1. What factor is not elevated in response to prolonged hypoglycemia
   1. Glucagon
   2. **Aldosterone**
   3. Growth Hormone
   4. Insulin
   5. Cortisol
2. When glucose enters a liver, adipose or muscle cell what is the mechanism?
   1. Active transport
   2. **Passive transport**
   3. Co-transport
   4. Antiporters
   5. Neurosecretion
3. How does the parasympathetic nervous system affect insulin release?
   1. **Induces insulin release via acetylcholine release**
   2. Prevents insulin release via acetylcholine release
   3. Induces insulin release via noradrenaline/adrenaline release
   4. Prevents insulin release via noradrenaline/adrenaline release
   5. They do not regulate insulin release
4. How do glucocorticoids regulate blood glucose levels?
   1. Promoting glucose uptake into muscle
   2. **Induce liver gluconeogenesis**
   3. Inhibiting lipolysis
   4. Inhibit glycogenolysis in the liver
   5. Inhibiting liver appetite
5. What is the functional purpose of glucocorticoid-induced muscle degeneration?
   1. To improve muscle strength
   2. **To provide substrates for hepatic gluconeogenesis**
   3. To provide amino acids to the brain
   4. To utilize glucose in the muscle
   5. All of the above
6. How are cortisol levels induced?
   1. CRH receptors on the adrenal stimulate synthesis of cortisol
   2. CRH receptors on the adrenal stimulate secretion of cortisol
   3. **ACTH receptors on the adrenal stimulate synthesis of cortisol**
   4. ACTH receptors on the adrenal stimulate secretion of cortisol
   5. None of the above
7. In what ways are adrenaline and cortisol similar?
   1. Both promote glucose utilization in muscle
   2. **Both induce gluconeogenesis in the liver**
   3. Both cause peripheral insulin resistance
   4. Both are released from the adrenal medulla
   5. Both are steroid hormones
8. Which hormone is released from the adrenal medulla?
9. **Adrenaline**
10. Cortisol
11. Parathyroid hormone
12. Testosterone
13. Aldosterone
14. GH levels are highest at what time?
15. Daytime, in young people
16. **Nighttime, in young people**
17. Daytime, in older people
18. Nighttime, in older people
19. Growth hormone levels do not change with age or time of day
20. Which factors do not induce growth hormone secretion?
21. GHRH Levels
22. Thyroid Hormones
23. Testosterone
24. Estrogen
25. **IGF-1**
26. A patient that has mutations in the IGF-1 receptor would be expected to have which phenotype?
27. **Increased lipolysis**
28. Reduced GH levels
29. Reduced IGF-1
30. Accelerated muscle growth
31. All of the above

# Short Answer

1. List the endocrine cell types of the pancreas and what hormones they release
2. What is the main tissue affected by glucagon? Name two ways in which it regulates blood glucose levels
3. Name two tissues in which insulin promotes glucose uptake and two in which it does not.
4. What hormone regulates aldosterone release, and how is this upstream hormone regulated?
5. When are cortisol levels in a normal healthy female the highest?
6. Describe the dual-effector hypothesis as it relates to growth hormone signaling.
7. What hormone causes the closing of the epiphyseal growth plate in a normal healthy male.

# Long Answer

1. Chronically elevated glucocorticoids occur in Cushing’s disease. What would be the some of the effects of this disease on glucose levels and why? Invent a drug that would prevent the long term effects of elevated glucocorticoids, describe how it might work and what some side-effects might be.
2. Would GLP-1 agonists and DPP-4 inhibitors be useful for Type I diabetics, Type II diabetics or both and why? Describe what they do to regulate blood glucose levels in a normal healthy person in your answer.