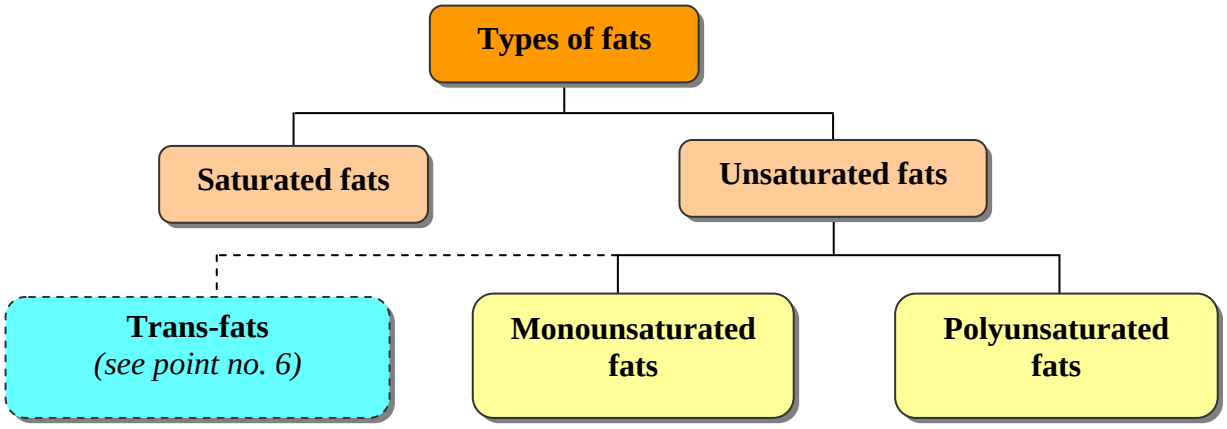
CHAPTER 4: CHEMICAL COMPOSITION OF THE CELL

Fats and Health

1. **Triglycerides**
   (a) They are a major form of fat (~95%) in foods and in the human body.
   (a) They may be **saturated**, **polyunsaturated** or **monounsaturated** *(see no. 2).*
   (b) The triglyceride level in the blood is raised by the intake of excessive amounts of fat and alcohol.
   (c) The triglyceride level can be reduced by going on a low-fat diet, weight loss, exercise, smoking cessation and taking alcohol in moderation.
2. The **three** types of fats (as *discussed in the main Malaysian Biology textbooks*) are…
   (a) saturated fats,
   (b) monounsaturated fats,
   (c) polyunsaturated fats.



Saturated and unsaturated fats

3. **High-density lipoprotein (HDL)**
   (a) It is a form of 'good' blood cholesterol.
   (b) It removes excess cholesterol from the artery walls and carries it to the liver to be eliminated.
4. **Low-density lipoprotein (LDL)**
   (a) It is a form of "bad" blood cholesterol.
   (b) It transports cholesterol to the arteries, starting the formation of plaques and arteriosclerosis (*see unit 6.3.2, page 159 and Figure 6.21, page 161, Nexus SPM Biology*).
5. **Fats and health**
   (a) Some types of fats are bad for human health, but some types of fats are essential for human health.
   (b) The following table is a summary on the health implications of different types of fats.

Types of fats and health implications

Types of fats	Characteristics	Source	Health implication
Saturated fats	• All the bonds between the carbon atoms are single bonds. • They are solid at room temperature. • Examples: butter, lard, body fat	• All animal products (e.g. fatty fresh and processed meats, skin and fat of poultry, egg yolk, dairy products) and some vegetable oils (e.g. coconut oil)	• Raises the blood cholesterol (LDL and HDL) levels and the net overall effect is more harmful than good • Increase the risk of coronary artery disease (heart attack or stroke may occur)
Monounsaturated fats	• There is one double bond, e.g. omega 9. • They exist as oil at room temperature.	• Most nuts, olive oil, peanut oil, canola (rapeseed) oil, avocado, and palm oil	• Lowers the blood cholesterol (LDL) and triglyceride levels • Raises the level of 'good' cholesterol (HDL) • Improves vascular health
Polyunsaturated fats	• More than one double bond exist, e.g. omega 3 and omega 6. • They exist as oil at room temperature.	• Most nuts, corn oil, soybean oil, sunflower oil and fatty fish (e.g. salmon is rich in omega 3), and palm oil	• Lowers the blood 'bad' cholesterol (LDL) level and triglyceride level • Reduces the risk of stroke and heart attack (*see unit 6.3.2, page 159 Nexus SPM Biology*)

6. **Trans-fatty acids**
   (a) They are a class of **man-made** fats *(see unit 10.6, point no. 2, page 355, Nexus SPM Biology).*
   (b) They are formed from naturally occurring ***cis*-unsaturated fatty** acids by the process of **hydrogenation** (liquid oils are turned into solid fats by adding hydrogen).
   (c) They are used to enhance flavour, stability and prolong the shelf life of foods.
   (d) They are bad for health as they increase the LDL level, decrease the HDL level, and increase the risk of coronary heart disease.
   (e) They are found in margarine (made from hydrogenation of vegetable oil) and shortenings (for making crackers, cookies and snack foods).