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**Course: Biochemistry**

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**Assignment:**

**1. Define the following terms**

* 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.

* Ketonaemia:

An excess of ketones in the blood, sometimes associated by lipolysis.

* Ketonuria:

Ketonuria is a medical condition in which ketone bodies are present in the urine. It is seen in conditions in which the body produces excess ketones as an indication that it is using an alternative source of energy. It is seen during starvation or more commonly in type 1 diabetes mellitus. Production of ketone bodies is a normal response to a shortage of glucose, meant to provide an alternate source of fuel from fatty acids.

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**2. What are the consequences of ketosis**

Ketosis is a natural metabolic state. Ketosis is generally considered to be safe for most people. However, it may lead to a few side effects, especially in the beginning.

Ketosis is a natural part of metabolism. It happens either when carbohydrate intake is very low (such as on a ketogenic diet), or when you haven't eaten for a long time.

Both of these lead to reduced insulin levels, which causes a lot of fat to be released from your fat cells. When this happens, the liver gets flooded with fat, which turns a large part of it into ketones.

During ketosis, many parts of your body are burning ketones for energy instead of carbs. This includes a large part of the brain.

However, this doesn't happen instantly. It takes your body and brain some time to "adapt" to burning fat and ketones instead of carbs.

During this adaptation phase, you may experience some temporary side effects. These are generally referred to as the "low-carb flu" or "keto flu

In ketosis, parts of the body and brain use ketones for fuel instead of carbs. It can take some time for your body to adapt to this.

The Low-Carb/Keto Flu

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.
* 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.

The "low-carb flu" or "keto flu" is a set of symptoms that can occur in the initial stages of ketosis. While it may cause some people to discontinue the diet, it's usually over in a short amount of time.

* Bad Breath Is Also Common

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 (8Trusted Source).

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, your breath, sweat and urine may smell like acetone. This ketone is produced by the liver from fat and increases on a ketogenic diet.

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.

Some people feel great and experience incredible benefits on a ketogenic diet, while others feel and perform much better on a higher-carb diet.

* Leg Muscles May Cramp

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.

Some people may experience muscle cramps in ketosis. Loss of water and minerals increases your risk of leg cramps.

* Ketosis May Cause Digestive Problems

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 (9Trusted Source).

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 week.

Constipation is a very common side effect of ketosis. Diarrhea may also occur in some people.

* Elevated Heart Rate

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.

A ketogenic diet can increase heart rate in some people, but staying hydrated and increasing your salt intake may help.

Other, less common side effects may includes Ketoacidosis.

**3. Write concisely on the management of ketoacidosis**

Ketoacidosis is a serious condition caused by uncontrolled diabetes. 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.

This can also be defines as a severe form of ketosis, most commonly seen in diabetics, in which so much ketone is produced that acidosis occurs.

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

Less common side effects include issues for breastfeeding women, kidney stones in epileptic children and raised cholesterol levels.

How to Minimize Potential Side Effects

Here's how to minimize the potential side effects of ketosis:

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.

Diabetic ketoacidosis (DKA) is a rare yet potentially fatal hyperglycemic crisis that can occur in patients with both type 1 and 2 diabetes mellitus. Due to its increasing incidence and economic impact related to the treatment and associated morbidity, effective management and prevention is key. Elements of management include making the appropriate diagnosis using current laboratory tools and clinical criteria and coordinating fluid resuscitation, insulin therapy, and electrolyte replacement through feedback obtained from timely patient monitoring and knowledge of resolution criteria. In addition, awareness of special populations such as patients with renal disease presenting with DKA is important. During the DKA therapy, complications may arise and appropriate strategies to prevent these complications are required. DKA prevention strategies including patient and provider education are important.

The therapeutic goals of DKA management include optimization of 1) volume status; 2) hyperglycemia and ketoacidosis; 3) electrolyte abnormalities; and 4) potential precipitating factors. The majority of patients with DKA present to the emergency room. Therefore, emergency physicians should initiate the management of hyperglycemic crisis while a physical examination is performed, basic metabolic parameters are obtained, and final diagnosis is made. Several important steps should be followed in the early stages of DKA management:

1. collect blood for metabolic profile before initiation of intravenous fluids;
2. infuse 1 L of 0.9% sodium chloride over 1 hour after drawing initial blood samples;
3. ensure potassium level of >3.3 mEq/L before initiation of insulin therapy (supplement potassium intravenously if needed);
4. initiate insulin therapy only when steps 1–3 are executed.

 It must be emphasized that successful treatment requires frequent monitoring of clinical and metabolic parameters that support resolution of DKA