

# I. Carbohydrates

## A) Structure

1. Building Block: single sugars  
(monosaccharides)

2. Made of elements:

a. Carbon (*organic*)

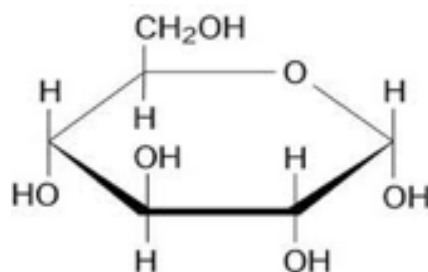
b. Hydrogen

c. Oxygen

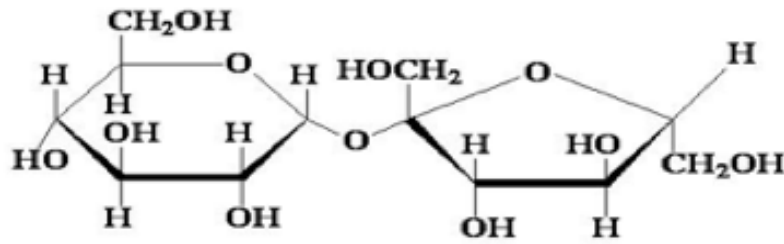
*1:2:1 ratio*  
*C:H:O*

3. Classified into groups

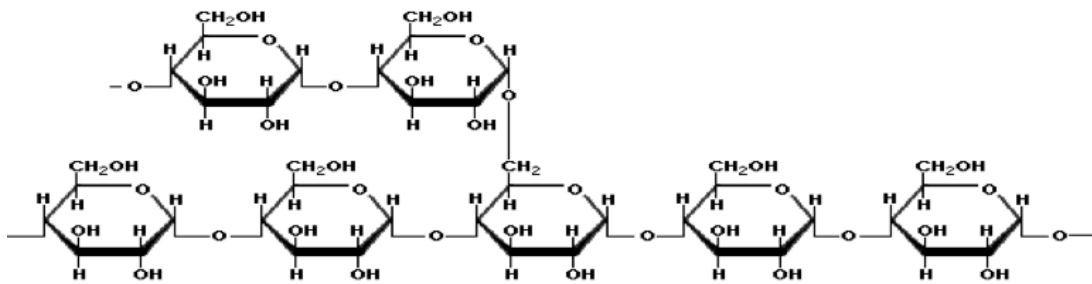
a. Monosaccharides: single sugars  
(ex. glucose)



b. Disaccharides: double sugars (ex. sucrose)



c. Polysaccharides: many sugars (ex. starch)  
Also called complex carbohydrates.



## B. Function

1. Provide energy: simple sugars provide quick energy while complex carbohydrates release energy bit by bit as they're broken down
2. Structural support: cellulose in plants provides rigid structure (wood)

- We'll talk about this later*
3. Cellular recognition: carbohydrates stick out of the cell membrane like flags

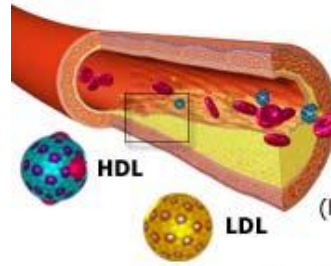
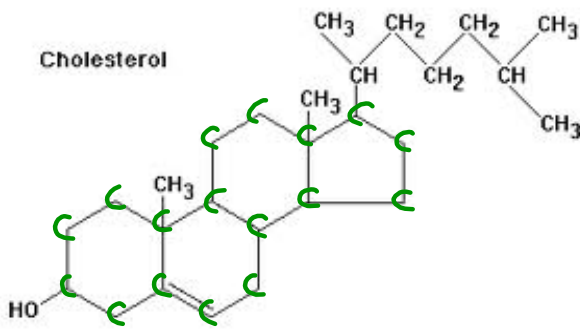
## II. Lipids (fats)

### A. Structure

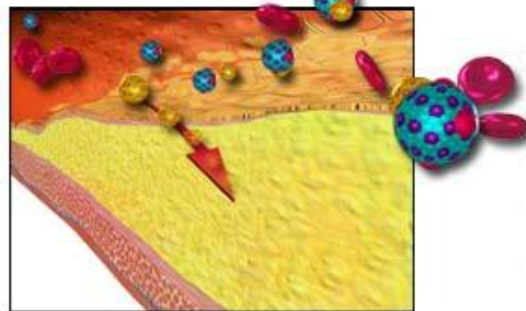
1. Building block: fatty acids (long chains of carbon and hydrogen)
  2. Made of elements
    - a. Carbon
    - b. Hydrogen
    - c. Oxygen
    - d. Sometimes Phosphorus
- most common*



c. Steroids: carbon and hydrogen form rings instead of chains (ex. cholesterol)



**Cholesterol** is a waxy fat (lipid) carried through blood by lipoproteins. The two main types of lipoproteins are high density lipoproteins (HDLs) and low density lipoproteins (LDLs).



HDLs (good cholesterol) carry LDLs (bad cholesterol) away from artery walls. LDLs stick to artery walls and can lead to plaque build-up (atherosclerosis).

4. Chains of carbon and hydrogen are **nonpolar** because they share electrons equally; being nonpolar is very important in the function of lipids.



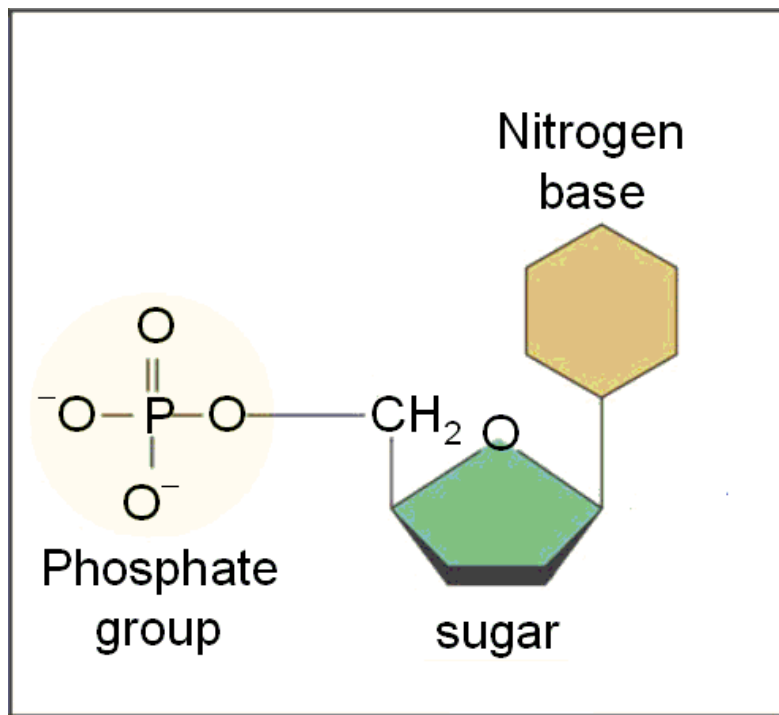
## B. Function

1. Water barrier: lipids are nonpolar so they repel water
2. Energy storage: excess food energy can be stored as fat to be used at a later date *burning lipids releases the most energy per gram*
3. Insulation: animals in cold climates have blubber to keep themselves warm
4. Chemical Signals (hormones)

## III. Nucleic Acids

### A. Structure

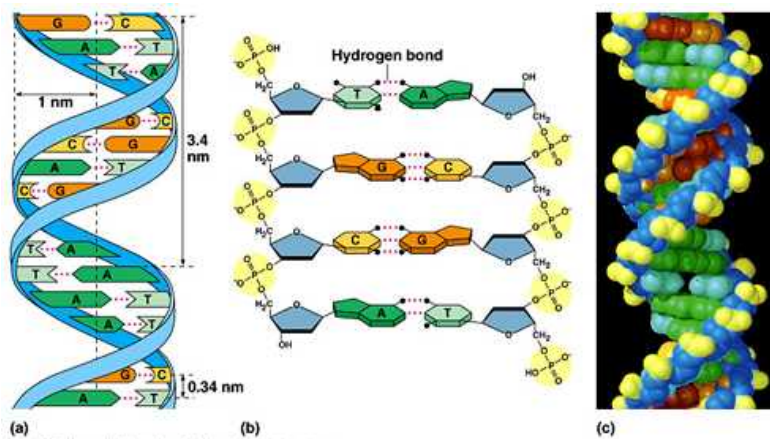
1. Building block: nucleotides
2. Made of elements:
  - a. Carbon
  - b. Hydrogen
  - c. Oxygen
  - d. Nitrogen
  - e. Phosphorus
  - f. Sulfur



Nucleotide

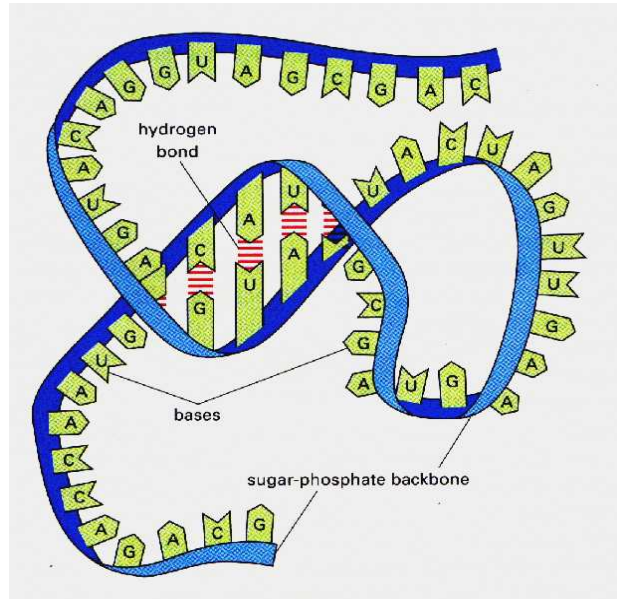
3. Classified into groups:

1. DNA (deoxyribonucleic acid): double stranded molecule found in the nucleus



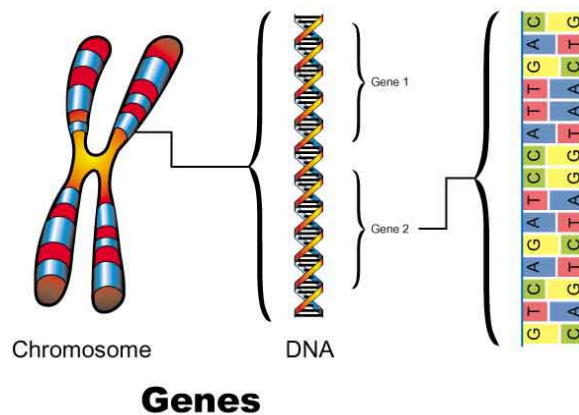
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## 2. RNA (ribonucleic acid): single stranded molecule found in the cytoplasm



## B. Function

1. Store genetic information: DNA contains genes that tell the cell how to function



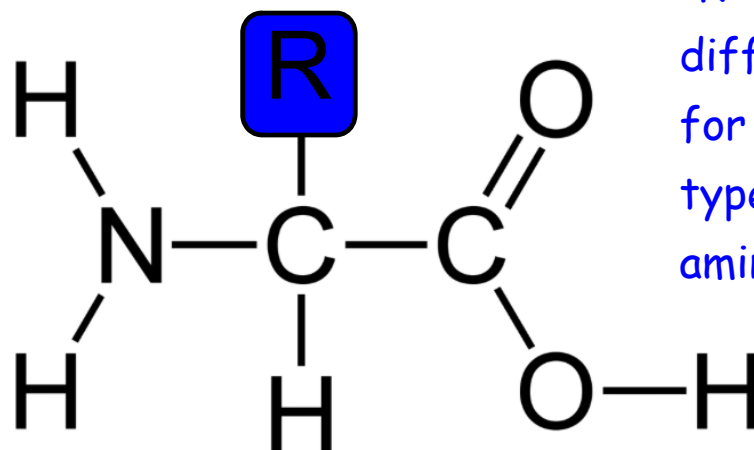


## IV. Proteins

### A. Structure

1. Building blocks: amino acids
2. Made of elements
  - a. Carbon
  - b. Hydrogen
  - c. Oxygen
  - d. Nitrogen

### Structure of an amino acid:



"R" is  
different  
for every  
type of  
amino acid

## B. Function

1. Structure and support: collagen in skin
2. Builds muscle
3. Regulate what enters/leaves the cell: proteins make "tunnels" through cell membrane
4. Speed up chemical reactions: **enzymes** are proteins that work as catalysts