NROSCI/BIOSC 1070 and MSNBIO 2070
Final Exam
December 19, 2015

Total POINTS: 100 20% of grade in class

1) Zollinger-Ellison syndrome results from a gastrin-secreting tumor, producing increased numbers of parietal cells and increased acid output in the stomach. The large quantity of acid produced leads to gastrointestinal mucosal ulceration. It also leads to diarrhea and malabsorption. Briefly explain why Zollinger-Ellison syndrome is associated with malabsorption. ***(5 points).***

2) Metabolic acidosis can lead to a change in plasma potassium levels. Does metabolic acidosis result in hyperkalemia or hypokalemia? Provide a brief explanation for your answer. ***(7.5 points).***

3) Earlier in the class, we discussed the use of calcium channel blockers such as verapamil to treat hypertension, angina, and cardiac arrhythmias. The most common side effect reported for such drugs is constipation. Briefly discuss the mechanism through which commonly-used calcium channel blockers produce constipation. ***(4 points).***

4) One of the earliest markers for liver failure in adults is Jaundice, a yellowish pigmentation of the skin, the conjunctival membranes (whites of the eyes), and other mucous membranes. The yellowish color is due to accumulations of bilirubin in these tissues. Briefly discuss why liver failure leads to Jaundice, and include in your answer a discussion of how the liver normally processes bilirubin. ***(5 points).***

5) During pregnancy, use of all over-the-counter drugs is usually discouraged. However, if a pregnant woman has a fever, she is usually told to take acetaminophen (e.g., Tylenol) instead of acetylsalicylic acid (e.g., Aspirin). Based on your knowledge about the pharmacology of NSAIDs, describe why low doses of Tylenol may be safer for a pregnancy than low doses of aspirin ***(7.5 points).***

6) Congenital adrenal hyperplasia is an inherited disease (autosomal recessive) where one enzyme (21-hydroxylase) is ineffective. Loss of this single enzyme results in loss of both cortisol and aldosterone synthesis, as well as overproduction of sex steroids. Briefly explain how loss of one enzyme can cause a change in the synthesis of so many hormones ***(4 points).***

7) The smell and taste and expectation of food will sometimes cause "lightheadedness." Briefly discuss why expecting food results in this cognitive effect. ***(5 points).***

8) Historically, iodine deficiency in the diet has been one of the most common causes of birth defects. Briefly discuss the consequences of iodine deficiency on the developing fetus, including the mechanism through which iodine deficiency leads to birth defects. ***(4 points).***

9) Bisphosphonates such as Fosamax and Boniva are now the standard treatment for postmenopausal women suffering from osteoporosis. Bisphosphonates have no action on estrogen receptors, but prevent bone loss through another mechanism. Discuss the mechanism through which Bisphosphonates act to treat osteoporosis. ***(3.5 points).***

10) Evista (raloxifene), which was patented by Eli Lilly, is another drug used to treat osteoporosis in postmenopausal women. Unlike bisphosphonates, Evista is also used for reduction of the risk of invasive breast cancer in postmenopausal women at high risk (e.g., with a family history of breast cancer). Briefly describe the action of Evista to produce these effects. ***(4 points).***

11) Analogs of gonadotropin-releasing hormone (GnRH) can be used to either prevent ovulation or to enhance ovulation, depending on how the hormone is administered. Discuss how GnRH must be administered to produce each effect. ***(5 points).***

12) A male is born with an inability to produce the aromatase enzyme. Answer the questions below regarding the physiological effects of loss of the aromatase enzyme in a male.

a) What would be the most overt (clearly-observable) manifestation of the aromatase deficiency? ***(3 points).***

b) List three hormones whose levels are altered in an adult male with an aromatase deficiency. Indicate whether the levels are increased or decreased. ***(6 points).***

13) Answer the following questions regarding the medical use of progesterone receptor antagonists.

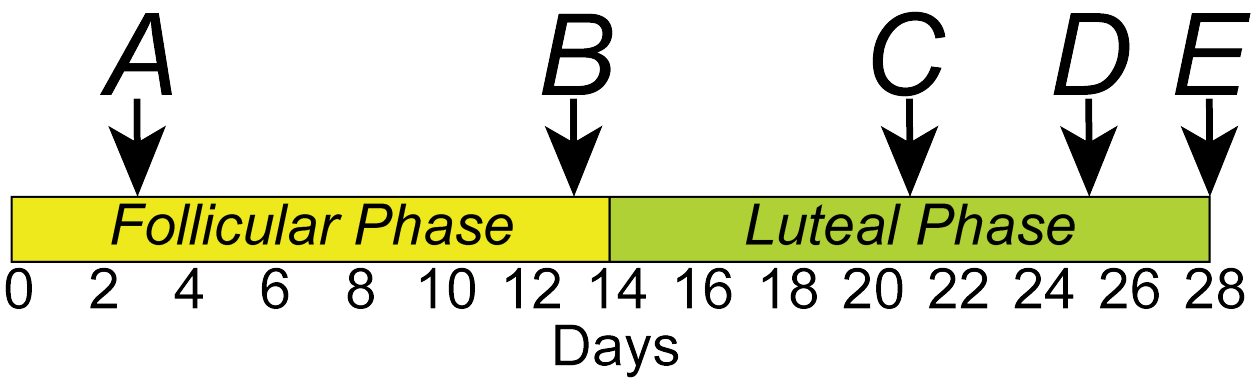
a) What is the main medical usage for progesterone receptor antagonists? ***(5 points).***

b) Often progesterone receptor antagonists are administered along with misoprostol, a synthetic analog for prostaglandin E_1 (PGE_1). Why are the drugs often combined? ***(5 points).***

c) Misoprostol is also used in the treatment of stomach ulcers. What action of misoprostol makes it effective in this therapy? ***(5 points).***

14) Could either a dopaminergic agonist or antagonist serve to stimulate lactation in a nursing mother? Which (an agonist or antagonist), if either, would be effective? How would the drug work to promote lactation? ***(7.5 points).***

15) Refer to the diagram below regarding the menstrual cycle, and indicate which letter designates when peak and minimal plasma values occur of particular hormones. ***(2 points each; 14 points total).***



a) Peak LH: _____

b) Peak FSH: _____

c) Minimal FSH: _____

d) Peak Estrogen: _____

e) Minimal Estrogen: _____

f) Peak Progesterone: _____

g) Minimal Progesterone: _____