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18/MHS01/381

Biochemistry Assignment

1.Define the following

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: a condition marked by an abnormal increase of ketone bodies in the circulating blood

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.

2.Consequences of Ketosis

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."

These may include:

\* Headache.

\* Fatigue.

\* Brain fog.

\* Increased hunger.

\* Poor sleep.

\* Nausea.

\* Decreased physical performance

3.Management of ketoacidosis

The main aims in the treatment of diabetic ketoacidosis are replacing the lost fluids and electrolytes while suppressing the high blood sugars and ketone production with insulin. Admission to an intensive care unit (ICU) or similar high-dependency area or ward for close observation may be necessary.

Fluid replacement

The amount of fluid replaced depends on the estimated degree of dehydration. If dehydration is so severe as to cause shock (severely decreased blood pressure with insufficient blood supply to the body's organs), or a depressed level of consciousness, rapid infusion of saline (1 liter for adults, 10 ml/kg in repeated doses for children) is recommended to restore circulating volume.Slower rehydration based on calculated water and sodium shortage may be possible if the dehydration is moderate, and again saline is the recommended fluid.Very mild ketoacidosis with no associated vomiting and mild dehydration may be treated with oral rehydration and subcutaneous rather than intravenous insulin under observation for signs of deterioration.

Normal saline (0.9% saline) has generally been the fluid of choice.There have been a few small trials looking at balanced fluids with few differences.

Insulin

Some guidelines recommend a bolus (initial large dose) of insulin of 0.1 unit of insulin per kilogram of body weight. This can be administered immediately after the potassium level is known to be higher than 3.3 mmol/l; if the level is any lower, administering insulin could lead to a dangerously low potassium level (see below).Other guidelines recommend delaying the initiation of insulin until fluids have been administered.It is possible to use rapid acting insulin analogs injections under the skin for mild or moderate cases.

In general, insulin is given at 0.1 unit/kg per hour to reduce the blood sugars and suppress ketone production. Guidelines differ as to which dose to use when blood sugar levels start falling; some recommend reducing the dose of insulin once glucose falls below 16.6 mmol/l (300 mg/dl)but other recommend infusing glucose in addition to saline to allow for ongoing infusion of higher doses of insulin.

Potassium

Potassium levels can fluctuate severely during the treatment of DKA, because insulin decreases potassium levels in the blood by redistributing it into cells via increased sodium-potassium pump activity. A large part of the shifted extracellular potassium would have been lost in urine because of osmotic diuresis. Hypokalemia (low blood potassium concentration) often follows treatment. This increases the risk of dangerous irregularities in the heart rate. Therefore, continuous observation of the heart rate is recommended,as well as repeated measurement of the potassium levels and addition of potassium to the intravenous fluids once levels fall below 5.3 mmol/l. If potassium levels fall below 3.3 mmol/l, insulin administration may need to be interrupted to allow correction of the hypokalemia.

Sodium Bicarbonate

The administration of sodium bicarbonate solution to rapidly improve the acid levels in the blood is controversial. There is little evidence that it improves outcomes beyond standard therapy, and indeed some evidence that while it may improve the acidity of the blood, it may actually worsen acidity inside the body's cells and increase the risk of certain complications. Its use is therefore discouraged,although some guidelines recommend it for extreme acidosis (pH<6.9), and smaller amounts for severe acidosis (pH 6.9–7.0)