

Nutrition & Metabolism

1. Food Pyramid

1. carbs
2. proteins
3. lipids
4. figure
5. essential amino acids

2. Vitamins

1. Fat Soluble

1. A- photoreceptor, skin, mucosa, antioxidant
2. D- hormone, increases Ca⁺⁺ absorption
3. E- antioxidant
4. K- clotting

2. Water Soluble

1. C- antioxidant, connective tissue formation
2. B vitamins- coenzymes
3. Biotin - coenzyme
4. Niacin- constituent of NAD⁺
5. Folic acid- coenzymes

3. Minerals

1. Major

1. Ca⁺⁺ - electrolyte, bones
2. Cl⁻ - electrolyte, HCl formation, chloride shift in blood for CO₂ transport
3. K⁺ - electrolyte
4. Na⁺ - electrolyte
5. S - proteins, cartilage, tendons, bone
6. Mg - coenzyme, nerve function
7. P - bones, teeth, buffers, ATP

2. Trace (< 0.005% body mass)

1. F - tooth structure
2. Co - B12
3. Cr - glucose metabolism
4. Cu - hemoglobin, melanin, myelin
5. I - thyroid hormones
6. Fe - hemoglobin, cytochromes, ox. phosph
7. Mn - coenzyme
8. Se - antioxidant
9. Zn - growth, wound healing

4. Metabolism

1. Overview

1. goal: make ATP
2. how?:
 1. glycolysis
 2. Krebs Cycle
3. electron transport & oxidative phosphorylation

2. Details

3. Catabolism vs. Anabolism

1. break down
2. build up

4. Carbs

1. Glycogenesis- glucose to glycogen
2. Glycogenolysis- glycogen splitting
3. Gluconeogenesis- new sugar from noncarbo sources

5. Lipids

1. oxidation
2. lipogenesis - glycerol or fatty acids to fats
3. lipolysis - fats to glycerol or fatty acids

6. Proteins

1. oxidation
 1. transamination
 2. oxidative deamination - remove amine group (-NH₂), pee out
 3. keto acid modification - keto acids can enter Krebs cycle

5. Control

6. Heat Balance

Paleolithic Insights (from work of S. Boyd Eaton)

vitamin/mineral	ratio of paleolithic : current
riboflavin	3.6
folate	1.49
thiamin	2.55
ascorbate	8.38
carotene	1.7
vitamin A	2.71
vitamin E	3.11
iron	5.82
calcium	1.67
zinc	2.74
sodium	0.136
potassium	2.97

The Liver

1. Carbohydrate Metabolism

1. conversion galactose & fructose to glucose
2. glucose buffer functions
 1. store glucose as glycogen when blood sugar high
 2. glycogenolysis when blood sugar low
3. gluconeogenesis
 1. amino acids & glycerol to glucose when glycogen exhausted
4. conversion of glucose to fats for storage

2. Fat Metabolism

1. breakdown of fatty acids to acetyl CoA
2. conversion of excess acetyl CoA to ketone bodies
3. stores fats
4. forms lipoproteins
5. synthesize & catabolize cholesterol

3. Protein Metabolism

1. deaminates amino acids
2. forms urea from ammonia
3. forms plasma proteins
4. transamination (amino acid intraconversion)

4. Vitamin/Mineral Storage

1. stores vitamin A (1-2 years supply!)
2. stores vitamins D & B₁₂ (1-4 months' supply)
3. stores iron as ferritin

5. Biotransformation Functions

1. synthetic reactions that deactivate compounds for secretion by kidneys
2. processes bilirubin from RBC breakdown
3. metabolizes hormones so can be excreted.