anabolic vs. catabolic
- Absorptive vs. Postabsorptive
- Recall glycolysis and TCA cycle
Control of Metabolism

Insulin and Glucagon

- Some consider that insulin is THE anabolic hormone
- Insulin:glucagon ratio

Other Hormones (Chapter 23)

NS

- Emotional factors (Running Problem)
Chapter 23: Endocrine Control of Metabolism

1. Adrenal Glands
   1. Steroids (aldosterone and cortisol)

2. Thyroid
   1. Accelerator Pedal?

3. Growth Hormone
   1. Facilitates Growth and Development

4. PTH and Calcitonin
   1. Control of [Ca^{2+}]


1) Adrenal Glands

- Adrenal medulla
  - Catecholamines

- Adrenal Cortex
  - Glucorticoids (controlled by ACTH)
  - Aldosterone
  - Anabolic steroids?? DHEA??
2) Thyroid

- Precursor: thyroglobulin
- Add iodine to make T₃ and T₄
- Control by TSH
  - cTSH
3) Growth Hormone

- Anterior Pituitary
- Anabolic
- Recently synthesized

Excess =
  - Acromegaly in adults
  - Gigantism in children

Target = IGF (insulin-like growth factors)
4) Calcium

- PTH raises $\text{Ca}^{2+}$
- Calcitonin lowers it
- Calcitriol enhances absorption of $\text{Ca}^{2+}$
  - AKA Vit $\text{D}_3$
- Role of estrogen??
  - Osteoporosis and HRT