

Quadrant II – Transcript and Related Materials

Programme: Bachelor of Science (First year)

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Paper Title: Chemistry in Daily Life

Unit: 08

Module Name: Macronutrients: Carbohydrates, Proteins and Fats-Health and Diseases: Deficient and Excess

Module No: 26

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Notes:

(Content from power point presentation)

Deficiency of carbohydrates

Many people are interested in trying a low-carbohydrate diet because they've heard it promotes weight loss.

While some evidence supports the eating plan for this purpose, a lack of carbohydrates is associated with some adverse health effects such as ketosis and a heightened cardiovascular risk.

After eating carbohydrates, whatever isn't used immediately for energy is stored in the muscles as glycogen or converted into fat in the liver.

During physical activity, the body first uses glycogen for energy, but if insufficient carbohydrates have been consumed, glycogen reserves are depleted.

Consequently, since the body can't get the glycogen it needs for fuel, it starts to break down protein in muscles to use as energy.

CAUTION! After a few months on a low-carbohydrate diet, particularly for people with an active lifestyle, the effects become dangerous: metabolism slows, fat storage builds and the risk of fatigue, dehydration and muscle aches increases.

The liver transforms fat into ketones, which the body uses for fuel. This process, referred to as ketosis, normally begins after three or four days of restricting carbohydrates.

- 1) *Early weight loss* (due to keto diet) is due to loss of water weight associated with depletion of glycogen.
- 2) After few days, *short-term unpleasant effects*: nausea, fatigue and dizziness.
- 3) Over time, ketosis may result in dehydration, altered chemical balance in the blood and perilously low blood sugar levels.

Excessive consumption of carbohydrates

Carbohydrates are your body's preferred source of energy. In the body, they break down into glucose, which is used as energy by the body and brain.

Glucose gets absorbed out of your digestive tract and into your bloodstream. The body closely regulates how much glucose is allowed to stay in your blood.

- When level of blood sugar increases, the pancreas stops secreting glucagon (hormone needed for body fat to be burned as energy) and releases insulin (hormone that transports glucose to the cells to provide energy) and stabilize blood sugar.
- But this initial secretion of insulin is based on carbohydrate levels of prior meals -- not the present overload -- so blood sugar remains elevated.
- As a result, a second secretion of insulin occurs and more glucose gets transported to the cells to be stored as a reserve energy called glycogen.

Side effects of excess protein intake

Weight Gain

People usually take high protein diet because it aids in weight loss but that's only a short term thing. Excess protein gets stored as fat in the body and on the contrary, it leads to weight gain.

Organ Damage

Consuming a lot of protein can lead to organ damage.

If you have some kidney disease, you need to limit your protein intake. Eating too much protein can build up extra waste in the body which kidneys will not be able to flush out.

In the liver's case, eating too much protein allows the build-up of ammonia and other toxic substances in the blood. The liver becomes overworked here which may cause damage.

Digestive ailments

Excess protein intake can also cause certain digestive problems. Also, as they have a high-fat content, they become difficult for the body to digest. This further leads to problems like constipation, nausea, diarrhea, bloating etc. which cause a lot of discomfort.

High Cholesterol

High protein diets, especially animal-based can increase the cholesterol levels. This cholesterol hardens the development of arteries in the body and thus causes heart diseases like strokes and heart attacks.

Dehydration

A high protein diet can lead to dehydration and puts a lot of strain on the kidneys. A lot of nitrogen waste is produced while the proteins get absorbed in the body which makes us thirsty and may cause problems like dry mouth and dehydration.

Side effects of deficient protein intake

When the body doesn't get the required protein amounts or isn't able to use protein efficiently, research has shown that it can lead to the following symptoms:

- Increased infections and illnesses
- Reduced muscle mass, often referred to as sarcopenia in older patients
- Swelling in the legs
- Slower [wound healing](#) times
- High blood pressure during the second trimester of [pregnancy](#), also called preeclampsia

Side effects of excess fat intake

- One of the more immediate effects of eating too many fats is the potential for weight gain.
- Fats are concentrated source of calories: they contain 9 calories per gram.

Risk of Cardiovascular Disease

Saturated and trans fats – chemically-altered fats found in margarine and some baked goods – both increase the level of harmful cholesterol in your bloodstream, which contributes to heart disease over time.

Other Health Risks

Regularly overeating carbs and fats can have other negative health effects, too.

- Eating carbohydrates throughout the day, especially sugar, contributes to tooth decay.
- A high-sugar diet also interferes with your body's normal blood sugar controls, which contributes to diabetes, and trans fats trigger insulin resistance, a step toward developing diabetes.

Side effects of deficient intake of fat

Heart Problems: Unlike saturated fats, found in animal products & fried foods, healthy fats promote positive cardiovascular health. (For example: Omega-3 fatty acids provide protection from hypertension, cholesterol problems & heart disease).

Vitamin Deficiencies: Because fats help the body absorb and utilize the fat-soluble vitamins A, D, E and K, consuming too little fat makes way for vitamin deficiencies.

If you develop a vitamin A deficiency, you can experience very dry skin, slow bone growth, and night blindness. Without enough vitamin D, which helps your body absorb calcium, your bones can become brittle and weak. Your immune system can suffer from too little vitamins A and E, and without enough vitamin K, your blood cannot clot properly.

Excessive appetite

- Harmful effects of too little fat can also interfere with appetite control.

Mood Problems

The brain requires a variety of nutrients, including fats, to function properly. Fats help the brain produce feel-good brain chemicals, such as serotonin and dopamine. They also increase your ability to concentrate, staving off foggy thinking and low moods.

- An omega-3 fatty acid deficiency can cause mood swings and depression.
- In severe cases, low-fat diets have been linked with suicidal tendencies.
- Ingesting too little fat as part of a weight-loss diet can also cause increased stress, anxiety and low-self-esteem.
