


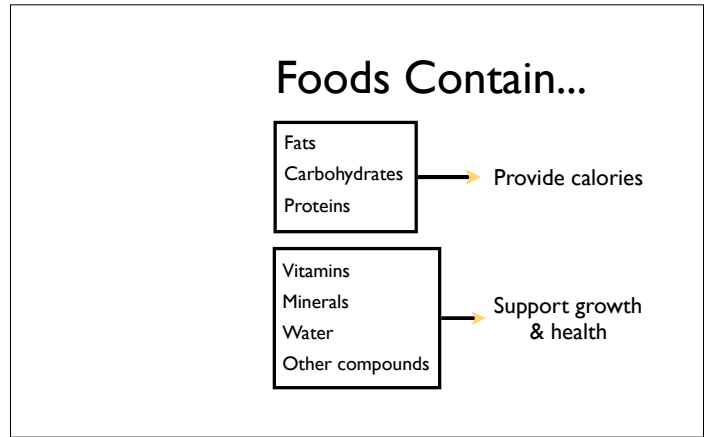


## Energy Nutrients

**Fats, Carbs, & Proteins**

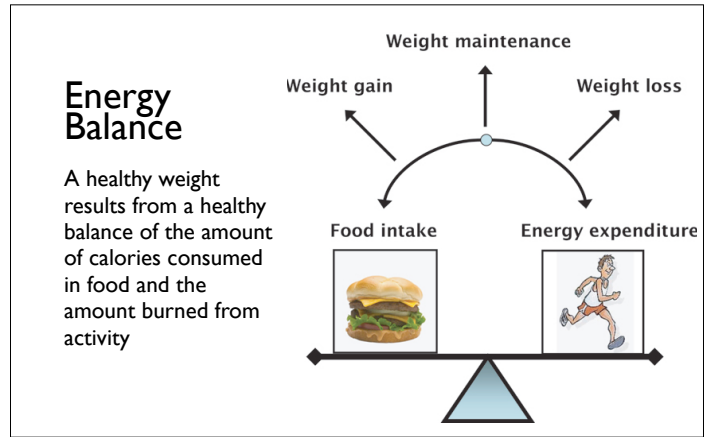
Angeline B. David, DrPH, MHS, RDN  
Health Ministries Director  
North American Division of Seventh-day Adventists



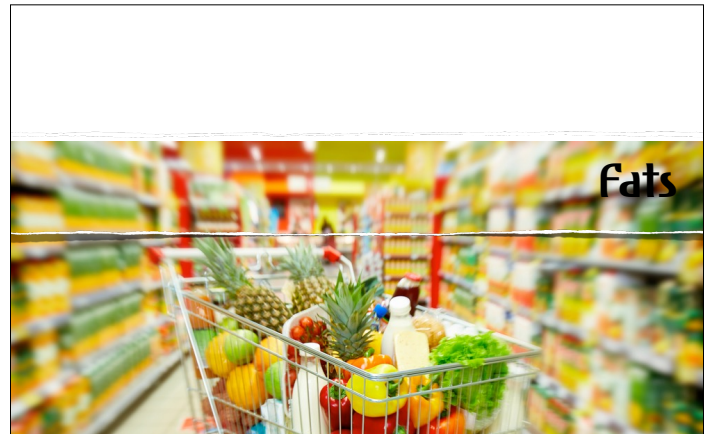
## What are Calories?

- 🍌 A measure of energy
- 🍌 Also called kilocalories (kcal)
- 🍌 Amount of energy we get from food



## Calorie Sources

- 🍌 1 gram of fat → 9 calories
- 🍌 1 gram of carbohydrates → 4 calories
- 🍌 1 gram of protein → 4 calories
- 🍌 1 gram of alcohol → 7 calories



## Fat is Necessary

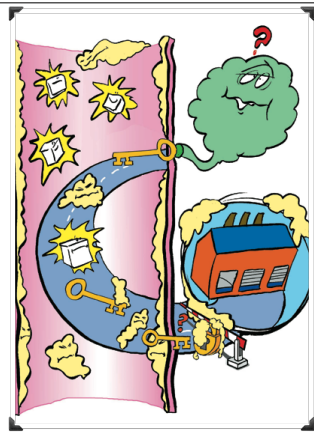
- Used to make tissues and biochemicals (eg, hormones)
- Support cell-to-cell communication
- Form structure of cell walls
- Provide insulation
- Act as transporters
- Source of energy

## Fat deficiency leads to...

- Decreased growth rate
- Skin and hair problems
- Inflammation
- Kidney & liver abnormalities
- Infertility
- Fragile red blood cells
- Poor wound healing
- And more...

### Too Much Fat CAN:

- Cause problems for the insulin keys – like a sludge in the system, leading to high blood sugar and diabetes
- Make it hard to lose weight because fatty foods are rich in calories
- Raise cholesterol



## Types of Fats (based on chemical structure)

Good fats		Bad fats	
Monounsaturated (MUFA)	Polyunsaturated (PUFA)	Saturated	Trans
Increase your consumption		Reduce consumption	Avoid altogether
<ul style="list-style-type: none"> <li>• Olive oil</li> <li>• Canola oil</li> <li>• Sunflower oil</li> <li>• Peanut oil</li> <li>• Sesame oil</li> <li>• Avocados</li> <li>• Olives</li> <li>• Nuts (almonds, peanuts, macadamia nuts, hazelnuts, pecans, cashews)</li> <li>• Peanut butter</li> </ul>	<ul style="list-style-type: none"> <li>• Soybean oil</li> <li>• Corn oil</li> <li>• Safflower oil</li> <li>• Walnuts</li> <li>• Sunflower, sesame, pumpkin seeds</li> <li>• Flaxseed</li> <li>• Fatty fish (salmon, tuna, mackerel, herring, trout, sardines)</li> <li>• Soy milk</li> <li>• Tofu</li> </ul>	<ul style="list-style-type: none"> <li>• Beef</li> <li>• Lamb</li> <li>• Pork</li> <li>• Chicken skin</li> <li>• Whole-fat dairy products (milk, cream)</li> <li>• Butter</li> <li>• Cheese</li> <li>• Ice cream</li> <li>• Palm and coconut oil</li> <li>• Lard</li> </ul>	<ul style="list-style-type: none"> <li>• Commercially-baked pastries, cookies, doughnuts, muffins, cakes, pizza dough</li> <li>• Packaged snack foods (crackers, microwave popcorn, chips)</li> <li>• Stick margarine</li> <li>• Vegetable shortening</li> <li>• Fried foods (French fries, fried chicken, chicken nuggets, breaded fish)</li> <li>• Candy bars</li> </ul>

## Two Essential Fats

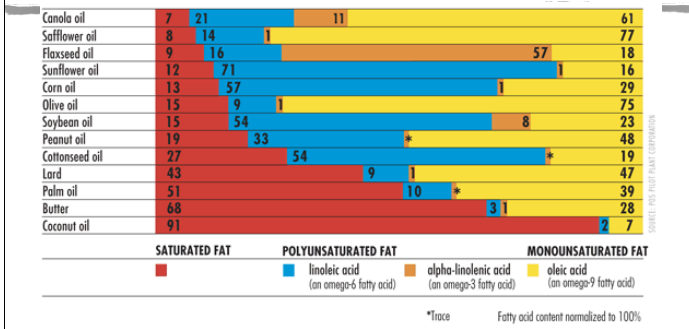
- Must be eaten because body cannot make these
- Both are polyunsaturated
  - **linoleic acid** (omega-6)
  - **alpha-linolenic acid** (omega-3)
    - Converted to EPA and DHA in the body
    - Decrease triglyceride levels in blood
- Compete with saturated fats
- Needed for brain development (perinatal, adolescence) and supports brain functions

## Essential Fat Food Sources

- **Linoleic acid** (essential omega-6)
  - Eggs, poultry, cereals, vegetable oils, whole-grain breads, baked foods, margarine, breast milk
- **Alpha-linolenic acid** (essential omega-3)
  - Canola oil, flax and flaxseed oil, walnuts, chia seeds, leafy green vegetables, fatty fish, breast milk
- **EPA** (omega-3)
  - Fatty fish, fish oil, breast milk
- **DHA** (omega-3)
  - Algae oil, fatty fish, fish oil

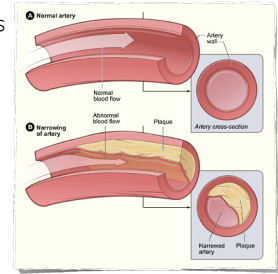


## Fats Found in Oils



## Cholesterol

- Waxy substance
- Produced in liver of animals & humans
- Transported to & from tissues via shuttles (LDL, HDL)
- Only dietary source is from animal foods (meat, fish, poultry, eggs, dairy)
- Excess → plaque buildup in arteries → heart attack or stroke



## How Much Fat?

### Dietary Reference Intakes (DRIs): Acceptable Macronutrient Distribution Ranges

Food and Nutrition Board, Institute of Medicine, National Academies

Macronutrient	Range (percent of energy)		
	Children, 1-3 y	Children, 4-18 y	Adults
Fat	30-40	25-35	20-35
n-6 polyunsaturated fatty acids <sup>a</sup> (linoleic acid)	5-10	5-10	5-10
n-3 polyunsaturated fatty acids <sup>a</sup> (α-linolenic acid)	0.6-1.2	0.6-1.2	0.6-1.2
Carbohydrate	45-65	45-65	45-65
Protein	5-20	10-30	10-35

<sup>a</sup> Approximately 10 percent of the total can come from longer-chain n-3 or n-6 fatty acids.

SOURCE: Dietary Reference Intakes for Energy, Carbohydrate, Fiber, Fat, Fatty Acids, Cholesterol, Protein, be accessed via [www.nap.edu](http://www.nap.edu).

## Recommendations for Fat

- Minimize fat to avoid excess calories
- Reduce animal foods high in saturated fat
- Eliminate sources of trans fats
- Eat healthy fats from whole plant sources
- Limit "extra" fats (oils, dressings, sauces)



## Protein

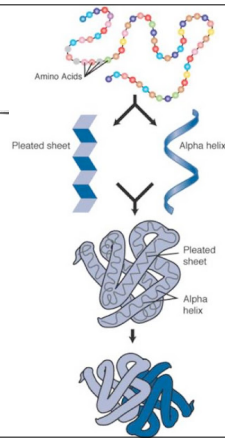


## Functions of Proteins

- Major structural component of all cells
- Act as enzymes and hormones
- Incorporated into membranes
- Transport molecules throughout body
- Precursors to other important molecules (nucleic acids, hormones, vitamins, etc)

## Protein Structure

- Amino acids are the building blocks of proteins
  - 100 amino acids found in nature
  - 20 can be used by humans



## Amino Acid Classification

- 9 are **essential** - cannot be made by body
  - histidine, isoleucine, leucine, lysine, methionine, phenylalanine, threonine, tryptophan, and valine
- 6 are **conditionally essential** - cannot be made sufficiently under some conditions, eg premature infants, illness
- 5 are **non-essential** - our body makes these

## Protein Quality

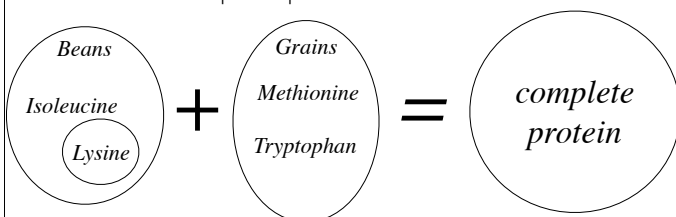
- Amino acids are taken from foods to form the proteins needed by the body
- Different food groups tend to have different types of amino acids
  - “incomplete” proteins lack one or more amino acid
- Goal is to get a variety of amino acids over the course of the day

## Protein Quality of Foods

Food	Protein Rating
Eggs	100
Fish	70
Lean beef	69
Cow's milk	60
Brown rice	57
White rice	56
Soy beans	47
Brewer's yeast	45
Whole-grain wheat	44
Peanuts	43
Dry beans	34

## Protein Complementarity

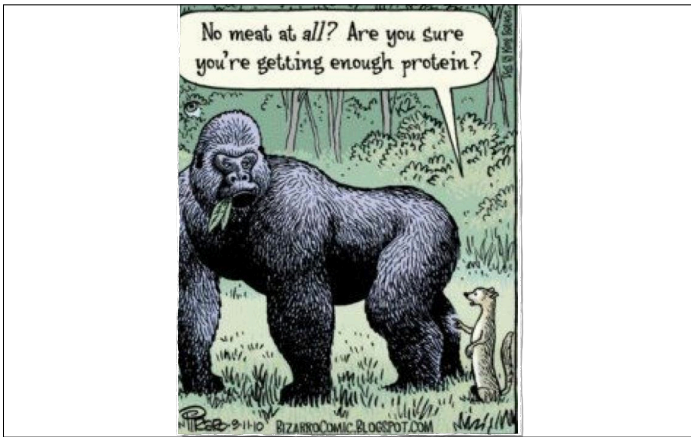
- Combine two or more “incomplete” food proteins to make a “complete” protein



## How Much Protein?

*non-pregnant, non-lactating*

	Adult Male	Adult Female
Grams of protein per kg body weight	0.9	0.8
Grams for 150-lb person	61	55
Average American consumption	110	96



Food	Amount	Calories	Grams Protein
Roasted chicken, white meat	3 oz	165	31
T-bone steak	3 oz	286	24
Hamburger patty	3 oz	311	17
Tofu, firm	½ cup	145	16
Whole wheat bread, 3 slices	½ cup	247	13
Pinto beans, cooked	½ cup	143	9
Lentils, cooked	½ cup	116	9
Oatmeal, cooked	½ cup	71	3
Spinach, cooked	½ cup	23	3
Broccoli, cooked	¾ cup	32	2
Brown rice, cooked	½ cup	112	2
White rice, cooked	½ cup	130	2
Potato, cooked without skin	½ cup	86	2
Mushrooms, cooked	½ cup	28	2

## Excess Protein

- Higher metabolic load
- Extra workload on the kidneys
- Increased risk of osteoporosis
- High protein foods are also high in fat and cholesterol
- High protein foods tend to be lower in fiber

## Recommendations for Protein

- Eat protein at each meal
- Choose plant sources of proteins more often
- Limit animal proteins to 2-3 times a week, or eliminate completely
- Eat a variety of foods each day



## Carbohydrate Functions

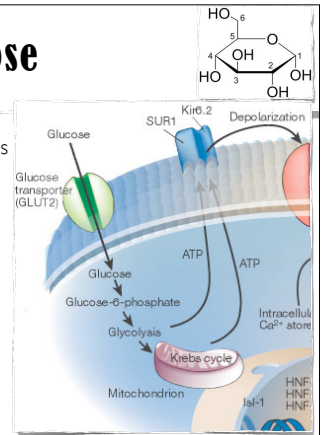
- Form structure of organs and cells
- Facilitates cell-to-cell communication
- Support gastrointestinal health (fiber)
- Provide sweetness in foods
- Preferred and most efficient source of FUEL for body and brain

## Carbohydrate Types

- Large family of naturally occurring compounds; few have dietary importance
- Stored in plants as:
  - **starches**
  - **fiber**: soluble and insoluble
  - **sugars**: glucose, fructose, galactose, etc
- Stored in animals & humans as glycogen in liver and muscles

## Glucose

- Primary source of energy for most cells
- Glucose transporter needed to take glucose into cells
  - Some need **insulin** for activation
- Main goals of glucose regulation
  - Glucose balance in blood
  - Provide sufficient glucose for brain function



## Simple Carbohydrates



## Complex Carbohydrates



## Dietary Fiber

- Found in plant foods
- Cannot be digested by humans
- 2 types: soluble and insoluble
- Type of fiber in foods are different, but in general:
  - Fruits & vegetables have mostly **soluble**
  - Grains & legumes have mostly **insoluble**

	Complex Carbs	Simple Carbs
Class	Starch & Fiber	Sugars
Digestion	Starch: slow Fiber: not digested	Quick
Effect on blood glucose (sugar)	Stable	Wide swings
Other effects	Sustained energy & longer satiety	Increase risk of diabetes & obesity
Food sources	Whole grains, beans, fruits, vegetables	Refined sugars, grains, flours, etc



## Why Eat More Fiber??

- Helps lower cholesterol
- Slows down absorption of carbohydrates
- May help stabilize blood sugar
- Prevents constipation
- Makes you feel more full and satisfied
- Helps with weight loss!!

## Carbs for Diabetes

- Include 45-60 grams of carbohydrate at each meal
- *Optional:* snacks include only 15-30 grams
- Be consistent in amounts eaten
- Collect data on how different foods affect you
  - Take blood sugar readings in pairs: before eating and two hours after you eat

## Amount of Carbs

- The following include **15 grams** of carbohydrate:
  - 1 slice of bread
  - ½ cup of cereal (both cold and hot)
  - ½ cup of rice
  - 1 small fresh fruit (4 oz) or ½ cup cut fruit
  - ½ cup of canned fruit (in juice, not sugar syrup)
  - 1 cup of milk (8 oz)
  - Starchy vegetables
    - 3 oz potato baked or boiled
    - ½ cup corn, yam, sweet potato, peas
  - Non-starchy vegetables: 1 ½ cups cooked or 3 cups raw

## Recommendations for Carbs

- Choose foods that have complex carbohydrates
- Save simple carbs for **occasional** special occasions
- Get **35-50 grams** of fiber (both soluble & insoluble) each day
- Diabetics: consistency is key -- when, what, how much
- Variety is important



[www.NADHealthMinistries.org](http://www.NADHealthMinistries.org)  
[health@nadadventist.org](mailto:health@nadadventist.org)

