• How does body “get” dietary amino acids? AMINO ACID POOL
• cells continually make and break down proteins as needed
• if not immediately needed by cell, released into circulation
• options:
  • make body **proteins**
  • make **“nonprotein”** products e.g. neurotransmitters, pigments, hormones
  • **deaminated** by liver - used to make ATP

• What about people who don’t eat any animal products?!
• vegetarian diets - see slide for definitions

**Health benefits**
• tend to have lower intake of fat, cholesterol
• tend to have higher intake of antioxidants like beta carotene, Vit A & C
• tend to have higher intake of dietary fiber and phytochemicals
• tend to have lower cholesterol levels, less risk for heart disease
• tend to weigh less
• lower risk for some cancers (BR and colon)

**Health risks**
• in general, the more limited the more risk
• pretty easy to meet protein needs by including milk
• if vegan, must take care to get enough B12 (fortified soymilk good source)
• Body prefers to use carbs and fat for energy
• first step is to get rid of the nitrogen-containing part = DEAMINATION
  • liver converts amine group to ammonia -> excreted in urine
  • carbon skeleton left enters appropriate catabolic pathway
Fates of carbon skeletons: can be used to make fatty acids or glucose, or broken down completely to make ATP

• entrance point to catabolic pathways depends on skeleton
• still goes through kreb’s cycle
• point of entry determines energy yield - earlier, more ATP; later, less ATP
• **Protein synthesis (anabolism)**
  
  • process = **translation**
  
  • sequential addition of amino acids to growing polypeptides
  
  • This occurs on ribosomes and is directed by DNA and RNA
Making nonessential amino acids

- if a **NONESSENTIAL** AA is not available in pool, body can MAKE it
- take a carbon skeleton, add an amine
- when take amine from one AA and transfer it directly to a carbon skeleton = **TRANSAMINATION**
  - requires Vit B6
- some nonessential AAs made by transamination; other synthesis pathways complex
Protein Metabolism

Overconsumption

Carbohydrate  Fat  Protein

- Storage stimulated (Insulin ON)
- Breakdown inhibited (Glucagon OFF)

Glucose  FA’s  AA’s

Glycogen stores refilled  AA pool refilled, proteins made; lose N in urea

Carbs used for energy; minimal fat burning; promotion of fat storage  FAT STORAGE

After Insel Fig. SM.17
Short-term fasting

Storage OFF

Insulin

Breakdown ON

Glucagon: liver glycogen
Epinephrine: muscle glycogen
Cortisol: amino acid breakdown

Maintain blood glucose levels

Fatty acids burned for fuel

Gluconeogenesis also helps maintain blood glucose levels
Prolonged fasting

- Body protein vs. body fat usage during fasting