

Pathophysiology of hyperglycemia

Family



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PATHOPHYSIOLOGY OF HYPERGLYCAEMIA Hyperglycemia is the condition of increased blood glucose, usually above 7mmol/l, which is the optimum (Holman, 2008). This occurs in a variety of clinical conditions and sometimes can occur postprandial in a normal individual who has eaten a heavy carbohydrate meal (Cryer, 2004). However, the commonest cause of hyperglycemia is diabetes mellitus (Antonetti & Klein, 2012). There are a variety of conditions that cause hyperglycaemia apart from diabetes mellitus. For instance, during increased levels of stress such as trauma, surgery, shock, and acute infections, blood glucose levels are also increased (DCCT, 2005). This occurs as a result of increased production of Adrenocorticotrophic Hormone (ACTH) as a stimulus to stress; this has the effect of stimulating the production of cortisol which triggers glycogenolysis and gluconeogenesis, therefore, increasing the blood glucose levels (Fowler, 2009). This stimulus to stress has been called a life saving mechanism to reset the normal optimum conditions in the body.

Pathological conditions may also increase blood glucose levels by increasing the level of cortisol. These include Cushing's syndrome due to adrenal hyperplasia and adenocarcinomas of the adrenal gland (Miller, 2010).

Administration of exogenous steroids like prednisone leads to hyperglycemia.

The pituitary gland secretes hormones which stimulate the production of other hormones that have a role in carbohydrate metabolism (Nikolic & Jovanovic, 2009). Any lesion in the pituitary gland that increases the levels of these tropic hormones also increases the levels of blood glucose increases.

For instance, ACTH secreting adenocarcinomas increases ACTH levels in the blood, which, in turn, increases blood glucose levels via the actions of

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cortisol (Ruderman, 2010). Conditions that lead to an increase in Thyroid Stimulating Hormone levels (TSH) levels induce to an increase in absorption of glucose from the intestinal tract and basal metabolic rate via the actions of thyroid hormone. Growth hormone produced in the anterior pituitary has anti-insulin effects and any condition that increases its levels during acromegaly, thereby increasing blood glucose (Marino, 2008).

Catecholamines such as epinephrine and norepinephrine increase blood glucose level via beta and alpha receptors and inhibit the secretion of insulin via alpha receptors. Conditions that cause increase in the levels of these amines are adrenal gland tumors (Miller, 2010).

Pancreatitis is another condition that causes hyperglycemia (Pfaff, 2008). This may occur acutely or in a chronic form such as in cystic fibrosis. The pancreas is the organ that secretes insulin and any lesion that affects its capacity to secrete this glucose-lowering hormone elevates the blood sugar level. There is also an associated increase in glucose in patients with stroke. This has been related to the fact that the underlying causative mechanism of the stroke was diabetes mellitus.

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