

# BR-NFL Nutrition

## Video

- ▶ While watching the video record at least 3 things that you can do to improve your diet.



# **Chapter 2: The Chemistry of Life**

## **Sec 2-3 Carbon Compounds:**

**What is special about the chemistry of carbon?**

**What are the four major macromolecules?**

**What is the connection between a monomer and a polymer?**

Goal-> To describe the key functions of each group of organic compounds.

1st job of a biologist is to understand the chemistry of life.

Water

Carbon

Energy (sun)

Oxygen

Fuel

**Organic Chemistry = study of all compounds that contain bonds between carbon atoms.**

## Why Carbon ?

### 4 Valence Electrons

-> covalent bonds

### Can bond with many elements

->hydrogen, oxygen, phosphorus,  
sulfur & nitrogen

### Carbon bonds to Carbon

-> Chains of unlimited length

->create complex structures

**Result = Versatile**

Macromolecules= 'giant molecules' made of thousands or hundreds of thousands of smaller molecules.

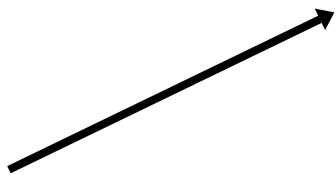
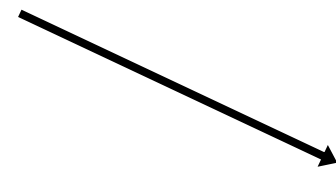
**Monomer (building blocks) -> Polymers-> Macromolecules**

Carbohydrates

Lipids

Nucleic Acids

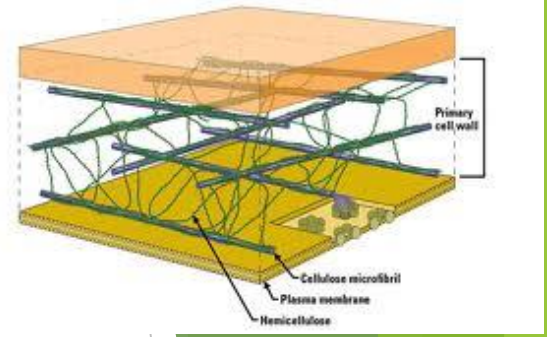
Proteins



Are in all living things

# Carbohydrates

# Function of Carbohydrates



## 1. Energy source!!!

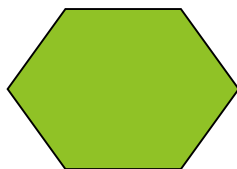
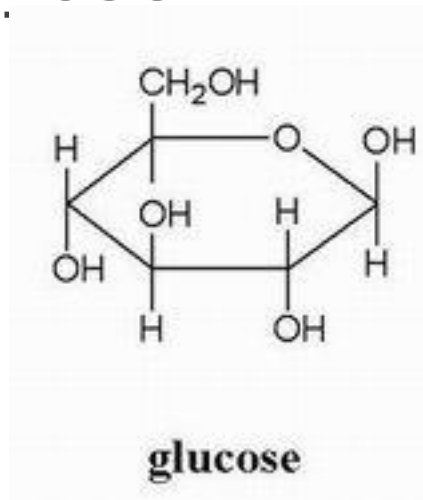
- ▶ Energy is stored in the C-H bonds

## 2. Plant Structure

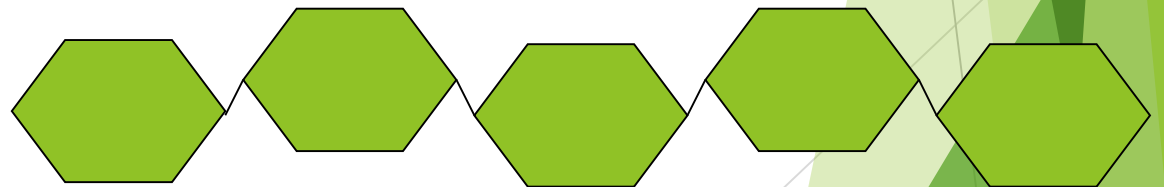
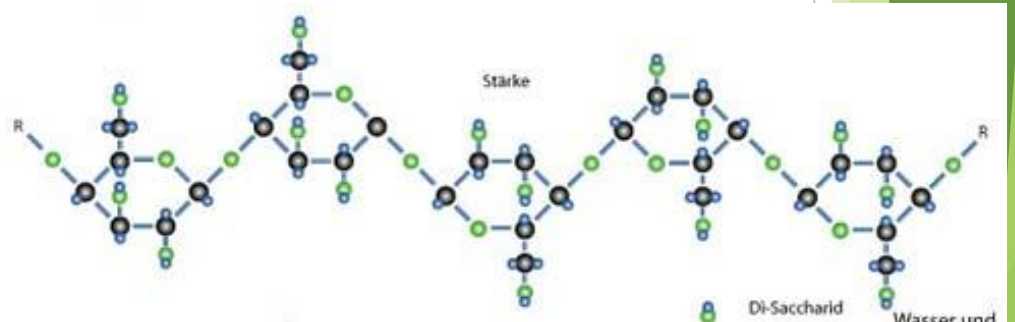
- ▶ Cellulose is a carbohydrate found in the cell wall of plants
  - ▶ We can eat cellulose, but we can't break it down and use it for energy
  - ▶ It is a source of dietary fiber

# Carbohydrate Structure

- ▶ Subunit is sugar, a simple carbohydrate
- ▶ Sugars end in -ose



- ▶ Many sugars linked together makes starch, a complex carbohydrate



## Structure (continued)

- ▶ Contain C, H, O in a 1:2:1 ratio

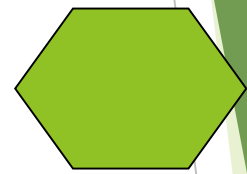
### Example: Glucose



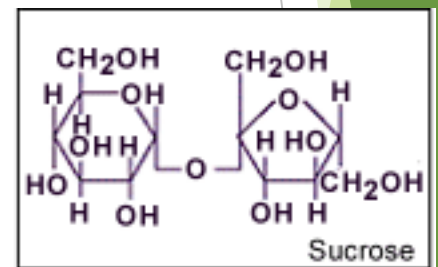
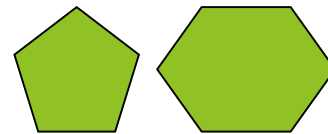


# Carbs are also called saccharides

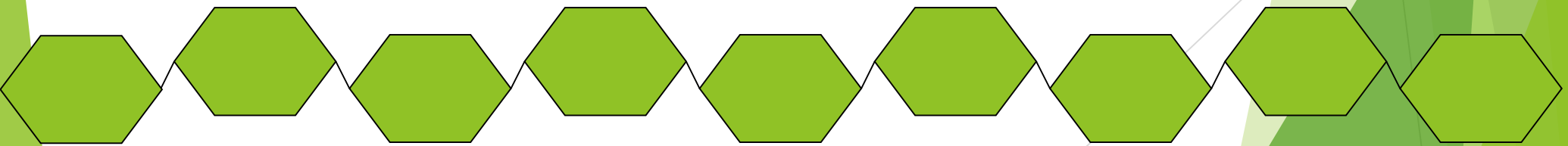
▶ Monosaccharide - 1 sugar



▶ Disaccharide - 2 sugars



▶ Polysaccharide - many sugars



# Carbohydrate Example

## ► Foods high in Carbohydrates

### ► Bread, Cereal, Pasta, Potato

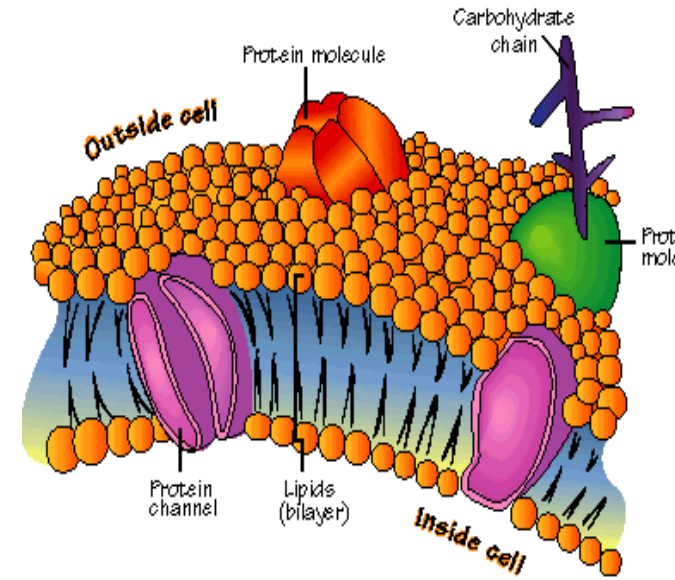


# BR- Review Carbohydrates

- ▶ What elements make carbohydrates?
- ▶ What is the ratio for simple (single) carbohydrates?
- ▶ What is the function of carbohydrates?

# Lipids

# Function



## 1. Long term energy storage

- Fats have more energy than carbs
  - 1 grams of fat = 9 cal
  - 1 gram of carbohydrate/protein = 4 cal
- Our bodies store unused energy in fat

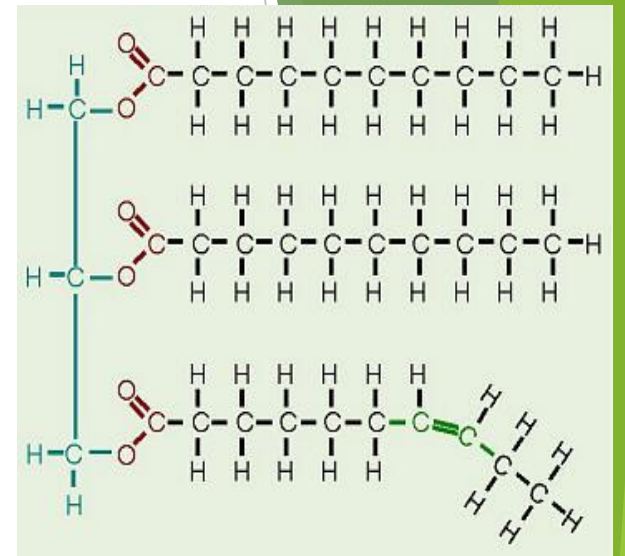
## 2. Form cell membranes

## 3. Steroid hormones (testosterone)

## 4. Cholesterol

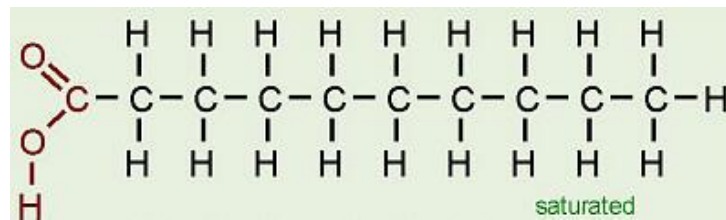
# Structure

- ▶ Lipids are NONPOLAR and cannot dissolve in water!
- ▶ They are hydrophobic (Water Fearing)
- ▶ Subunit is fatty acid
  - ▶ 3 long chains of C and H
  - ▶ Elements included C, H, O



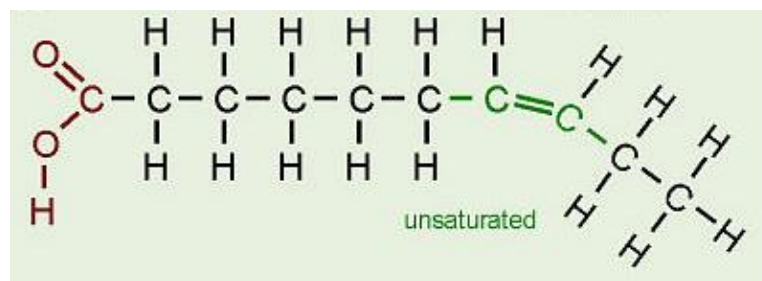
## Structure (continued)

- ▶ Saturated (all single bonds)



- ▶ Usually solids, like butter

- ▶ Unsaturated (1 or more double bonds)



- ▶ Usually liquids, like oil

# Lipid Examples

- ▶ Fats, oils, and waxes
- ▶ cholesterol and hormones



**GOOD**

**Unsaturated Fats**

**VS**



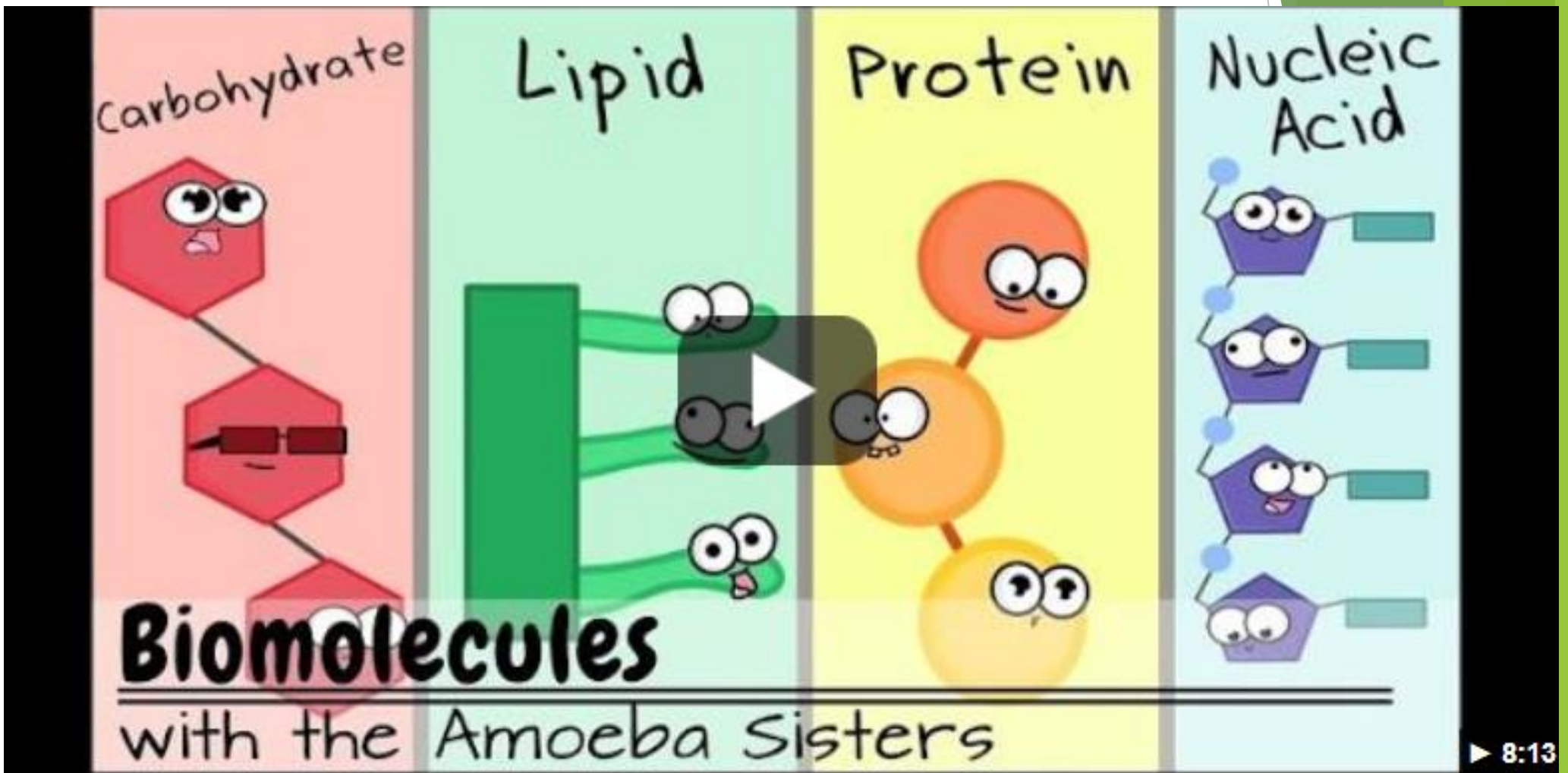
**BAD**

**Saturated Fats**





Fill out the worksheet while we watch the video



[Video](#)

# Protein



# Function of Proteins

## 1.) Structural:

Collagen:

- ▶ Forms cartilage and tendons

Keratin:

- ▶ Forms hair

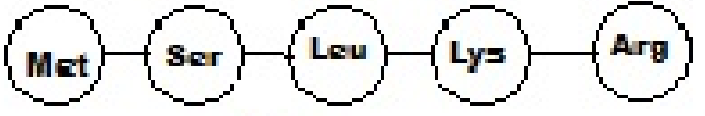
## 2.) Functional:

Some transport things (hemoglobin transports oxygen)

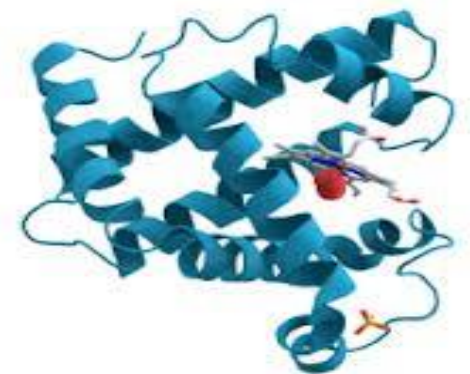
- ▶ ENZYMES - end with -ase (catalase)

- ▶ Help chemical reactions by speeding them up; This is very important for bodily functions, like metabolism

# Protein Structure

- ▶ Proteins are made of subunits called amino acids (AA)
- ▶ There are 20 (AA). Met—Ser—Leu—Lys—Arg
- ▶ The average protein has 100 AA
- ▶ amino acid contains four elements: **hydrogen, oxygen, nitrogen and carbon.**

[Protein Video](#)



## Example of food high in protein

- ▶ Steak, Chicken, Insects, Eggs, nuts



# Nucleic Acids

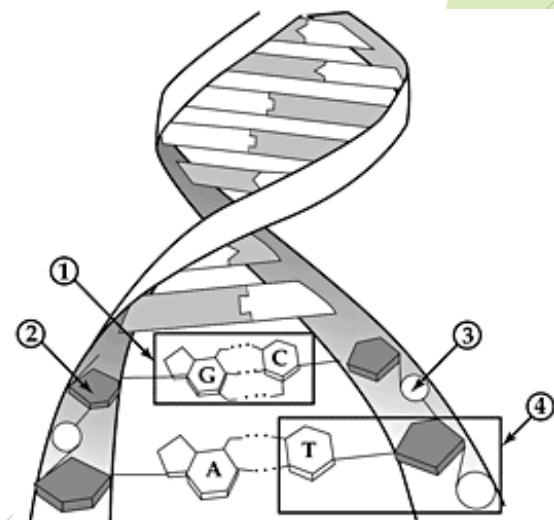
The background features abstract, overlapping geometric shapes in various shades of green, ranging from light lime to dark forest green. These shapes are primarily located on the right side of the page, creating a modern, layered effect. The text 'Nucleic Acids' is positioned in the upper left quadrant in a clean, sans-serif font.

## Function of Nucleic Acids

- ▶ Store and transmit genetic information.
- ▶ Direct the formation (synthesis) of new proteins

# Structure of Nucleic Acids

- ▶ Nucleic Acids are made up of Nucleotides
  - ▶ Nucleotides have 3 parts
    - ▶ Sugar, Phosphate, Nitrogenous Base
      - ▶ 5 types of nitrogenous bases
        - ▶ Adenine, Guanine, Cytosine, Thymine(DNA only), Uracil (RNA only)





# Examples of Nucleic Acids

- ▶ DNA-Deoxyribonucleic acid
- ▶ RNA-Ribonucleic acid
  - ▶ 3 main types of RNA
    - ▶ mRNA(messenger)- takes genetic information to the ribosome
    - ▶ tRNA(transfer)- carries amino acids for protein synthesis
    - ▶ rRNA(ribosomal)-makes up ribosome and aids in protein synthesis.