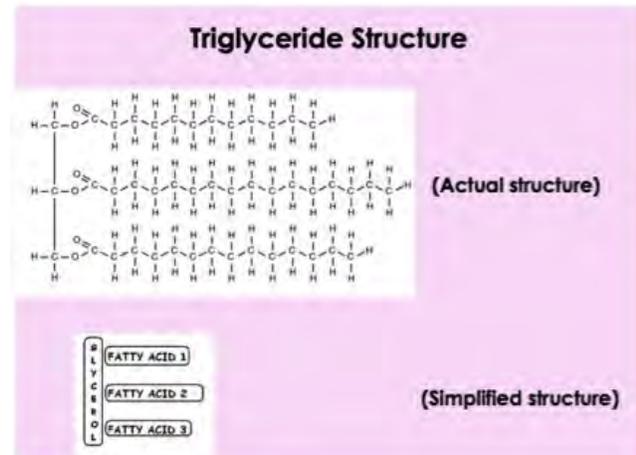


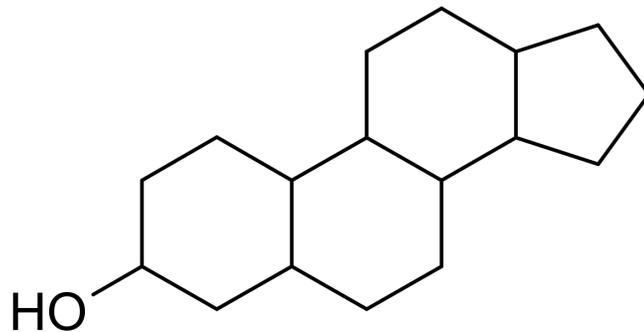
1. Chapter 5: Lipids LIPIDS=FAT

1. Lipids: composition and function [CLICK HERE FOR A RESOURCE](#)



a. **Triglycerides (the Energizer):**

glycerol bound to three fatty acid molecules; makes up 99% of lipids in body, and 95% of dietary lipids; provides energy/fuel for the body and stores unused energy/fuel



b. **Sterols (the Messenger):**

four rings of hydrogen and carbon; cholesterol is the most common one; found only in foods of animal origin (but humans make their own, so we do not need to consume it); translates messages to a cell (hormones send the message to sterol, then sterol takes it into the cell and lets the cell know what's up), help make up cell membrane, breaks down fat soluble vitamins

- Anorexia is often diagnosed when an individual struggles with an eating disorder and has a BMI of under 17.5. Those struggling with eating disorders should seek immediate help.
- **Health risks:**
 - Problems with menstrual cycle and fertility
 - Osteoporosis
 - Malnutrition
 - Depression
 - Anemia
 - Slowed growth
 - Skin, hair, and nail problems
 - Weakened immune system
- Location of body fat and how this affects health [CLICK HERE FOR RESOURCE](#)
 - Subcutaneous: fat located under the skin
 - Normally harmless
 - Excess amounts can cause health issues, but visceral fat is more of a concern.
 - Visceral: **(discussed in detail under short answer section)**

The short answer questions will involve:

1. Lipids: (Types of lipids is also part of this, but it is detailed at the top of the notes.)

- Dietary recommendations [CLICK HERE FOR RESOURCE](#)
 - Recommended that 20-35% of calories come from fat for adults/day
 - Equates to about 44-77 grams of fat for a 2,000 calorie diet
 - One fat serving is 45 calories/5 grams of fat.
 - Suggested percentages of types of fats (*see below for more info on types of fatty acids*):
 - **Monounsaturated fat** (fatty acid): 15-20%
 - Come from plant sources
 - Food source: olive/canola/peanut oil, nuts, olives, avocado

- Calculated by taking weight in kg divided by the square of the height in meters (**weight (kg) / height² (m))**
 - BMI is a general screening tool to indicate relative health risks from being under or overweight, but it is not 100% accurate or inclusive (ie: an individual can have an “obese” BMI but be completely healthy because they have a high rate of muscle.)
 - Other ways of calculating BMI (that are more accurate) include:
 - using calipers,
 - underwater weighing,
 - bioelectrical impedance (You may have seen this if you’ve used a machine that you hold out in front of you or a scale that measures your BMI),
 - DXA,
 - and isotope dilution.
- Body composition: [CLICK HERE FOR RESOURCE](#)
 - Refers to the percentage of fat, bone, water, and muscle in your body
 - This is historically a **better indicator of overall health** and appropriate weight ratio compared to BMI because it is inclusive and views your body holistically.
 - Methods to determine body composition:
 - Hydrostatic Weighing (just for body fat)
 - Air Displacement Plethysmography (for fat vs. fat-free)
 - DEXA (muscle and fat)
 - MRI (total body)
 - Bioelectrical impedance analysis (total body)
- The meaning of energy balance:
 - Refers to the balance achieved when the number of calories eaten is equal to the number of calories used.
 - Energy balance can be affected by the following:
 - Physical activity
 - Body size
 - Total body fat or muscle
 - Genetics
- Identify BMI categories and level of risk
 - Underweight: Below 18.5
 - Healthy Weight: 18.5-24.9
 - Overweight: 25.0-29.9
 - Obese (low risk): 30.0-34.9
 - (moderate risk): 35.0-39.9
 - (high risk): >40.0

- a. Fats cannot travel throughout the body on their own, so proteins bind to the fats in order to move them through blood and other fluids. These fat/protein combos are called _____. (Remember chylomicrons from above? That's one!)
- b. **Function:** transport fat (cholesterol and triglycerides) in water (blood plasma and extracellular fluids) throughout the body
- c. **Composition:** a combination of fats (_____ and triglycerides) and proteins (apolipoproteins)
 - i. All lipoproteins will have ratios of cholesterol, triglycerides, and various apolipoproteins, but some are primarily one substance.
- d. *Types of lipoproteins*
 - i. _____: the least dense; primarily fat (triglycerides); moves fat from intestines to cells
 - ii. **Very low density lipoproteins (VLDL)**: second least dense, primarily fat (triglycerides); made in liver; delivers _____ to cells for cellular processes; slowly becomes an LDL once at its destination
 - iii. **Intermediate density lipoproteins (IDL)**: the intermediate phase between VLDL and _____ when a lipoprotein is becoming less fatty and higher in protein
 - iv. **Low density lipoproteins (LDL)**: denser than chylomicrons, VLDL, and LDL; primarily cholesterol; carries cholesterol to cells that _____ it; high amounts of LDL are unhealthy and lead to heart disease; "bad" cholesterol
 - v. **High density lipoproteins (HDL)**: the most dense typically found in body; less cholesterol and more protein; made in liver and intestines; carries _____ back to the liver for eventual excretion or reuse; "good" cholesterol
- e. Other notes:
 - i. Protein is denser than fat; therefore, lipoproteins with more protein are denser than those with more fat. These are ordered in rank of density.

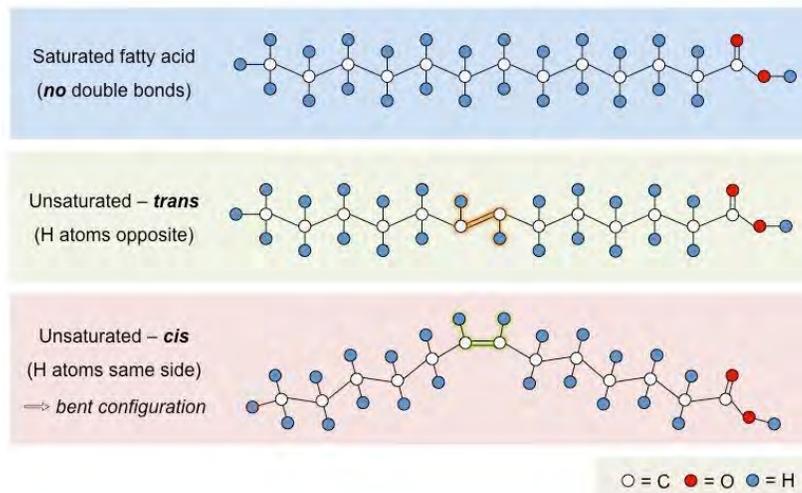
2. Chapter 6: Protein

6. Proteins: Structure and function in the body

- a. **Structure of Protein:** [CLICK HERE FOR RESOURCE](#)
 - i. Proteins are made up of chains of 20 _____ (an amino group, a carboxyl group, hydrogen, and various side chains).
 - ii. Links of amino acids are connected by _____ (formed when a water molecule bonds to the carboxyl group of two amino acids. Part of why water is so important for you!).
 - iii. These links are also considered the primary structure of protein.

Type of Fatty Acid	Double Bonds	Diagram
Saturated	None	
Monounsaturated	One	
Polyunsaturated	Multiple (>1)	

-
- Saturated: bonds
- Unsaturated: bonds
 - Monounsaturated: one bond
 - Polyunsaturated: multiple bonds
 - Cis: bonds are on the same side
 - Trans: bonds are on sides



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- Note that the two unsaturated fats in the diagram above are monounsaturated.
- Which lipids are associated with health benefits or disease risks?
 - Health benefits:
 - **Monounsaturated** (lowers both LDL and risk of heart disease and stroke)
 - **Polyunsaturated** (lowers both LDL and risk of heart disease and stroke)
 - Disease risk:
 - (raises LDL AND lowers HDL, increases risk of heart disease)
 - To an extent, **saturated fats** (can raise LDL and increase risk of heart disease and stroke)