The Proteins and Amino Acids

14 OCTOBER 2020

Recap

Additional questions on fats in the diet

Sent out: information on nuts and cheese and the type of fat and fat content. As well as Blood Cholesterol levels with LDL and HDL recommended levels

Suggestion for seeking online nutrition knowledge: try to use .gov or .edu or .org sites.

Dietary Supplements: Office of Dietary Supplements at NIH

- https://ods.od.nih.gov/

Salt Wars: a new book from Michael Jacobson on the role of salt in our food supply and its relationship with chronic disease

Protein and Amino Acids

Amounts needed

Role of proteins in the body

Structure of protein: amino acid

Protein quality

Vegetarian Eatin

Food Protein: Need and Quality

DRI

- Depends on body size
- Recommended Protein intake
  - 10-35% of total calories
  - Adults at healthy body weight: 0.8g per kg
  - Athletes: 1.2-1.7g per kg
- Malnutrition or infection increases protein need

The Importance of Protein

- Amino acids must be continually available
- Amino acids are needed each day
- Protein turnover
  - Continuous breakdown

The Roles of Body Proteins

- Regulation of gene expression
- Providing structure and movement
- Building enzymes
- Building hormones
- Building antibodies
  - Destroy invaders
- Transporting substances
  - Hemoglobin (carries oxygen) and lipoproteins (transport lipids)
- Maintaining fluid and electrolyte balance
  - Protein deficiency leads to edema

Providing Energy and Glucose

- Inadequate carbohydrate or energy
- Amino acids to glucose
- No storage compound for protein
  - Only active in tissues
- Oversupply of amino acids
  - Remove amine group
  - Use of residues
    - Meet energy needs, store as fat, make glucose to store as glycogen

The Structure of Proteins

Difference from carbohydrates and fats

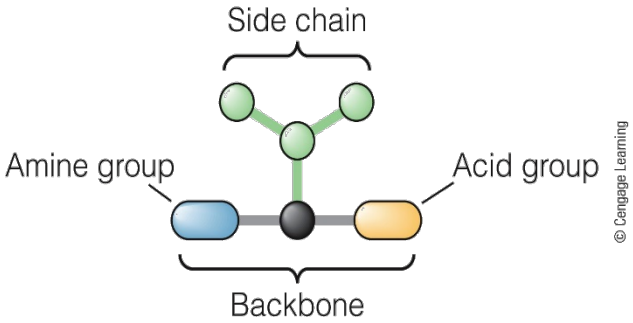
- Contain nitrogen

Amino acids

- Carbon atom with amine group and acid group
- Side chain

Essential amino acids

- Recycling
  - Amino acids reused for different needs



Amino Acids Important in Nutrition

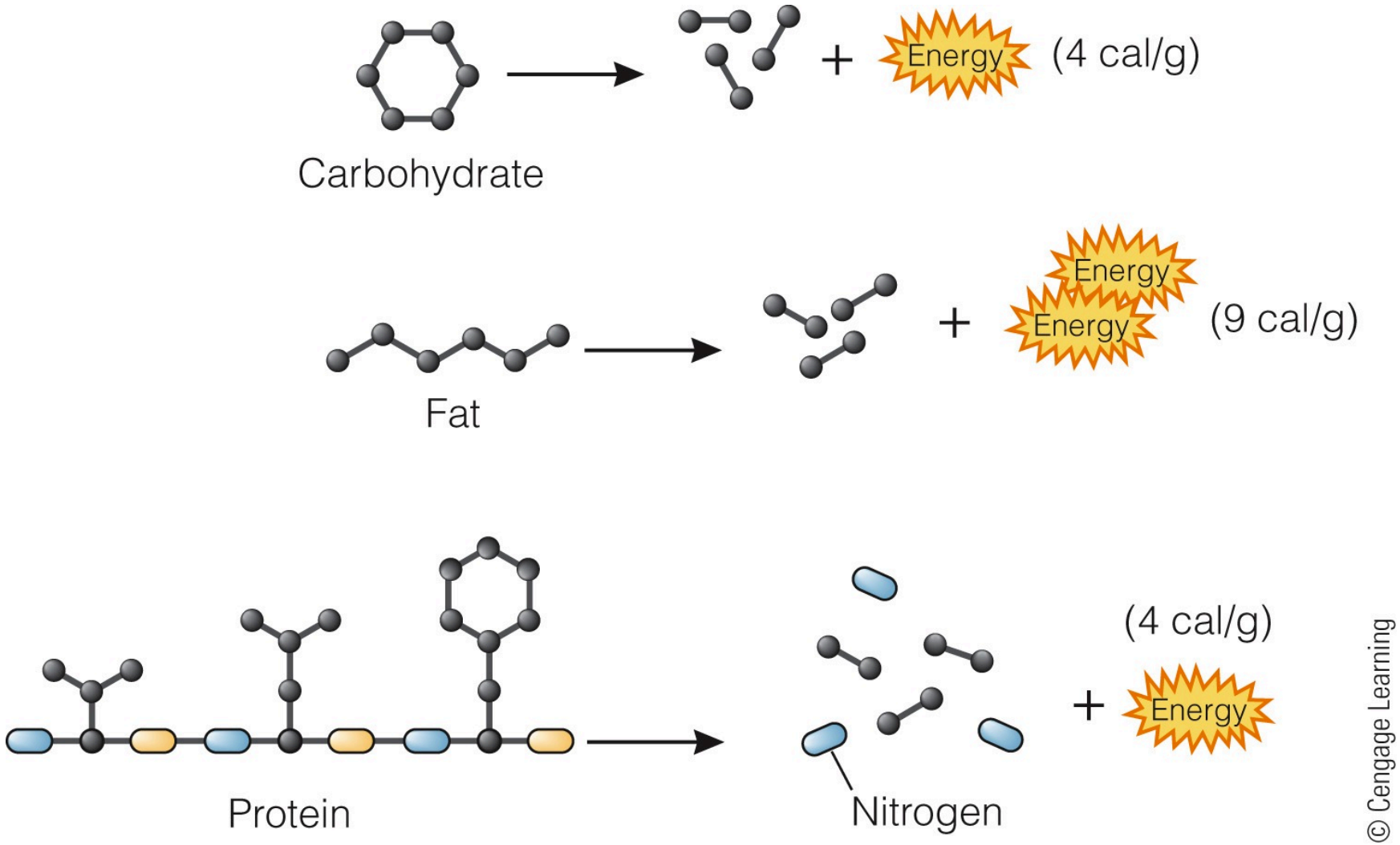
Table 6–1

Amino Acids Important in Nutrition

The left-hand column lists amino acids that are essential for human beings—the body cannot make them, and they must be provided in the diet. The right-hand column lists other, nonessential amino acids—the body can make these for itself. In special cases, some nonessential amino acids may become conditionally essential (see the text).

Essential Amino Acids (pronunciation)	Nonessential Amino Acids (pronunciation)
Histidine (HISS-tuh-deen)	Alanine (AL-ah-neen)
Isoleucine (eye-so-LOO-seen)	Arginine (ARJ-ih-neen)
Leucine (LOO-seen)	Asparagine (ah-SPAR-ah-geen)
Lysine (LYE-seen)	Aspartic acid (ah-SPAR-tic acid)
Methionine (meh-THIGH-oh-neen)	Cysteine (SIS-the-een)
Phenylalanine (fen-il-AL-ah-neen)	Glutamic acid (GLU-tam-ic acid)
Threonine (THREE-oh-neen)	Glutamine (GLU-tah-meen)
Tryptophan (TRIP-toe-fan, TRIP-toe-fane)	Glycine (GLY-seen)
Valine (VAY-leen)	Proline (PRO-leen)
	Serine (SEER-een)
	Tyrosine (TIE-roe-seen)

Three Different Energy Sources



Protein Quality

High-quality proteins
- Enough of all essential amino acids

Limiting amino acids
- Essential amino acid in insufficient amount
- Limits protein synthesis

Complementary proteins
- Mutual supplementation

Complementary Protein Combinations

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3/4 c oatmeal =	5 g
Protein total	5 g

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1 c rice =	4 g
1 c beans =	16 g
Protein total	20 g

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1 1/2 c pasta =	11 g
1 c vegetables =	2 g
2 tbs Parmesan cheese =	4 g
Protein total	17 g

Evaluating Protein and Amino Acid Supplements

Protein supplements

- Do not improve performance
- Not effective for weight loss
- Extra nitrogen can put burden on kidneys

Amino acid supplements

- Body designed to work with whole proteins
- No safe level of amino acid supplementation – no UL
- Can cause side effects

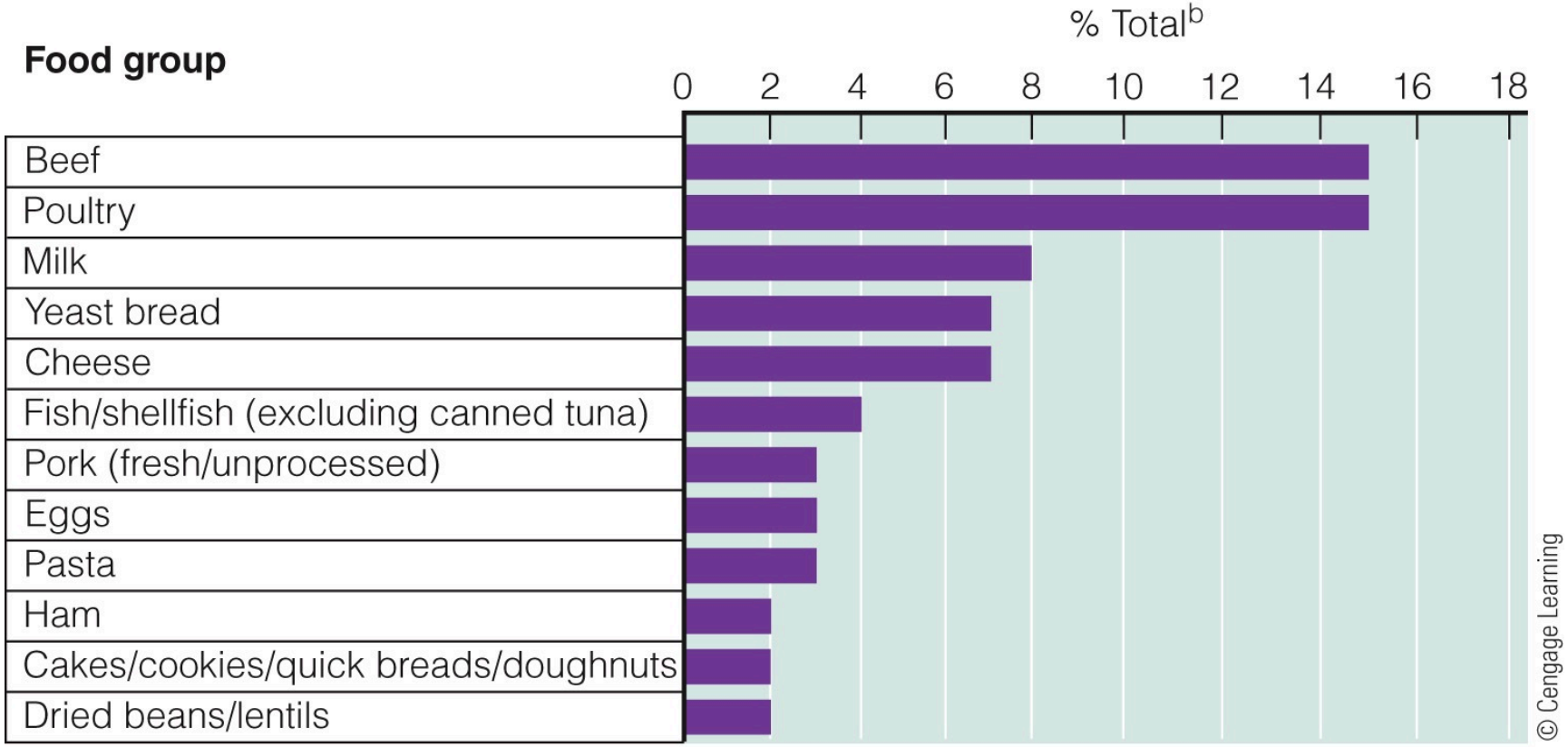
Getting Enough but Not Too Much Protein

Protein-rich foods
- Beans, meat, poultry, nuts, legumes, eggs, milk, yogurt, cheese

Advantages of legumes
- Protein abundant
- Vitamin and mineral source
  - Supplies B Vitamins & Iron
  - Lacks B12, Vitamin A, Vitamin C

Soybeans
- Can inhibit iron absorption in large amounts
- Tofu

Top Contributors of Protein to the U.S. Diet



[a]*These foods supply about 70 percent of the protein in the U.S. diet. The remainder comes from foods contributing less than 2 percent of the total.*
[b]*Rounded values.*

Table C6–2

Terms Used to Describe Vegetarian Diets

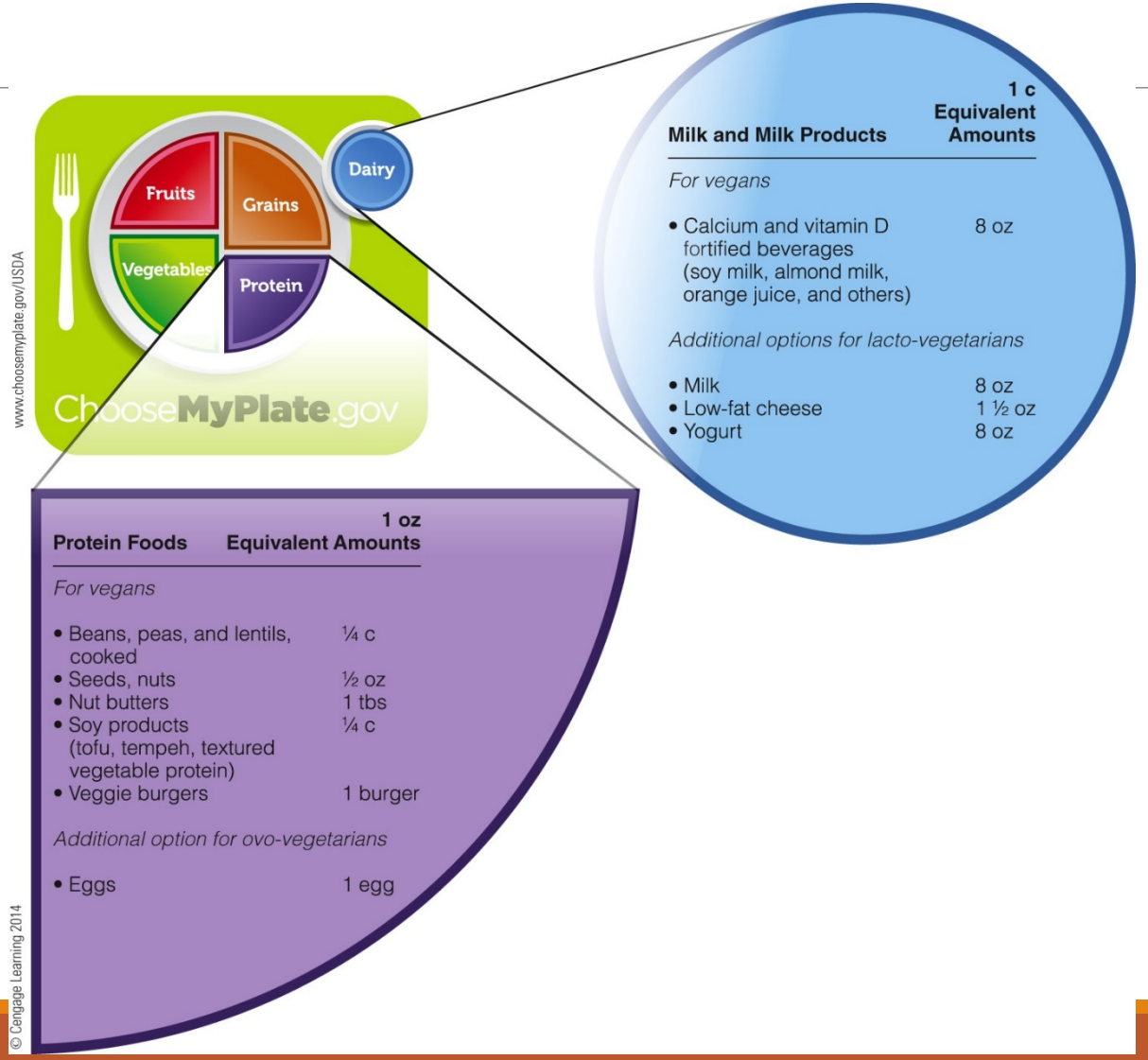
Some of the terms below are in common usage, but others are useful only to researchers.

- **fruitarian** includes only raw or dried fruits, seeds, and nuts in the diet.
- **lacto-ovo vegetarian** includes dairy products, eggs, vegetables, grains, legumes, fruits, and nuts; excludes flesh and seafood.
- **lacto-vegetarian** includes dairy products, vegetables, grains, legumes, fruits, and nuts; excludes flesh, seafood, and eggs.
- **macrobiotic diet** a vegan diet composed mostly of whole grains, beans, and certain vegetables; taken to extremes, macrobiotic diets can compromise nutrient status.
- **ovo-vegetarian** includes eggs, vegetables, grains, legumes, fruits, and nuts; excludes flesh, seafood, and milk products.
- **partial vegetarian** a term sometimes used to mean an eating style that includes seafood, poultry, eggs, dairy products, vegetables, grains, legumes, fruits, and nuts; excludes or strictly limits certain meats, such as red meats. Also called *semi-vegetarian*.
- **vegan** includes only food from plant sources: vegetables, grains, legumes, fruits, seeds, and nuts; also called strict vegetarian.
- **vegetarian** includes plant-based foods and eliminates some or all animal-derived foods.

Positive Health Aspects of Vegetarian Diets

- Obesity
- Heart disease
- High blood pressure
- Cancer
- Other health benefits
  - Helps prevent diabetes, cataracts, gallstones, osteoporosis

Filling the Vegetarian MyPlate



Complete Protein Guide for Vegetarians