Mastery Series: The Liver and Carbohydrates

1. How do glucose and fructose get from the lumen of the intestine to the liver?
2. What happens to fructose when it enters the liver?
3. What happens to glucose when it enters the liver?
4. What is fatty liver and what does a high-calorie, high-carbohydrate diet have to do with it?
5. Define:
    a. glycogenesis
    b. glycogenolysis
    c. lipogenesis
    d. lipolysis
6. What does insulin tell the liver to do?
7. What might happen if the liver is "resistant" to insulin?
8. Based on what you know about drug tolerance, what might have happened to the insulin receptors on a person's liver if they are insulin resistant?
9. What does cortisol tell the liver to do?
10. Why might someone with too much cortisol in his blood be mistakenly diagnosed with diabetes?

The Liver, Part 1 Mastery Series Answers

1. absorbed into capillaries in the submucosa, then enter the hepatic portal vein and go to the liver
2. *used immediately for ATP production; *excess converted into triglycerides which can be stored in the liver or shipped out to adipose tissue
3. *used immediately for ATP production; *excess converted into glycogen for storage in liver; further excess converted into triglycerides for storage in liver or shipped out to adipose tissue
4. Fatty liver is associated with a decline in hepatocyte function. A high-carbohydrate diet that is far excessive to caloric needs may lead to this.
5. a. glucose stored in long chains (usually taken out of the bloodstream to do this); b. glycogen broken back down into glucose molecules (usually then put into the bloodstream); c. fatty acids stored as triglycerides; d. triglycerides broken back down into fatty acids (and then usually put into bloodstream)
6. STOP glycogenolysis and lipolysis (so that glucose will not keep being added to bloodstream); START glycogenesis and Lipogenesis (so that glucose is removed from bloodstream and stored as glycogen)
7. Liver will keep putting glucose in the bloodstream, which raises blood sugar too high
8. Downregulated
9. START glycogenolysis and gluconeogenesis; STOP glycogenesis and Lipogenesis
10. Cortisol increases blood sugar output from liver.

Mastery Series: The Liver, Part 2

1. What does the liver convert ammonia into… and where does this less-toxic waste product then go?
2. What are the types of plasma proteins that I mentioned the liver making?
3. What is the primary role of albumin in the blood?
4. How does the liver regulate iron levels in the body?
5. What protein transports iron in the blood?
6. What is really the only way to lose iron from the body?
7. What is the name of the broken down heme pigment from old RBCs?
8. What does the liver do to this substance? And why does "conjugation" matter?
9. How is conjugated bilirubin excreted from the body (two ways)?
10. What stimulates bile release from the gall bladder?
11. What is the function of bile?
12. Summarize the notes of the previous pages into 5 liver functions.
13. Why does liver disease lead to confusion and irritability in patients?
14. Why does liver disease cause low blood pressure (or erratic blood pressure)?
15. Why does liver disease cause bleeding problems?
16. Why does liver disease cause anemia?
17. Why does liver disease/immaturity cause jaundice?
18. Why does a blocked bile duct cause jaundice?

The Liver, Part 2 Mastery Series Answers

1. urea; kidneys
2. clotting factors (including fibrinogen); albumin
3. osmotic pressure: pulls water in the blood vessels to maintain blood pressure
4. it can block further absorption with hepacidin
5. transferrin
6. bleeding
7. bilirubin
8. conjugates it so that it can be soluble in blood and bile
9. feces and urine
10. fat entering the duodenum
11. emulsifies fat (big droplets to little droplets)—this is mechanical digestion
12. *regulates blood sugar levels; *converts ammonia into urea; *makes plasma proteins; *regulates iron levels in the body; *produces bile which emulsifies fat and gets rid of bilirubin
13. ammonia builds up and affects neuronal signaling in brain
14. albumin deficiency
15. clotting factors deficiency
16. iron deficiency
17. unable to conjugate bilirubin *note: UV lights for infants helps break down bilirubin in the blood
18. bile can't leave liver

Mastery Series: The Liver, Part 3

1. What organ makes cholesterol for your body?
2. What macronutrient is the main source of VLDL in the body?
3. What makes a lipoprotein more or less dense?
4. Why do you need cholesterol?
5. How does a statin work?
6. What are two documented side effects of statins?
7. What does “first pass” mean when discussing the design of a drug?
8. What does drug dosing having to do with passes through the liver?
9. What are 3 types of Hepatitis and how is each primarily spread?
10. Why is eating liver like taking a high-powered multi-vitamin?

The Liver, Part 3 Mastery Series Answers

1. liver
2. carbohydrate
3. amount of lipid compared to protein (more protein = more dense; more lipid = less dense)
4. cell membranes, production of steroid hormones (estrogen, testosterone, progesterone, aldosterone, cortisol)
5. By inhibiting the liver's ability to synthesize cholesterol
6. increased risk of diabetes and liver damage
7. how the liver modifies a medication when it first enters through the hepatic portal vein
8. determine how many times through the liver before the drug is inactivated; and therefore how frequently the drug should be given
9. A: oral/fecal; B: body fluids and blood-borne (sexual contact and tattoos, piercings or needles); C: blood-borne (IV drug-users or blood transfusions)
10. Stores A, D, E, and K; iron, choline, etc