FATS – Lipids

*Lipids =* a family of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_that are a main component of every living cell.

-Like carbohydrates, composed of\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, and\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

-Lipids contain many more carbons and hydrogens in proportion to their oxygens, so can supply more \_\_\_\_\_\_\_\_\_\_\_\_\_ per gram (Remember: 9 calories per gram)

# The Lipid Family

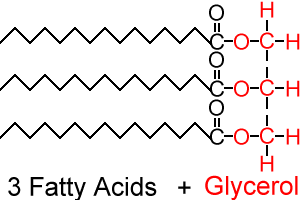
**The Family includes**:

1. *\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_:* ‘head’ of the family as they predominate in both foods and in the body. They include nearly all of the fats and oils people typically eat.
2. *\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_:* used as an emulsifier that mix fats with water, and found naturally in food.
3. *\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_:* include bile acids, some hormones, and cholesterol.

## TRIGLYCERIDES

*Main Function:* \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Composed of three fatty acids (carbon chain with hydrogens attached) attached to a glycerol (backbone to a triglyceride)



The chemistry of a fatty acid influences the characteristics of foods and the health of the body, which brings us to Types of Fats!

*Fatty acids differ by:*

* \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
* \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
* \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

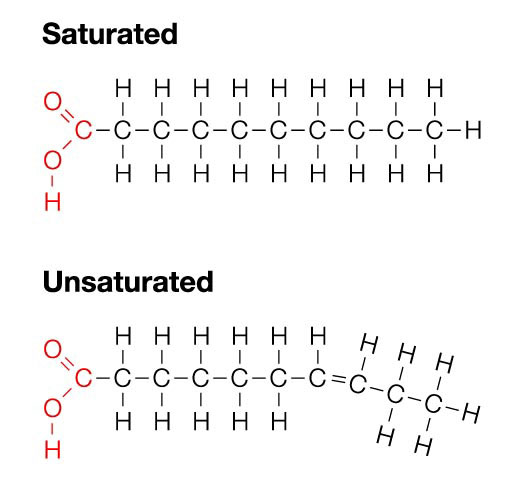
**Types of Fats:**

**\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_Fats**

* Molecules have \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
* Contain all of the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_atoms their molecular structure can hold – linked to \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
* These chains are fairly straight and can \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ closely together, making these fats \_\_\_\_\_\_\_\_\_\_\_\_\_at room temperature (i.e., lard, butter – animal fats)
* Found mostly in \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
* Intake should be limited

**\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_Fat**

* Has at least \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ between carbons
* \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ hydrogen atoms – to make up the difference for a missing single bond, a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_forms.
* Double bonds cause the molecule to bend.
* The kinks in the tails mean that unsaturated fats can't \_\_\_\_\_\_\_\_\_\_\_as closely together, making them \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_at room temperature (i.e., vegetable oil)



**Types of Unsaturated Fats**

**\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_Fats**

* Carbon molecules with at least \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
* Found primarily in olive oil and canola oil
* Recommended as a replacement for \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_Fats**

* Carbon molecules with at least \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
* Found mainly in vegetable oils (safflower, sunflower, corn, soybean, cottonseed)
* Contain essential fatty acids: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Essential Fatty Acids:

* *Omega-3 fatty acids\_*– Necessary for human health for the body can’t make them
* Research shows that omega-3 fatty acids reduce \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_and may help lower risk of chronic diseases such as \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
* *Omega –6 fatty acid* – Are highly concentrated in the brain and appear to be important for cognitive (brain memory and performance) and behavioural function (
* Shown to lessen the risk of heart disease

(food sources: fish, flaxseed, leafy greens, eggs)

**Oxidation, Hydrogenation and Trans – Fats**

**Oxidation**

* Occurs as surface of the foods reacts with \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
* When fatty acids oxidize, they \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ by combiningwith oxygen
* Main reason that high-fat foods spoil
* Unsaturated fats with more double bonds (which make them more unstable) are \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Hydrogenation**

* A chemical process in which \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_to unsaturated fat molecules, breaking some double bonds and replacing them with single bonds.
* It \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_against oxidation by making polyunsaturated fats more \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
* It alters the texture of foods by making \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_vegetable oils more \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_(i.e., margarine and shortening)

**Trans-Fat**

* Hydrogenation gives rise to trans-fatty acids – altered fatty acids that may have health effects similar to saturated fats.
* Occur when oils are partially hydrogenated and some of the unsaturated fatty acids change their shape – artificially created chemical process
* Found in many processed foods that contain partially hydrogenated fats (some margarines, cookies, crackers, french fries, potato chips)
* Can raise \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_levels, increase risk for \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Meeting your Fat Needs**

* Generally we consume too much fat in our diets
* Canadian Dietitians recommend we include between \_\_\_\_\_\_\_\_\_\_\_% of energy as fat
* Eating fat does \_\_\_\_\_\_\_\_\_\_mean you are going to\_\_\_\_\_\_\_\_\_\_\_\_\_.
* It is the number of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_(more energy in than out) that causes an increase in\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

**Functions of Fats**

* The main function of fats in the body is to\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_:
  + By supplying energy, fats save \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_from being used for energy and allow them to perform their more important role of building and repairing tissues
* Fats can also be stored in body for subsequent use (\_\_\_\_\_\_\_\_\_\_\_\_\_\_)
* Help in forming structural material of cells and tissues such as the\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
  + Protect our \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_from harm
* Carry the fat soluble vitamins \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_into the body and help in the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_of these vitamins in the intestines.
* Some fats supply essential \_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Understanding the Fat Issue**

* Heart disease is Canada’s number \_\_\_\_\_\_\_ killer
* Hardening of the \_\_\_\_\_\_\_\_\_\_ is one of the most common types of heart disease
* Fatty deposits on the inner lining of the artery walls reduce the artery’s total diameter (blockage or atherosclerosis), \_\_\_\_\_\_\_\_\_\_\_\_\_ the flow of blood, causing \_\_\_\_\_\_\_\_\_\_\_\_\_by blood clot = heart attack or stroke
* \_\_\_\_\_\_\_\_\_\_\_\_\_ diet helps to eliminate this risk

*Controllable Risk Factors*

* High blood cholesterol levels
* Smoking
* Lack of exercise
* High blood pressure
* Stress
* Obesity

*Uncontrollable Risk Factors*

* Heredity
* Gender
* Age
* Diabetes