

LEMAK

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Lipid: Fat & Oil

- Lipid: trigliserida (fat & oil), fosfolipid (lechitin), & sterol (kolesterol).
- Fat: lipid yg padat pd temperatur ruangan
- Oil: lipid yg wujudnya cair pd temperatur ruangan.

Fungsi Lipid

- Bantalan organ
- Menimbulkan rasa kenyang
- Insulasi
- Sumber energi
- Sintesis hormon
- Membantu absorpsi vitamin yg larut lemak

The Role of Fat

Fat-soluble vitamins

- ◆ Vitamins A, D, E, and K
- ◆ Fat is required for their transport

Fat is essential to many body functions

- ◆ Cell membrane structure
- ◆ Nerve cell transmissions
- ◆ Protection of internal organs
- ◆ Insulation to retain body heat

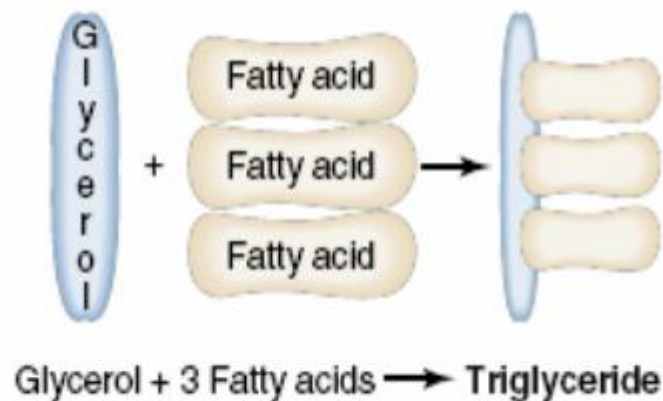
The Role of Fats

Fat provides flavor and texture to foods

Fat contributes to making us feel satiated because

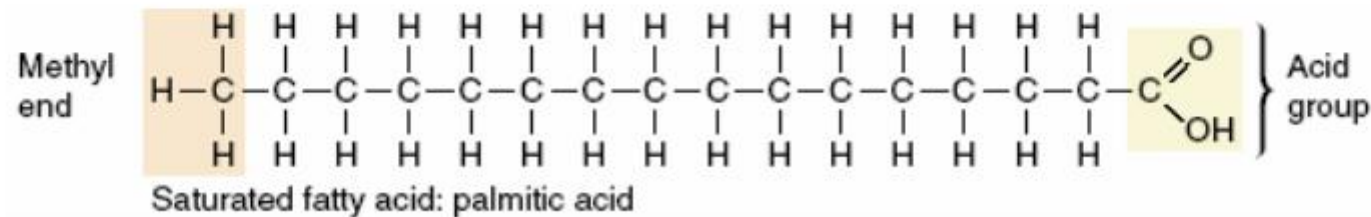
- ◆ Fats are more energy dense than carbohydrates or protein
- ◆ Fats take longer to digest

A Closer View of Fats



- **Fatty acids:** basic units of fat composed of chains of carbon atoms with an acid group at one end and hydrogen atoms attached all along their length.
- **Triglycerides (try-GLISS-er-ides):** the major class of dietary lipids, including fats and oils. A triglyceride is made up of three units known as *fatty acids* and one unit called *glycerol*.
- **Glycerol (GLISS-er-all):** an organic compound that serves as the backbone for triglycerides.

THE TYPES OF FATTY ACIDS



C is a carbon atom.

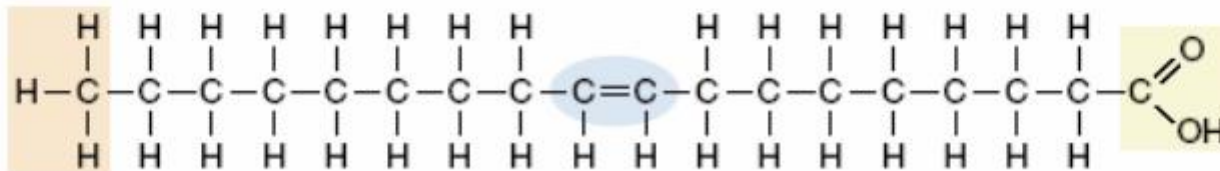
H is a hydrogen atom.

— is a single bond.

= is a double bond.

- **Saturated fatty acid:** a fatty acid carrying the maximum possible number of hydrogen atoms (having no points of unsaturation). Saturated fats are found in animal foods like meat, poultry, and full-fat dairy products, and in tropical oils such as palm and coconut.

THE TYPES OF FATTY ACIDS

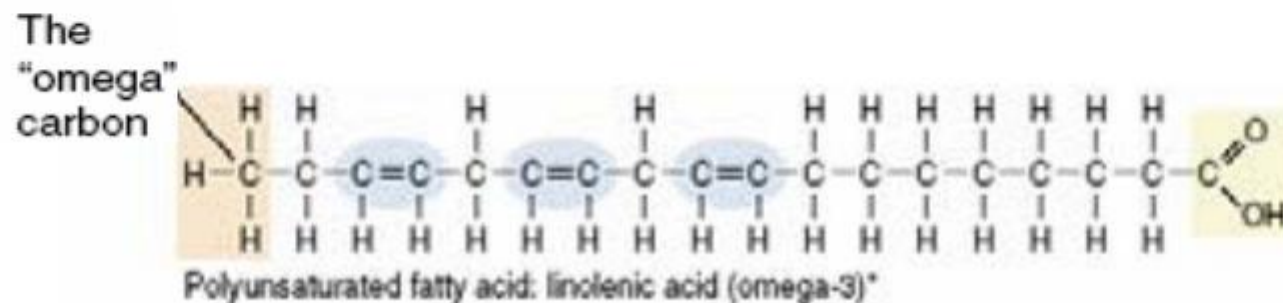


Monounsaturated fatty acid: oleic acid (omega-9)*

$\text{C}=\text{C}$ is a point of unsaturation.

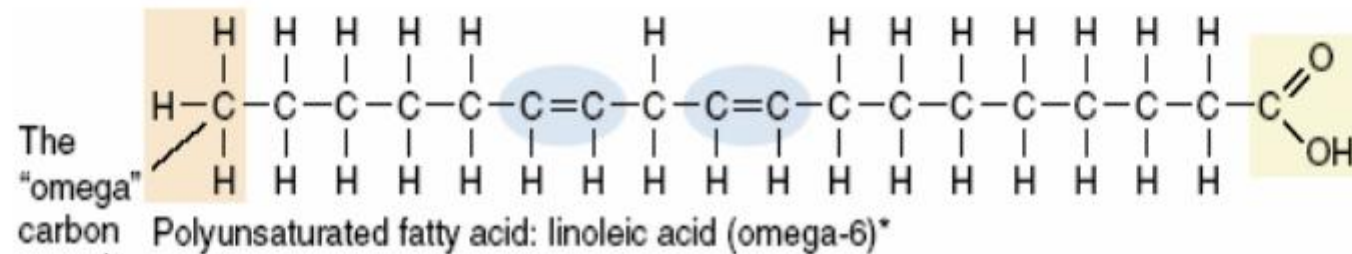
- **Unsaturated fatty acid:** a fatty acid with one or more points of unsaturation. Unsaturated fats are found in foods from both plant and animal sources. Unsaturated fatty acids are further divided into monounsaturated fatty acids and polyunsaturated fatty acids.
- **Monounsaturated fatty acid:** a fatty acid containing one point of unsaturation, found mostly in vegetable oils such as olive, canola, and peanut.

THE TYPES OF FATTY ACIDS



- **Polyunsaturated fatty acid:** (sometimes abbreviated PUFA) a fatty acid in which two or more points of unsaturation occur, found in nuts and vegetable oils such as safflower, sunflower, and soybean, and in fatty fish.

Polyunsaturated Fatty Acids



- **Linoleic (lin-oh-LAY-ic) acid, linolenic (lin-oh-LEN-ic) acid:** polyunsaturated fatty acids, essential for human beings.
- **Essential fatty acid:** a fatty acid that cannot be synthesized in the body in amounts sufficient to meet physiological need.

Essential Fatty Acids

The Essential Fatty Acids

Polyunsaturated Fatty Acids



The fatty acids in fish oils include eicosapentaenoic (EYE-kossa-PENTA-ee-NOH-ic) acid (EPA) and docosahexaenoic (DOE-cosa-HEXA-ee-NOH-ic) acid (DHA), both of which are omega-3 fatty acids.

- Omega-3 fatty acids, found in fish oils, offer a protective effect on health.
 - Interest in fish oils was first kindled when someone thought to ask why the Eskimos of Greenland, who eat a diet very high in fat, have such a low rate of heart disease.
 - Blood clot formation, inflammation (e.g. arthritis, asthma), irregular heart rhythm and cancer also seem to be beneficially affected by DHA and/ or EPA.

Classification of Fats in Foods

Saturated

Animal Fats
Lard
Butter
Palm
Palm Kernal
Coconut

Monounsaturated

Olive Oil
Canola Oil
Peanut
Avocado

Polyunsaturated

Corn
Soybean
Cottonseed
Safflower
Sunflower
Fish Oils
(Omega 3 Oils)

Triglycerides

Hydrogenation: The addition of hydrogen atoms to unsaturated fatty acids.

- ◆ Converts liquid oils into a more solid form
- ◆ Use to create margarine from plant oil
- ◆ Creates *trans* fatty acids
- ◆ Increases risk for cardiovascular disease

Blood Levels for Lipoproteins

- Total Cholesterol:
 - <200 mg/dl = desirable
 - 200-239 mg/dl = borderline hyperlipidemia
 - >240 mg/dl = hyperlipidemia
- LDL < 100 mg/dl is favorable
- HDL ≥ 60 mg/dl is favorable
- Triglycerides <150 mg/dl is favorable

The Effects of Various Types of Fat on Blood Lipid Levels

- Saturated Fat
 - Increases total cholesterol
 - Increases LDL-cholesterol
- Polyunsaturated Fat
 - Decreases total cholesterol
 - Decreases LDL-cholesterol
 - Decreases HDL-cholesterol
- Monounsaturated Fat
 - Decreases total cholesterol
 - Decreases LDL-cholesterol
 - Increases HDL-cholesterol

The Effects of Various Types of Fat on Blood Lipid Levels

- Omega-3 Fat
 - Decreases total cholesterol
 - Decreases LDL-cholesterol
 - Increases HDL-cholesterol
 - Decreases serum triglycerides
- Trans Fat
 - Increases total cholesterol
 - Increases LDL-cholesterol

How Much Fat?

The *type* of fat consumed is important.

- ◆ Saturated and trans fats are highly correlated with increased risk of heart disease

Recommendation

- ◆ Saturated fat: less than 7% of total calories
- ◆ *Trans* fats: reduced to the absolute minimum

Food Sources of Fat

Visible fats

- ◆ Fats we knowingly add to foods
- ◆ Butter, cream, mayonnaise, dressings

Invisible fats

- ◆ Fats hidden in foods
- ◆ Naturally occurring or added during processing
- ◆ Baked goods, dairy, processed meats

Food Sources of Fat

Beneficial fats

- ◆ Omega-3 fatty acids may be low in diets
- ◆ Fish, walnuts, soy, canola, flax seeds

Switching to more healthful fats without increasing total fat intake

- ◆ Use olive or canola oil in place of butter or margarine
- ◆ Select low-fat or non-fat dairy products

Cardiovascular Disease

How can fat intake protect against heart disease?

Diets high in omega-3 fatty acids (along with moderate exercise) can

- ◆ increase HDL “good” cholesterol levels
- ◆ decrease VLDL production

Cardiovascular Disease

Lifestyle changes can prevent or reduce cardiovascular heart disease

- ◆ Total fat intake: 20-35% total calories
- ◆ Saturated fat: less than 7% total calories
- ◆ Cholesterol: less than 300 mg per day
- ◆ Trans fat: reduce to absolute minimum
- ◆ Increase omega-3 fatty acids
- ◆ Dietary fiber: 20-30 grams per day
- ◆ Folate: 400 micrograms/day
- ◆ Increase intake of plant sterols

Cardiovascular Disease

Lifestyle changes can prevent or reduce cardiovascular heart disease

- ◆ Keep blood glucose and insulin within normal limits
- ◆ Eat throughout the day
- ◆ No more than 2 alcoholic beverages per day for men and one drink per day for women
- ◆ Maintain an active lifestyle
- ◆ Maintain a healthful body weight

Fat and Cancer

Diet and lifestyle: important environmental factors in cancer development

- ◆ Physical activity can reduce the risk of colon cancer
- ◆ Strong association between animal fat and prostate cancer
- ◆ Association between high fat diet and breast cancer is controversial (but many studies do show a strong association)