ENDOCRINE CONTROL OF INTERMEDIARY METABOLISM
QUIZ #3

1. In a normal individual
   a) Carbohydrate is the most abundant energy reserve
   b) Fat is stored in the form of fatty acids in adipose tissue
   c) Protein is the major source of blood glucose during a fast
   d) About a week's supply of energy is stored in the form of glycogen in the liver and muscle

2. During the absorptive phase
   a) Gluconeogenesis is increased
   b) Most tissues are metabolizing fatty acids
   c) Lipoprotein lipase (LPL) activity would be increased
   d) Plasma ketones would be increased

3. Insulin
   a) is produced by the a cells of the pancreatic islets
   b) increases glucose uptake by increasing the translocation of GLUT4 to plasma membranes
   c) activates Hormone Sensitive Lipase (HSL)
   d) stimulates gluconeogenesis

4. Which of the following would stimulate Insulin release?
   a) fasting hypoglycemia
   b) intense exercise
   c) a somatostatin-secreting tumor
   d) administration of a cholinergic agonist

5. The metabolic response to prolonged fasting includes all of the following EXCEPT
   a) an increase in plasma glucagon levels
   b) an increase in plasma ketones
   c) increase in glycogen stores
   d) a decrease in oxidation of glucose by the central nervous system

6. An increase in plasma amino acids stimulates increased release of
   a) insulin, glucagon and cortisol
   b) glucagon, epinephrine and cortisol
   c) glucagon, growth hormone and cortisol
   d) insulin, glucagon and growth hormone
7. Insulin-dependent diabetes mellitus (IDDM)
   a) is caused by a defect in insulin receptors
   b) is characterized by hypoglycemia
   c) can often be managed by diet and exercise
   d) if unmanaged, will lead to ketoacidosis

8. The symptoms of diabetes mellitus would be relieved by
   a) growth hormone- secreting tumor
   b) hypersecretion of cortisol
   c) hypophysectomy
   d) obesity

9. An increase in mobilization of fatty acids would occur
   a) Immediately after eating a meal
   b) after an increase in lipoprotein lipase activity
   c) after an increase in hormone sensitive lipase activity
   d) following a fall in plasma cortisol levels

10. The excessive production of ketones in diabetics leads to which of the following complications
    a) atherosclerosis
    b) loss of sodium and potassium
    c) alkalosis
    d) weight loss
1. Which of the following matches is not correct?
   a) Somatostatin   D cells
   b) Glucagon       A cells
   c) Insulin        B cells
   d) Pancreatic polypeptide C cells

2. Which of the following is regulated by insulin?
   a) GLUT-1
   b) Glucose transport into brain neurons
   c) Lipoprotein lipase
   d) Glucose transport into exercising muscle

3. To determine whether the beta cells have recovered any secretory capacity in a Type 2 diabetic, which of the following measurements would be most useful?
   a) Insulin
   b) C peptide
   c) Proinsulin after injecting epinephrine
   d) Glucagon after inducing mild hypoglycemia

4. Insulin
   a) decreases protein catabolism
   b) increases hormone-sensitive lipase activity
   c) increases triglyceride breakdown in adipose tissue
   d) increases glycogen breakdown

5. Which of the following situations will result in the stimulation of glucagon secretion?
   a) Decreased plasma amino acid concentrations
   b) Increased somatostatin secretion
   c) An increase in plasma glucose
   d) High levels of insulin in the absence of insulin resistance
   e) Beta cell exhaustion, and decreased plasma insulin

6. In diabetes mellitus
   a) there might be a metabolic alkalosis
   b) Adipose tissue lipoprotein lipase is activated
   c) Circulating glucose levels are high and insulin concentrations are always low
   d) Diet and exercise would lessen the symptoms
7. Administration of insulin to a normal individual would acutely result in
   a) an increase in blood glucose
   b) an increase in epinephrine
   c) polyuria
   d) the brain switching to ketone metabolism

8. Following the stress of breaking a leg, there would be an increase in plasma levels of
   a) insulin, glucagon and growth hormone
   b) epinephrine and cortisol
   c) glucagon, growth hormone, epinephrine and cortisol
   d) growth hormone, epinephrine and cortisol

9. Gluconeogenesis is the formation of glucose from
   a) lactate, glycerol, and amino acids
   b) glycogen, triglycerides and amino acids
   c) glycerol, fatty acids and lactate
   d) lactate, glycerol and fatty acids

10. Which of the following is true?
    a) During the absorptive phase, gastric inhibitory peptide (GIP) inhibits insulin secretion
    b) Protein is the major source of blood glucose during fasting
    c) In a given tissue, the number of insulin receptors would be higher in an obese individual than in a lean person
    d) The most abundant form of energy in the body is protein
Endocrine Control of Intermediary Metabolism

Select the **BEST** answer, Class Quiz **2000**

1. Fat
   a) is the major source of blood glucose in fasting
   b) yields about the same amount of energy as carbohydrates when metabolized
   c) is stored in the form of fatty acids in adipose tissue
   d) is the most abundant and efficient energy reserve in the body

2. Which islet of Langerhans hormone would inhibit growth hormone release if administered exogenously?
   a) insulin
   b) glucagon
   c) somatostatin
   d) gastrin
   e) pancreatic polypeptide

3. The most numerous cells of the pancreatic islets are the
   a) alpha
   b) beta
   c) delta

4. Insulin
   a) decreases cellular uptake of plasma glucose
   b) decreases glycogen synthesis in liver and muscle
   c) increases triglyceride synthesis in adipose tissue
   d) increases gluconeogenesis

5. Hormone-sensitive lipase
   a) is found in liver cells
   b) promotes free fatty acid and glycerol release
   c) is activated by insulin
   d) increases synthesis of adipose cell triglycerides

6. During fasting
   a) most tissues utilize fatty acids as an energy substrate
   b) adipose tissue lipoprotein lipase is activated
   c) both glucagon and insulin levels are increased because of the elevation in plasma amino acids
   d) the brain begins to metabolize ketones within one day
QUESTIONS 7-10: Match the following changes following changes from normal fasting glucose and insulin levels with the conditions below.

a. high glucose, high insulin
b. high glucose, low insulin
c. low glucose, high insulin
d. low glucose, low insulin

7. Type I diabetes mellitus
8. Type II diabetes mellitus
9. After 1 month of fasting
10. Soon after Thanksgiving dinner
1. Gluconeogenesis is the production of glucose in the liver and kidney from endogenous stores of
   a) glycerol, glycogen, and lactate
   b) glycerol, lactate and fatty acids
   c) glycerol, lactate and amino acids
   d) lactate, amino acids and fatty acids

2. Which of the following is true
   a) The most abundant energy reserve in the body is protein
   b) The most efficient energy reserve in the body is fat
   c) Fat is stored in adipose tissue in the form of fatty acids
   d) Most tissues can convert protein to carbohydrate

3. During the post-absorptive phase
   a) Most tissues are metabolizing glucose that is derived from gluconeogenesis and glycogenolysis
   b) The activity of phosphorylase is suppressed
   c) Muscle glycogen is being metabolized to glucose
   d) Activity of hormone-sensitive lipase is increased

4. Insulin
   a) secretion in a normal individual is not accompanied by release of C peptide
   b) release at normal rates of secretion is biphasic
   c) upon binding to its receptor activates adenyl cyclase
   d) increases glucose uptake by opening gates on pre-existing glucose channels in the membrane

5. Insulin
   a) release is inhibited by a paracrine action of somatostatin within the pancreatic islets
   b) decreases glycogen synthesis in liver and muscle
   c) increases fat storage in the form of fatty acids in adipose tissue
   d) increases gluconeogenesis

6. All of the following would increase insulin release EXCEPT:
   a) an increase in gastrointestinal hormones like GIP and VIP
   b) an increase in parasympathetic activity
   c) an increase in circulating norepinephrine
   d) an increase in plasma amino acids

7. During fasting
   a) glycogen stores last for about a week
   b) fat breakdown provides the major source of substrates for gluconeogenesis
   c) insulin levels are increased because of an increase in plasma amino acids
   d) over the long term, the brain begins to metabolize ketones
8. In diabetes mellitus
   a) there is low blood sugar hypoglycemia
   b) exercise will lower blood glucose levels and thus decrease the symptoms of hyperglycemia
   c) in all cases, there is inadequate insulin release
   d) the brain is utilizing ketones for its energy needs

9. Increases in plasma amino acids would directly stimulate increases in
   a) insulin, growth hormone and glucagon
   b) glucagon and growth hormone
   c) insulin and growth hormone
   d) insulin and glucagon

10. Following the stress of breaking an arm, there would be an increase in plasma levels of,
    a) insulin, glucagon and growth hormone
    b) epinephrine and cortisol
    c) glucagon, growth hormone, epinephrine and cortisol
    d) growth hormone, epinephrine and cortisol
Endocrine Control of Intermediary Metabolism
Class Quiz

1. When carbohydrates, protein, or fat intake exceeds energy output, the excess calories are stored in the body primarily as
   a) carbohydrate, protein, or fat, respectively
   b) carbohydrate
   c) fat
   d) protein

2. Which islet of Langerhans hormone would inhibit growth hormone release if administered exogenously?
   a) insulin
   b) glucagon
   c) somatostatin
   d) pancreatic polypeptide

3. The most numerous cells of the pancreatic islets are the
   a) alpha
   b) beta
   c) delta
   d) gamma

4. The autonomic nerves have the following effect on the pancreas
   a) Parasympathetic stimulation decreases insulin secretion
   b) Parasympathetic stimulation increases insulin secretion
   c) Sympathetic stimulation decreases glucagon secretion
   d) Both Parasympathetic and sympathetic stimulation directly increase insulin secretion

5. Insulin
   a) decreases cellular uptake of plasma glucose
   b) decreases glycogen synthesis in liver and muscle
   c) increases triglyceride synthesis in adipose tissue
   d) increases gluconeogenesis

6. Hormone-sensitive lipase
   a) is found in liver cells
   b) increases synthesis of adipose cell triglycerides
   c) is activated by insulin
   d) activity is increased by epinephrine
7. During fasting  
   a) the synthase enzyme in liver cells is activated  
   b) adipose tissue lipoprotein lipase is activated  
   c) both glucagon and insulin levels are increased because of the elevation in plasma amino acids  
   d) protein provides the major source of blood glucose

8. In diabetes mellitus  
   a) diet and exercise would lessen the symptoms  
   b) circulating glucose levels are high and insulin concentrations are always low  
   c) fat esterification is stimulated  
   d) there might be a metabolic alkalosis

9. Administration of insulin to a normal individual would acutely result in  
   a) an increase in blood glucose  
   b) an increase in epinephrine  
   c) increased thirst and polyuria  
   d) all of the above

10. Following the stress of breaking an arm, there would be an increase in plasma levels of  
    a) insulin, glucagon and growth hormone  
    b) epinephrine and cortisol  
    c) glucagon, growth hormone, epinephrine and cortisol  
    d) growth hormone, epinephrine and cortisol
Endocrine Control of Intermediary Metabolism
Class Quiz

1. The major source of blood glucose in fasting is
   a) carbohydrate
   b) fat
   c) protein

2. Which of the following is true?
   a) In most tissues, carbohydrates can be readily converted to either fat or protein
   b) Lipolysis provides fatty acids as a substrate for gluconeogenesis
   c) Glycogenolysis is catalyzed by the synthase enzyme
   d) Esterification of fatty acids to triglycerides depends on activity of hormone sensitive lipase

3. Gluconeogenesis
   a) the production of glucose from glycogen, lactate and amino acids
   b) is inhibited by insulin
   c) is increased during the absorptive phase
   d) does not occur in diabetic individuals

4. The symptoms of diabetes would be diminished by
   a) hypercortisolism
   b) exercise
   c) a hypersecreting tumor of the alpha cells of the pancreatic islets
   d) acromegaly

5. Insulin
   a) increases glucose uptake in the central nervous system
   b) stimulates glycogenolysis in liver and muscle
   c) increases fatty acid esterification
   d) stimulates gluconeogenesis

6. Hormone-sensitive lipase
   a) stimulates uptake of fatty acids into adipose cells
   b) promotes free fatty acid and glycerol release
   c) is activated by insulin
   d) increases synthesis of adipose cell triglycerides

7. Insulin secretion is increased directly by all of the following, EXCEPT
   a) arginine
   b) acetylcholine
   c) VIP
   d) epinephrine
   e) glucose
8. In diabetes mellitus
   a) there is hypoglycemia
   b) in all cases, there is inadequate insulin release
   c) there is glucosuria
   d) the brain is utilizing ketones for its energy needs

9. Increases in plasma amino acids would directly stimulate increases in
   a) insulin and glucagon
   b) glucagon and growth hormone
   c) insulin and growth hormone
   d) insulin, growth hormone and glucagon

10. In a Type I diabetic individual, how should the patient after his/her replacement dose of insulin in
    anticipation of strenuous exercise?
   a) increase the dose
      b) decrease the dose
      c) do not change the dose
1. In a normal individual

a) Carbohydrate is the most abundant energy reserve.
b) Fat is stored in the form of fatty acids in adipose tissue.
c) Protein is the major source of blood glucose during a fast.
d) About a week's supply of energy is stored in the form of glycogen in the liver and muscle

2. During the absorptive phase

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9. An increase in mobilization of fatty acids would occur
   a) immediately after eating a meal
   b) after an increase in lipoprotein lipase activity
   c) after an increase in hormone sensitive lipase activity
   d) following a fall in plasma cortisol levels

10. The excessive production of ketones in diabetics leads to which of the following complications
    a) weight loss
    b) loss of sodium and potassium
    c) alkalosis
    d) atherosclerosis