**Diabetes Mellitus Assignment**

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**1.** The alpha cells in the islets of Langerhans produce glucagon; the beta cells produce insulin while the delta cells produce somatostatin. Glucagon functions to increase blood glucose levels; insulin decreases or controls blood glucose levels while somatostatin works in a paracrine function decreasing the secretion of both insulin and glucagon.

**2.** Gluconeogenesis is the formation of glucose from non-carbohydrate sources of carbon. However, glycogenolysis is the formation of glucose resulting from a breakdown of the polymer glycogen.

**3.** The steps of educating a diabetic client about maintaining blood sugar are as follows:

1. The patient must be educated about a blood glucose level testing procedure that can be carried out at home for example, fingersticks or CGM done with an implant.
2. The patient must be asked to choose the home blood glucose testing method of their choice.
3. Patient must be trained on monitoring it.
4. The patient must be asked to decrease glucose intake if the levels rise beyond 2.8mmol/L and increase if the levels fall.

**4.** Diabetic ketoacidosis is a metabolic complication that results from a scarcity of insulin that has extended over a long period of time. (Ebenezer A. Nyenwe, 2016) It is defined with the level of acidic ketones in the blood rising to unusual levels and this situation is mostly fatal. There are several metabolic pathways that could contribute to the development of diabetic ketoacidosis, but it is mainly characterized with a lack of insulin and a rise in hormones that counter-regulate insulin. Glucagon plays an important role, but it is not the only factor. The pathogenesis may involve problems in the carbohydrate metabolism (gluconeogenesis), disturbance in the levels of electrolytes or abnormal metabolism of lipids and ketones. Clinically, DKA can be characterized by dehydration visible from loss of turgor in skin or with tachycardia. Blood glucose levels of around 615mg/dl while presence of ketones in urine and in the serum indicate presence of diabetic ketoacidosis.

**5.**

* Hyperosmolar hyperglycemic acidosis mainly occurs in elderly patients of type 2 diabetes (Umpierrez, 2018) mellitus and happens in conditions of stress. It is characterized physiologically by severe dehydration and hyperglycemia aided by a hyperosmolar plasma that may result in an altered consciousness. When hyperglycemia results in inhibition of reabsorption of water in kidneys and increase in urination causing dehydration, it is hyperosmolar hyperglycemic acidosis. A constant state of low insulin and high counter-insulin hormones results in this state.
* The diagnostic criteria for hyperosmolar hyperglycemic acidosis involve testing for several biochemical diagnostic markers. The blood glucose levels for a positive result in this regard are above 600mg/dL while the effective osmolarity in plasma has to be above 320mOsm/L. Serum bicarbonates have to be above 18mEq/L and ketones in the serum or the urine have to absent or present in very low amounts. This eliminates the idea that ketoacidosis might be present. If the level of beta hydroxybutyrate in the serum is less than 3mmol/L, it is also a diagnostic marker for hyperosmolar hyperglycemic acidosis. Clinically, the person is in the state of alternative consciousness characterized by stupor or coma. (Umpierrez F. J., 2014)
* Basic priorities for managing hyperosmolar hyperglycemic acidosis include resuscitation. Since this is a severe medical emergency, restoring the intravascular volume using an airway in case of a coma is a priority. Managing water and electrolyte levels by fluid management via administering a sodium chloride solution comes next. Correcting hyperglycemia by insulin is the third step. (Sze May Ng, 2017)

**6.** Other than the clinical presentation, if autoimmune markers (for example, an antibody against glutamic acid decarboxylase) are present, T1DM is confirmed. Low C-peptide levels also confirm TIDM. Antibodies against islet antigens or ZnT8 are also markers. Upregulations in genes like HLA-DQA1 and HLA-DQB1 also confirm T1DM.

**7.** Diabetes patients need to regularly inspect their feet for any cuts or injuries no matter how minor. Patients should not cut their nails very deep. Patients should wash their feet using lukewarm water. Feet should be washed very gently. Diabetic patients should moisturize their feet regularly. Patients should not moisturize area between their toes to avoid a fungus infection. Patients should report to a doctor immediately if there is a callus on their feet. Patients should wear socks designed for diabetic patients. Patients should keep their feet warm and dry. Patients should have regular examinations of their feet.

**8.** The HbA1c test checks blood glucose level over two to three months by calculating how many glycated red blood cells are present in the sample. An HbA1c result showing glucose above 48mmol/mol confirms diabetes.

# References

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