

Energy Yielding Nutrient (Fats)



Learning Objectives

- State the functions of fats and its food sources
- Identify the Recommended Nutrient Intake (RNI) for fats
- Classify fats
- Differentiation between saturated and unsaturated fats
- Describe the digestion, absorption and storage of fats
- Explain the deficiency and overconsumption of fats intake







- Fats and oil belong to a group of compounds called lipids
- Mainly made of carbon, hydrogen, and oxygen
- Fats are solid at 20C. They called oils if they are liquid at the temperature
- More concentrated sources of energy than carbohydrates and proteins

1g = 9 kcal

Lipids



Cell

0

Cleveland Clinic





Recommended Nutrient Intake (RNI)

Nut

Appendix 3.5 Comparison of recommended intake of fat and its components: RNI Malaysia (2017), RNI Malaysia (2005), FAO (2010) and IOM (2006)

| Nutriant | Age /Life | Mal: (20 | aysia 117) | Malaysia (2005)ª | FA0 (2010) | 10M (2006)° |
|-----------|---------------------|-------------|---------------|---------------------|---------------|----------------|
| Nutrent | stage group | g/day | % TEI | % TEI | % TEI | % TEI |
| Total fat | Infants (Boys) | | | | | |
| | 0 – 2 months | 21 - 31 | 40 - 60 | 50 - 60 | 40 - 60 | 30 - 40 |
| | 3 – 5 months | 24 - 36 | 40 - 60 | 50 - 60 | 40 - 60 | 30 - 40 |
| | 6 – 8 months | 21 – 28 | 30 - 40 | 30 - 40 | ~ 35 | 30 - 40 |
| | 9 – 11 months | 24 - 32 | 30 - 40 | 30 - 40 | ~ 35 | 30 - 40 |
| | Infants (Girls) | | | | | |
| | 0 – 2 months | 19 – 28 | 40 - 60 | 50 - 60 | 40 - 60 | 30 - 40 |
| | 3 – 5 months | 22 - 33 | 40 - 60 | 50 - 60 | 40 - 60 | 30 - 40 |
| | 6 – 8 months | 19 – 25 | 30 - 40 | 30 - 40 | ~ 35 | 30 - 40 |
| | 9 – 11 months | 22 - 29 | 30 - 40 | 30 - 40 | ~ 35 | 30 - 40 |
| | Children (Boys) | | | | | |
| | 1 – 3 years | 27 - 38 | 25 - 35 | 25 - 35 | 25 - 35 | 30 - 40 |
| | 4 – 6 years | 36 - 51 | 25 - 35 | 20 - 30 | 25 - 35 | 25 - 35 |
| | 7 – 9 years | 49 - 68 | 25 - 35 | 20 - 30 | 25 - 35 | 25 - 35 |
| | Children (Girls) | | | | | |
| | 1 – 3 years | 25 - 35 | 25 - 35 | 25 - 35 | 25 - 35 | 30 - 40 |
| | 4 – 6 years | 34 - 47 | 25 - 35 | 20 - 30 | 25 - 35 | 25 - 35 |
| | 7 – 9 years | 45 - 63 | 25 - 35 | 20 - 30 | 25 - 35 | 25 - 35 |
| | Adolescents (Boys) | | | | | |
| | 10 – 12 years | 54 – 75 | 25 - 35 | 20 - 30 | 25 - 35 | 25 - 35 |
| | 13 - 15 years | 61 - 86 | 25 - 35 | 20 - 30 | 25 - 35 | 25 - 35 |
| | 16 - 18 years | 65 - 91 | 25 - 35 | 20 - 30 | 25 - 35 | 25 - 35 |
| | Adolescents (Girls) | | | | | |
| | 10 - 12 years | 48 - 67 | 25 - 35 | 20 - 30 | 25 - 35 | 25 - 35 |
| | 13 – 15 years | 50 - 70 | 25 - 35 | 20 - 30 | 25 - 35 | 25 - 35 |
| | 16 - 18 years | 53 - 74 | 25 - 35 | 20 - 30 | 25 - 35 | 25 - 35 |
| | Adults (Men) | | | | | |
| | 19 – 29 years | 62 - 75 | 25 – 30 ° | 20 - 30 | 20 - 35 | 20 - 35 |
| | 30 – 59 years | 61 – 73 | 25 – 30 ° | 20 - 30 | 20 - 35 | 20 - 35 |
| | ≥ 60 years | 56 - 68 | 25 - 30 | 20 - 30 | 20 - 35 | 20 - 35 |
| | | | | | | |

| rient | Age /Life | Mala (20 | iysia 17) | Malaysia (2005)ª | FA0 (2010) | 10M (2006) ^b |
|-------|----------------|-------------|--------------|---------------------|---------------|----------------------------|
| | stage group | g/day | % TEI | % TEI | % TEI | % TEI |
| | Adults (Women) | | | | | |
| | 19 – 29 years | 51 – 61 | 25 – 30 ° | 20 - 30 | 20 – 35 | 20 - 35 |
| | 30 – 59 years | 53 - 63 | 25 – 30 ° | 20 – 30 | 20 – 35 | 20 – 35 |
| | ≥ 60 years | 49 – 59 | 25 – 30 | 20 – 30 | 20 – 35 | 20 – 35 |
| | Pregnancy | | | | | |
| | 1st trimester | 54 – 65 | 25 – 30 ° | 20 – 30 | 20 – 35 | 20 – 30 |
| | 2nd trimester | 60 – 71 | 25 – 30 ° | 20 – 30 | 20 – 35 | 20 – 35 |
| | 3rd trimester | 65 - 78 | 25 – 30 ° | 20 – 30 | 20 – 35 | 20 – 35 |
| | Lactation | | | | | |
| | 1st 6 months | 66 - 79 | 25 – 30 ° | 20 – 30 | 20 – 35 | 20 – 35 |

VISION

Food Sources of Fats

- **Animal fats**: Butter, cheese, eggs, meat, fish
- Vegetable fats : Some plants store fats in their seeds. Eg: almond, coconut, sunflower, cashew nuts, soybeans, sesame
- Fruits and vegetable are poor source of fats



Appendix 3.1 Fatty acid composition of selected dietary fats and oils

| Type of fats and oils | SFA | MUFA | PUFA | P/S ratio | <12:0 | 12:0 | 14:0 | 16:0 | 16:1 | 18:0 | 18:1 | 18:2 | 18:3 | Others |
|--------------------------|------|------|------|--------------|-------|------|------|------|------|------|------|------|------|--------|
| Coconut oil | 91.9 | 6.5 | 1.5 | 0.02 | 14.9 | 48.5 | 17.6 | 8.4 | - | 2.5 | 6.5 | 1.5 | - | 0.1 |
| Palm kernel oil | 84.2 | 13.7 | 2.0 | 0.02 | 8.2 | 49.6 | 16.0 | 8.0 | - | 2.4 | 13.7 | 2.0 | - | 0.1 |
| Cocoa butter | 60.4 | 35.6 | 2.9 | 0.05 | - | - | 0.1 | 25.8 | 0.3 | 34.5 | 35.3 | 2.9 | - | 1.1 |
| Beef fat | 50.6 | 42.1 | 2.8 | 0.06 | 0.1 | 0.1 | 3.3 | 25.5 | 3.4 | 21.6 | 38.7 | 2.2 | 0.6 | 4.6 |
| Shea butter | 46.0 | 48.0 | 5.1 | 0.11 | - | - | - | 5.0 | - | 41.0 | 48.0 | 5.1 | - | 0.9 |
| Palm oil | 44.9 | 43.4 | 10.8 | 0.24 | - | 0.3 | 0.8 | 39.5 | 0.3 | 4.3 | 43.1 | 10.5 | 0.3 | 0.5 |
| Palm olein | 42.4 | 44.0 | 11.8 | 0.28 | - | 0.2 | 0.8 | 37.2 | 0.4 | 4.2 | 43.6 | 11.5 | 0.3 | 0.3 |
| Lard | 38.7 | 48.2 | 11.0 | 0.28 | 0.1 | 0.1 | 1.4 | 24.8 | 3.1 | 12.3 | 45.1 | 9.9 | 1.1 | 3.0 |
| Olive oil | 18.8 | 68.2 | 14.6 | 0.78 | - | - | - | 16.5 | 1.8 | 2.3 | 66.4 | 13.0 | 1.6 | 0 |
| Groundnut oil | 9.6 | 71.2 | 18.2 | 1.89 | - | - | 0.04 | 7.5 | 0.1 | 2.1 | 71.1 | 18.2 | - | 0.9 |
| Corn oil | 14.2 | 27.8 | 57.1 | 4.02 | - | - | - | 12.3 | 0.1 | 1.9 | 27.7 | 56.1 | 1.0 | 0.9 |
| Soybean oil | 14.8 | 24.1 | 59.9 | 4.05 | - | - | 0.1 | 10.8 | 0.2 | 3.9 | 23.9 | 52.1 | 7.8 | 1.2 |
| Canola oil | 7.4 | 56.0 | 35.6 | 4.81 | - | - | - | 5.6 | - | 1.8 | 56.0 | 25.8 | 9.8 | 1.0 |
| Sunflower oil | 9.1 | 28.1 | 62.4 | 6.85 | - | 0.02 | 0.09 | 6.2 | 0.12 | 2.8 | 28.0 | 62.2 | 0.16 | 0.4 |
| Safflower oil | 9.2 | 11.6 | 79.2 | 8.60 | - | - | 0.1 | 6.7 | 0.1 | 2.4 | 11.5 | 79.0 | 0.15 | 0.1 |

Notes: values represent %/100g edible fat.

Sources: Dubois et al. (2007), Grundy & Denke (1990), Kris-Etherton et al. (1988), Orsavova et al. (2015), Gunstone et al. (2007), and Karupaiah et al. (2005)



Appendix 3.2a Malaysian foods with significant content of dietary fat (g/100g)

| Food | Total fat | SFA | MUFA | PUFA | TFA* |
|----------------------------------|-----------|------|-------|------|------|
| Fishes | | | | | |
| Black Pomfret (Bawal Hitam) | 2.3 | 0.94 | 0.14 | 0.71 | N/A |
| Giant Seaperch (Siakap) | 2.7 | 0.13 | 0.23 | 0.93 | N/A |
| Golden Snapper (Jenahak) | 1.3 | 0.42 | 0.94 | 0.51 | N/A |
| Indian Mackerel (Kembong) | 1.8 | 0.59 | 0.3 | 0.19 | N/A |
| Silver Pomfret (Bawal Putih) | 2.1 | 0.88 | 0.15 | 0.57 | N/A |
| Yellowstripe scad (Selar Kuning) | 2.1 | 0.83 | 0.29 | 0.14 | N/A |
| Shellfish | | | | | |
| Cockles (Kerang) | 1.9 | 0.64 | 0.40 | 0.61 | N/A |
| Cuttlefish (Sotong) | 1.4 | 0.57 | 0.11 | 0.50 | N/A |
| Oyster (Tiram) | 1.2 | 0.56 | 0.82 | 0.34 | N/A |
| Prawn (Udang) | 1.1 | 0.31 | 0.11 | 0.46 | N/A |
| Nuts and Seeds | | | | | |
| Almond | 49.4 | 3.7 | 30.9 | 12.1 | - |
| Hazelnut | 62.4 | 4.5 | 46.6 | 8.5 | - |
| Peanut | 49.7 | 6.9 | 24.6 | 15.7 | - |
| Walnut | 59.0 | 3.4 | 15.0 | 35.1 | - |
| Confectionary | | | | | |
| Chocolate wafer | 27.3 | 62.3 | 27.9 | 6.4 | 2.72 |
| Cooking chocolate | 33.1 | 80.7 | 15.64 | 2.0 | 1.27 |
| Fats, oils, spreads, dressing | | | | | |
| Butter | 80.6 | 57.8 | 31.7 | 5.9 | 1.32 |
| Fat spread | 73.4 | 36.3 | 39.4 | 23.2 | 0.22 |
| Ghee | 99.8 | 61.5 | 29.7 | 3.3 | 1.04 |
| Margarine | 77 | 46.5 | 36.3 | 16.8 | 0.36 |
| Peanut butter | 42 | 20.3 | 48.6 | 26.9 | 0.52 |
| Salad dressing | 45 | 14.5 | 22.7 | 61 | 0.18 |
| Shortening | 99.8 | 57 | 33.6 | 8.8 | 0.2 |
| Vanaspati | 99.8 | 50.6 | 37.9 | 10.7 | 0.43 |
| Dairy-based products | | | | | |
| Adult milk powder | 25.6 | 58.9 | 30.8 | 5.2 | 1.65 |
| Cheese | 21.5 | 59.8 | 31.6 | 4.6 | 0.78 |
| Children's milk > 3 years | 17.8 | 44.7 | 36.8 | 16.4 | 0.93 |
| Children's milk < 1 years | 27.4 | 39.6 | 40.7 | 18.3 | 0.14 |
| Ice cream | 11.0 | 68.3 | 23.4 | 4.8 | 2.09 |

Appendix 3.2b Malaysian foods with significant content of dietary fat (g/100g)

| Food | Total fat | SFA | MUFA | PUFA | TFA* |
|----------------------------------|-----------|------|------|------|------|
| oups | | | | | |
| oup, canned | 45.8 | 10.7 | 54.6 | 32.3 | 0.09 |
| oup, concentrates | 17.0 | 52.0 | 36.3 | 9.0 | 1.94 |
| inacks | | | | | |
| rench fries | 2.55 | 51.3 | 36.9 | 10.8 | 0.26 |
| rozen Chappati/paratha | 9.1 | 52.1 | 34.3 | 12.2 | 0.64 |
| rozen dough | 5.5 | 48.9 | 37.8 | 12.2 | 0.28 |
| Potato chips | 32.7 | 38.3 | 45.3 | 15.1 | 0.24 |
| Aeat & products | | | | | |
| eef lean | 1.1 | 0.6 | 0.4 | 0 | N/A |
| Burger patties | 13 | 40.9 | 43.4 | 12.3 | 0.08 |
| hicken thigh, farm with skin | 3.7 | 1.1 | 1.8 | 0.8 | N/A |
| hicken thigh, farm, without skin | 0.5 | 0.1 | 0.2 | 0.1 | N/A |
| len egg | 8.1 | 2.6 | 4.7 | 0.8 | N/A |
| futton | 4.6 | 2 | 2.4 | 0.2 | N/A |
| luggets | 15 | 43.5 | 42.1 | 13.1 | 0.18 |
| Pork fat | 89.3 | 37.8 | 45.9 | 5.5 | N/A |
| Pork lean | 21 | 7.9 | 11 | 2.1 | N/A |
| Prawn | 0.3 | 0.1 | 0.1 | 0.1 | N/A |
| ausages | 13.8 | 31.1 | 45.9 | 21.3 | 0.15 |
| opular Street Foods | | | | | |
| har Siew Pau | 15.4 | 7.2 | 7 | 1.2 | N/A |
| hicken rice | 4.6 | 1.8 | 2.1 | 0.7 | N/A |
| Curry laksa | 6.4 | 4.4 | 1.4 | 0.6 | N/A |
| losai | 0.7 | 0.4 | 0.2 | 0 | N/A |
| ried Kueh Tiau | 9.7 | 3.9 | 4.5 | 1.2 | N/A |
| ried mee - Hokkien | 6.6 | 2.7 | 3 | 0.9 | N/A |
| ried mee - Indian style | 9 | 5.6 | 2.3 | 1.1 | N/A |
| or Mai Kai | 5 | 1.9 | 2.4 | 0.7 | N/A |
| lasi goreng cina | 13.2 | 5.3 | 6.5 | 1.4 | N/A |
| lasi lemak | 3.6 | 2 | 1.1 | 0.5 | N/A |
| Satay | 10.8 | 3.6 | 4.6 | 2.6 | N/A |

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Source: Tee et al. (1997), Karupaiah et al. (2014) *relates to total TFA content as a sum of 18:1 n9t; 18:2 n6t; cis-9 t-12; t-9, cis-12; 18:3t1; 18:3t2; 18:3t4; and 18:3t5 excluding natural isomers of conjugated linoleic acid (cis-9,trans-11). N/A=not available

Source: Tee et al. (1997), Karupaiah et al. (2014), Abd. Aziz et al. (2013)

Appendix 3.3 Local fish choices with varying fat content, Cold water fish and Overall rich sources of fatty acids content

| Food group | Sources |
|-------------------------------|---|
| Low fat fish (<1g/100g) | Kikek, bulus-bulus, toman, stingray, grouper, seluang, nyior-nyior, baung. |
| Moderate fat fish (1-3g/100g) | Dory, cencaru, black pomfret, sepat, ikan parang, tenggiri, gelama, jenahak, pelata, kerisi, ikan merah, selar, tilapia, belida. |
| High fat fish (>3g/100g) | Siakap, keli, patin, senangin, kembong, white pomfret. |
| Deep sea cold fish | Tuna, sardines, cod fish, salmon. |
| SFA | Coconut oil, santan, palm kernel oil, palm oil, beef, pork, milk, yogurt, cheese |
| MUFA | Olive oil, Canola oil, peanut oil, almond, peanut, hazelnut, palm oil |
| n-6 PUFA | Soybean oil, sunflower oil, corn oil, tofu, tempeh, walnut |
| n-3 PUFA | Soybean oil, Canola oil, fish, walnut |



Appendix 3.4 Composition of human breast milk in comparison to cow's milk

| Nutrients | Human breast milk Concentration (g/L) | Cow's milk Concentration (g/L) | | |
|----------------------|--|-----------------------------------|--|--|
| Protein | | - I | | |
| Total whey protein | 67.3 | 6.3 | | |
| Immunoglobulins | 1.3 | 0.7 | | |
| Lactoferrin | 1.5 | 0.1 | | |
| α-lactalbumin | 1.9 | 1.2 | | |
| Total caseins | 2.7 | 26 | | |
| Carbohydrate | | | | |
| Lactose | 67 | 53 | | |
| Oligosaccharides | 0.05-0.20 | - | | |
| Fat | 32-36 | 33 | | |
| Triglycerides 97-98% | | 97% | | |
| AA | 0.35-0.70 % total fat | N/A | | |
| DHA | 0.17-1.0% total fat | | | |

Source: Nguyen et al. (2015), Koletzko et al. (2008)



Function of Fats

- Provide energy
- Therma insulation (subcutaneous fats act as insulator against cold by retaining body heat)
- Protect against protein-sparing effect to allow protein perform their main functions of growth and maintenance
- Protect vital organs from mechanical shock
- Synthesis hormones (Cholesterol steroid hormones, sex hormone)
- Essential for the absorption of fat-soluble vitamins
- Essential constituent of the membrane of every cell

Organ Protection

Fat provides cushioning around internal organs and protects them from injury.

FAT SURROUNDING RIGHT KIDNEY -----



Classification of Fats



Simple Lipids

These lipids consist mainly of carbon, hydrogen, and oxygen, and are the most common types of lipids in biological systems.

Fats (Triglycerides):

- Consist of three fatty acids attached to a glycerol molecule.
- Primary energy storage in animals; they are stored in adipose tissue.
- Saturated fats (solid at room temperature) and unsaturated fats (liquid at room temperature).

Waxes:

- Esters of long-chain fatty acids and long-chain alcohols.
- Protective coatings on plant leaves, animal fur, and skin (beeswax, plant waxes)



Unsaturated Fats

Saturated Fats

- Come mainly from plant and fish sources such as peas, cooking oil, margarine, oily fish
- Unsaturated fats are usually liquid at room temperature.
- Low melting point

- Come mainly from an animal source such as meat, eggs, milk and dairy product.
- Saturated fats are usually solid at room temperature.
- Too much saturated fat in your diet can lead to heart disease.
- High melting point







Compound Lipids

These lipids are similar to simple lipids but also contain additional elements (such as phosphate, nitrogen, or carbohydrates).

Phospholipids:

- Consist of two fatty acids, a glycerol molecule, and a phosphate group (and sometimes additional nitrogen-containing compounds).
- Major components of cell membranes, providing structural integrity and fluidity.

Glycolipids:

- Consist of a glycerol backbone, fatty acids, and a carbohydrate (sugar) group.
- Found on the surface of cell membranes, where they play a role in cell recognition and signaling..

Compound Lipids

*****Lipoproteins:

- Consist of lipids (such as triglycerides and phospholipids) and proteins.
- Transport lipids through the bloodstream.
- Example: Low-density lipoproteins (LDL) and high-density lipoproteins (HDL).



Derived Lipids

These are substances derived from simple or compound lipids, typically by hydrolysis or enzymatic action.

Fatty Acids:

Long hydrocarbon chains with a carboxyl group (-COOH) at one end.

Fatty acids are the building blocks of fats and oils and are important for energy production.

&Glycerol:

A three-carbon alcohol molecule that forms the backbone of triglycerides and phospholipids. Glycerol binds to fatty acids to form triglycerides.

Steroids:

Composed of a four-ring carbon structure (sterane) with various functional groups attached. Involved in signaling and membrane structure; includes hormones like testosterone and estrogen, as well as cholesterol, a key component of cell membranes.



Cholesterol

- Cholesterol is a waxy substance found in all cells of body.
- The body needs it to make hormones, Vitamin D, and substances that aid in digestion.
- The liver makes all the cholesterol needed for these functions.
- Lipoproteins are substances made of protein and fat that carry cholesterol through your bloodstream.
- Two of the lipoproteins that carry cholesterol throughout the body are LDL and HDL



LDL Cholesterol

- Low-density lipoprotein or bad cholesterol
- It takes cholesterol to arteries and form waxy deposit called plaque in arteries.
- It can also clog your arteries, creating less room for blood to circulate.
- This condition is called atherosclerosis





HDL Cholesterol

- High-density lipoprotein or good cholesterol
- Protects the arteries against the formation of fatty deposits.
- Remove LDL cholesterol from the blood and transport it to the liver, where it can be processed and eliminated







HDL • •

I am the "Good" "Happy" cholesterol, and my job is to help keep your arteries clear and free of plaques!

LDL

I am the "Bad" "Lethal" cholesterol, and I form plaques in your arteries causing them to harden and narrow!



 Lipid digestion begins in the mouth, continues in the stomach and ends in the small intestine.

Mouth

- Digestion of fat is initiated by the lingual lipase enzymes (Secreted by glands in the tongue)
- > Hydrolyse fatty acids from triglycerides to form diglycerides
- > Minimal digestion occurs here as the fats are not emulsified yet.

Stomach

Gastric glands secrete gastric lipase - works on triglycerides to produce diglycerides and free fatty acids.



Small Intestine

- Bile produce by the liver and stored in the gallbladder bile salts emulsify fats into smaller droplet (micelles), increasing the surface area for enzyme action
- Pancreases release pancreatic lipase to breakdown triglycerides into monoglycerides and free fatty acids



- Glycerol and short chain fatty acid directly absorbed from the intestinal lumen into the portal veins and taken to liver for metabolism
- Long chain fatty acids, cholesterol together with with bile salts form mixed micelles.
- Bile salts surround monoglycerides and free fatty acids, forming water-soluble micelles.
- Micelles transport lipids to the brush border of intestinal epithelial cells.
- Monoglycerides and free fatty acids are absorbed into intestinal epithelial cells (enterocytes) via simple diffusion or transport proteins.



- They act as vehicles that allow hydrophobic molecules (fatty acids, cholesterol) to be transported in the watery environment in intestines and delivered to enterocytes.
- Bile salts, secreted by the liver and stored in the gallbladder, are released into the small intestine during digestion.
- When bile salts mix with dietary fats and pancreatic lipase breaks down triglycerides into monoglycerides and free fatty acids.
- The bile salts surround these smaller fat molecules.
- The hydrophobic tails of bile salts face inward toward the lipid molecules, while the hydrophilic heads face outward, creating a stable micelle.
- Without micelles, the efficient absorption of dietary fats and fatsoluble vitamins would be severely impaired.





- Inside the enterocytes, monoglycerides and free fatty acids are reassembled into triglycerides.
- Triglycerides are packaged with cholesterol, phospholipids, and proteins into lipoprotein particles called chylomicrons.
- Chylomicrons are specially designed lipoproteins that transport triglycerides through the lymphatic system and eventually into the bloodstream



 The storage of fats in the body primarily occurs in adipose tissue (fat tissue), where fats are stored as triglycerides for future energy use





Deficiency of Fats

- Malabsorption of fat-soluble vitamins (A, D, E, K)
- Energy deficiency and fatigue
- Disrupt hormone production, leading to irregular menstrual cycles in women, fertility issues, and reduced libido in both men and women.
- Dry, flaky, and irritated skin, which may lead to conditions like eczema or dermatitis.
- Growth and developmental problems in children.



Phrynoderma hyperkeratosis

(excessive keratin production) on the skin



1. Weight Gain and Obesity

Excessive fat intake can lead to an energy imbalance, causing the body to store the surplus energy as fat, leading to weight gain and potentially obesity

2. Increased Risk of Heart Disease

High consumption of saturated fats and trans fats is linked to an increased level of LDL cholesterol (the "bad" cholesterol) in the blood.

This can lead to plaque buildup in the arteries, increasing the risk of atherosclerosis (narrowing and hardening of the arteries), heart attack, and stroke.





Overconsumption

3. Digestive problem

Can cause digestive discomfort, such as bloating, diarrhea, or indigestion, as the body struggles to process large amounts of fat.

4. Fatty Liver Disease

Excess fat can accumulate in the liver, leading to non-alcoholic fatty liver disease (NAFLD). Over time, this can cause liver inflammation and potentially progress to cirrhosis or liver failure



Ion-Alcoholic Fatty Liver Disease (NAFLD)

Progression of Liver Disease

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