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17/MHS01/119

MEDICINE AND SURGERY

MEDICAL BIOCHEMISTRY IV (BCH313)

DIABETES, OBESITY AND CANCER

1. DEFINE THE FOLLOWING TERMS:

- A. KETOGENESIS
- B. KETONEMIA
- C. KETONURIA

2. WHAT ARE THE CONSEQUENCES OF KETOSIS?

3. WRITE CONCISELY ON THE MANAGEMENT OF KETOSIS.

ANSWERS

1. A. KETOGENESIS:

Ketogenesis is the biochemical process through which organisms produce ketone bodies through breakdown of fatty acids and ketogenic amino acids. This process supplies energy under circumstances such as fasting or caloric restriction to certain organs, particularly the brain, heart and skeletal muscle.

B. KETONAEMIA:

This is the presence of an abnormally high concentration of ketone bodies in the blood. It is a physiological consequence of lipid metabolism. It eventually leads to excretion of ketone bodies into the urine called KETONURIA.

C. KETONURIA:

This is the excretion of abnormally large amounts of ketone bodies in the urine, characteristic of diabetes mellitus, starvation, or other medical conditions. This condition is also called ketoaciduria and acetonuria. It is most common in individuals who have diabetes, particularly type 1 diabetes mellitus. It can also occur in women who are pregnant or breastfeeding. If ketone levels rise too high for too long, your blood becomes acidic. This can harm your health.

2. CONSEQUENCES OF KETOSIS

In the beginning of ketosis, you may experience a range of negative symptoms. They are often referred to as "low-carb flu" or "keto flu" because they resemble symptoms of the flu. These may include: headache, fatigue, brain fog, increased hunger, poor sleep, nausea and decreased physical performance. These issues may discourage people from continuing to follow a ketogenic diet, even before they start reaping all the benefits. However, the "low-carb flu" is usually over within a few days.

One of the more common side effects of ketosis is bad breath, often described as fruity and slightly sweet. It's caused by acetone, a ketone that is a byproduct of fat metabolism. Blood acetone levels are elevated in ketosis, and your body gets rid of some of it via your breath. Occasionally, sweat and urine can also start to smell like acetone. Acetone has a distinctive smell — it's the chemical that gives nail polish remover its pungent odor. For most people, this unusual-smelling breath will go away within a few weeks.

In ketosis, some people may experience leg cramps. Although they're usually a minor problem, they're never pleasant and can be painful. Leg cramps in ketosis are usually connected to dehydration and loss of minerals. This is because ketosis causes a reduction in water

weight. Glycogen, the storage form of glucose in muscles and liver, binds water. This gets flushed out when you reduce carb intake, and is one of the main reasons why people lose weight rapidly in the first week of a very low-carb diet. That being said, there are many other potential causes of muscle cramps.

Dietary changes can sometimes lead to digestive issues. This is also true for ketogenic diets, and constipation is a common side effect in the beginning. This is most commonly due to not eating enough fiber and not drinking enough fluids. Some people may also get diarrhea, but it's less common. If you made drastic changes to your diet in order to get into ketosis, it's more likely that you'll experience digestive symptoms. Nevertheless, digestive issues are usually over within a few weeks.

Some people also experience increased heart rate as a side effect of ketosis. This is also called heart palpitations or a racing heart, and can happen during the first few weeks of a ketogenic diet. Being dehydrated is a common cause, as well as low salt intake. Drinking a lot of coffee might also contribute to this. If the problem doesn't stop, you might need to increase your carb intake.

Other, less common side effects may include:

- **Ketoacidosis:** A few cases of ketoacidosis (a serious condition that occurs in uncontrolled diabetes) have been reported in breastfeeding women, likely triggered by a very low-carb diet. However, this is extremely rare.
- **Kidney stones:** Although uncommon, some epileptic children have developed kidney stones on a ketogenic diet.
- **Raised cholesterol levels:** Some people get increased total and low-density lipoprotein (LDL) cholesterol levels.

3. MANAGEMENT OF KETOSIS

Being in ketosis has been shown to have powerful benefits for certain people, such as people with obesity or type 2 diabetes and children with epilepsy. Yet although ketosis is generally healthy and safe, you may experience some side effects. These include the "low-carb flu," leg cramps, bad breath and digestive issues. However, these effects are usually temporary and should go away within a few days or weeks. Diet and lifestyle changes can also help minimize these effects. Additionally, it should be noted that while getting into ketosis has obvious benefits for some people, it is definitely not for everyone. Some people feel great and experience incredible benefits on a ketogenic diet, while others feel and perform much better on a higher-carb diet. There are different ways to manage ketosis. They include:

- **Drink plenty of water:** Make sure to drink at least 68 Oz (2 liters) of water a day. A significant amount of water weight is lost in ketosis, especially in the beginning.
- **Get enough salt:** Sodium, a crucial electrolyte, gets excreted in large amounts when carb intake is reduced. Replenish your salt by adding it to foods or drinking broth.
- **Increase mineral intake:** Foods high in magnesium and potassium may help relieve leg cramps.
- **Avoid intense exercise:** Don't push yourself too hard while you're adapting to ketosis. Stick to moderate levels of exercise in the first week or two.
- **Try a low-carb diet first:** To ease the transition, it might help to reduce your carbs to a moderate amount before trying a ketogenic (very low-carb) diet.

- **Eat fiber:** A low-carb diet is not no-carb. Eat fiber-rich foods like nuts, seeds, berries and low-carb veggies.