Review Questions for Clinical Examination of Urine Part 2 topic

Review questions will not be collected and are not worth any points. Doing them will, however, help you prepare for the midterms and quizzes in this course. Furthermore, some of these review questions will appear on the final exam (although the numbers within the questions may be changed).

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1) Most substances that enter the nephron enter by the process of…
   A) Filtration
   B) Reabsorption
   C) Secretion
   D) Urination

2) The substances from the blood that enter into the nephron are called the…
   A) Filtrate
   B) Urine
   C) Pre-urine
   D) Plasma

3) Most substances in the filtrate are returned to the blood by the process of…
   A) Filtration
   B) Reabsorption
   C) Secretion
   D) Urination

4) The blood vessel that receives the reabsorbed substances from the filtrate is the…
   A) Glomerulus
   B) Renal artery
   C) Afferent arteriole
   D) Peritubular capillary bed

5) The "filter" of the nephron (where liquids enter the nephron) is formed by…
   A) The ureter and the urethra
   B) The glomerulus and the first part of the nephron
   C) The distal end of the nephron and the peritubular capillary bed
   D) The peritubular capillary bed
   E) The renal arteries

6) The kidney regulates all of the following except

A) blood pressure
B) the concentrations of electrolytes and waste products in the blood.
C) the absorption of substances from the gastrointestinal tract.
D) the acid-base balance (pH) of the blood plasma.

7) Which of these substances is normally filtered and then completely (100%) reabsorbed by the nephron?

A) protein
B) sodium
C) urea
D) glucose

8) Glucose and amino acids are normally

A) not in the blood and not in the filtrate (they are only found inside cells)
B) found in the urine.
C) partially reabsorbed
D) reabsorbed completely

9) Plasma proteins…

A) Usually do not filter into the nephron.
B) Filter into the nephron but are usually totally reabsorbed back into the blood.
C) Filter into the nephron but are usually partially reabsorbed back into the blood, so small amounts of protein appear in the urine.
D) Filter into the nephron but are usually not reabsorbed back into the blood, so large amounts of protein appear in the urine.

10) Plasma glucose…

A) Usually does not filter into the nephron.
B) Filters into the nephron but is usually totally reabsorbed back into the blood.
C) Filters into the nephron but is usually partially reabsorbed back into the blood, so small amounts appear in the urine.
D) Filters into the nephron but is usually not reabsorbed back into the blood, so Large amounts appear in the urine.

11) Glucose will be found in the urine when plasma glucose concentration is above…

A) 70 mg/100 mL
B) 80 mg/100 mL
C) 100 mg/100 mL
D) 120 mg/100 mL
E) 180 mg/100 mL

12) Ketone bodies

A) Are usually present in the plasma but are not present in the urine because they are too large to filter into the nephron.

B) Are usually present in the plasma and filter into the nephron but are not present in the urine because they are totally reabsorbed back into the blood.

C) Are usually present in the plasma and filter into the nephron so large amounts appear in the urine.

D) Are usually present in small amounts in the plasma, filter into the nephron, and are present in small amounts in the urine.

13) RBCs in the urine is known as…

A) Hematuria

B) Lysouria

C) Erythrouria

D) Cytouria

14) Red blood cells (RBCs)…

A) Do not filter into the nephron and therefore are usually not found in the urine.

B) Filter into the nephron but are usually totally reabsorbed back into the blood and therefore are usually not found in the urine.

C) Filter into the nephron but are usually partially reabsorbed back into the blood, so small amounts appear in the urine.

D) Filter into the nephron but are usually not reabsorbed back into the blood, so large amounts appear in the urine.

15) Hemoglobin…

A) Does not filter into the nephron and therefore are usually not found in the urine.

B) Filters into the nephron but is usually totally reabsorbed back into the blood and therefore is usually not found in the urine.

C) Filters into the nephron but is usually partially reabsorbed back into the blood, so small amounts appear in the urine.

D) Filters into the nephron but is usually not reabsorbed back into the blood, so large amounts appear in the urine.

16) The presence of hemoglobin in the urine

A) Occurs normally

B) Indicates the presence of a kidney disease where the nephron cannot reabsorb hemoglobin from the filtrate

C) May occur in diabetes mellitus

D) May indicate a hemolytic disease

17) If a patient has hematuria and hemoglobinuria, which of the following may be the cause? (More than one possible answer)

A) Sickle cell anemia
B) Menstruation while giving the urine sample
C) Injury to urinary tract organs
D) Malaria
E) Transfusion mismatch

18) The two organs most responsible for acid-base balance of the blood are the

A) heart and kidneys.
B) liver and lungs.
C) kidneys and lungs.
D) lungs and heart.

19) If a patient has hemoglobinuria without hematuria, which of the following may be the cause?

A) Sickle cell anemia
B) Menstruation while giving the urine sample
C) Injury to urinary tract organs
D) Malaria
E) Transfusion mismatch

20) Bilirubin…

A) Is too large to filter into the nephron and therefore are usually not found in the Urine, no matter what its concentration in the blood.
B) Is present at high concentration in the blood and filters into the nephron but is totally reabsorbed back into the blood and therefore is usually not found in the urine.
C) Filters into the nephron but is usually present in such small amounts in the blood that it is not detectable in the urine.
D) Is present at high concentration in the blood and filters into the nephron but is usually not reabsorbed back into the blood, so large amounts appear in the urine.

21) Low concentration urine has which two characteristics?

A) High volume and high specific gravity
B) High volume and low specific gravity
C) Low volume and high specific gravity
D) Low volume and low specific gravity

22) High concentration urine has which two characteristics?

A) High volume and high specific gravity
B) High volume and low specific gravity
C) Low volume and high specific gravity
D) Low volume and low specific gravity

23) If a person had low water concentration in their blood, their blood's osmolarity would be _____. If a person had high water concentration in their blood, their blood's osmolarity would be _____.

A) Low/Low
B) Low/High
C) High/Low
D) High/High
E) Water content has no effect on the blood's osmolarity. Osmolarity is solute concentration, not water concentration.

24) Define the following terms as they were defined in class.

a) Urinalysis

b) Renal corpuscle

c) Renal threshold

d) Proteinuria

e) Glycosuria

f) Ketonuria

g) Hematuria

h) Hemoglobinuria

i) Bilirubinuria

j) High concentration urine

k) Low concentration urine

25) The substances in the filtrate that are not reabsorbed become the _____.

26) The correct term for one blood filtering apparatus in the kidney (formed from the first part of a nephron and a glomerulus together) is a(n) _____.

27) The most abundant molecule in the urine is _____. In addition, the urine always has nitrogen-containing waste molecules that have been removed from the plasma. The most abundant of the urine's nitrogen-containing waste molecules is _____.

28) List the normal urine characteristics below. Each answer should be the normal range of values for that characteristic.

a) Normal daily urine volume range: _____

b) Normal urine specific gravity: _____

c) Normal urine pH range: _____

29) Most small organic nutrients in the filtrate, such as glucose and amino acids, are totally secreted/excreted/reabsorbed/metabolized (circle one of the four words) by the nephron.

30) Molecule X is a nutrient molecule that is normally found in the plasma. The concentration of molecule X in a person's plasma suddenly increases to a much higher than its normal concentration because the person ate a meal very rich in molecule X. Based on the general principles of kidney function that we discussed in class, we would expect the amount of molecule X in the filtrate after the meal to be higher/equal/lower (circle one word) than the normal amount of molecule X before the meal. We would expect that rate at which molecule X is reabsorbed after the meal to be larger/equal/smaller (circle one word) than the rate of reabsorption before the meal. We would expect the amount of molecule X in the urine after the meal to be larger/equal/smaller (circle one word) than the amount of molecule X in normal urine.

31) Name the three common causes of proteinuria that were given in class:

1) _____

2) _____

3) _____

32) Proteinuria is often accompanied by edema. Explain the cause-and-effect relationship between these symptoms. (Hint: Review exercise 2.1 – particularly the Clinical Application box in the proteins section of that lab activity)

33) Name the three common causes of glycosuria that were given in class:

1) _____

2) _____

3) _____

Circle the one(s) that occur only occur when blood glucose is above the normal concentration range.

34) (a) What is the normal range of glucose concentration in the plasma?

_____

(b) Above what plasma glucose concentration will glucose appear in] the urine?

Your answers should include the correct numbers and the correct units for the numbers.

35) Is it possible for someone to have an abnormally high plasma glucose concentration and yet not have glycosuria? Explain your answer.

36) Answer the following questions about ketone bodies

a) What organ makes them? _____

b) What larger molecules are they made from?

c) What is their function?

d) Under what circumstances are large amounts of them made?

37) Name the three common causes of ketonuria that were given in class:

1) _____

2) _____

3) _____

Circle any answers on the list that cause ketone bodies and glucose to both be above their normal concentration range in the plasma.

38) Ketone bodies are usually made only when cells are starved for glucose. Under what circumstances will the body make large amounts of ketone bodies when blood glucose is higher than its normal concentration range? Justify your answer.

39) Describe a quick non-invasive test that can be done outside the body to determine if a person is in ketosis (making large amounts of ketone bodies). Hints: It is not a blood test or urine test. It is something the rescue workers often do to see if an unconscious person is having a diabetic emergency.

40) If a person's body is making large amounts of ketone bodies (as will occur in starvation or with uncontrolled diabetes mellitus), the pH of the urine will increase/decrease/not change (circle one of the three answers). Justify the answer you circled.

41) Name the three common causes of hematuria that were given in class:

1) _____

2) _____

3) _____

42) Name the three common causes of hemoglobinuria that were given in class that do **not** involve injury, exercise, or menstruation.

1) _____

2) _____

3) _____

43) If a person has suffered trauma to their urinary tract organs, RBCs may be found in the urine. Hemoglobin protein is found inside RBCs, but usually the hemoglobin is not able to exit the RBCs (the RBC's cell membrane blocks the hemoglobin from exiting the RBC). Therefore, when intact RBCs are in their urine, there is no free hemoglobin in their urine (the hemoglobin is inside the RBCs). But if the RBCs in the urine lyse, free hemoglobin can appear in the urine. Explain what might cause RBCs in the urine to lyse and therefore release their hemoglobin into the urine?

44) When the body removes old RBCs from the blood, the heme groups inside the RBCs are converted into a yellow-brown pigment called _____; The _____ (an organ) uses this pigment as one of the main ingredients for making _____, which is a substance used in the digestive system.

45) Bilirubin is/isn't (circle one) normally found in the urine. Justify your answer.

46) Name two common causes of bilirubinuria that were given in class that do not involve increased levels of RBC destruction.

1) _____

2) _____

47) Name three common causes of bilirubinuria that were given in class that do involve increased levels of RBC destruction.

1) _____

2) _____

3) _____

48) Explain how liver disease can lead to bilirubin in the urine. Your answers should include all the molecules and processes that are involved.

49) Bilirubin is yellow, so if liver disease impairs the liver's ability to remove bilirubin from the blood, the result is _____, a visible yellowing of the skin, the whites of the eyes, and other external body structures.

50) A patient has jaundice and also an abnormally long clotting time. Describe one possible disorder than can cause jaundice and long blood clotting time. Justify your answer.

51) In the blank space after each plasma component on the left, write the letter(s) of all descriptions on the right that match it.

Ketone bodies: _____

Bilirubin:_____

Glucose:_____

Protein:_____

a) Too large to enter nephron

b) Filtered, then normally completely reabsorbed

c) Derived from fat breakdown

d) Derived from heme groups of hemoglobin

e) Usually at such a low level in the plasma that it is undetectable in the urine

52) The term that relates to the hydrogen ion (H+) concentration of a solution is _____. For urine, the normal range of this is _____ to _____.

53) Name two common causes of acidic urine that were given in class.

1) _____

2) _____

54) Name two common causes of basic urine that were given in class.

1) _____

2) _____

55) Explain exactly, at a molecular level, how severe diarrhea can lead to acidic urine.

56) Explain exactly, at a molecular level, how severe vomiting can lead to basic urine.

57) Name two the urine abnormalities that you would expect of a person were on an ultra low-carbohydrate diet (such as the Atkins diet)? Explain the process involved for each of the two urine abnormalities.

58) Name three urine abnormalities that you would expect of a person with uncontrolled diabetes mellitus who eats sugary meals. Explain the process involved for each of the three urine abnormalities.

59) The normal daily volume range of urine is _____ to _____ liters per day.

60) The term that means the density of a liquid compared to water is _____. For urine, the normal range of this is _____ to _____.

61) In each blank space below, write either the word High or the word Low.

a) If the water content of the blood is low, then the urine's osmolarity will be _____, the urine's specific gravity will be _____, an d the urine's volume will be _____.

b) If the water content of the blood is high, then the urine's osmolarity will be _____, the urine's specific gravity will be _____, an d the urine's volume will be _____.

62) By definition, the term "High Concentration Urine" means that the urine has two characteristics. Name the two characteristics of high concentration urine. Give specific numbers as part of your answer.

63) By definition, the term "Low Concentration Urine" means that the urine has two characteristics. Name the two characteristics of low concentration urine. Give specific numbers as part of your answer.

64) When you did the urinalysis dipsticks in the laboratory, you dipped each dipstick into the urine sample for five seconds. After dipping, you lay the dipstick flat on a paper towel. Explain why it was important to lay the dipstick flat after dipping.

65) After dipping the dipstick, you waited one minute before reading the test squares on the dipstick. Explain why you waited one minute before reading the test squares.

66) The lab instructions recommended that you dip and read no more than two dipsticks at a time. Explain why you didn't dip all the dipsticks at the same time.

67) All the substances listed below can been found in urine. Some of these substances, however, are not present in normal healthy urine. Put a + next to the substance(s) that are not normally detected in the urine. Put a * next to the substance(s) that decrease in the urine when large amounts the hormone aldosterone is present in the blood. Put a box around the substance(s) that increase in the urine when large amounts the hormone aldosterone is present in the blood. Circle the substance(s) that decrease in the urine when large amounts of the hormone ADH (anti-diuretic hormone) is present is the blood.

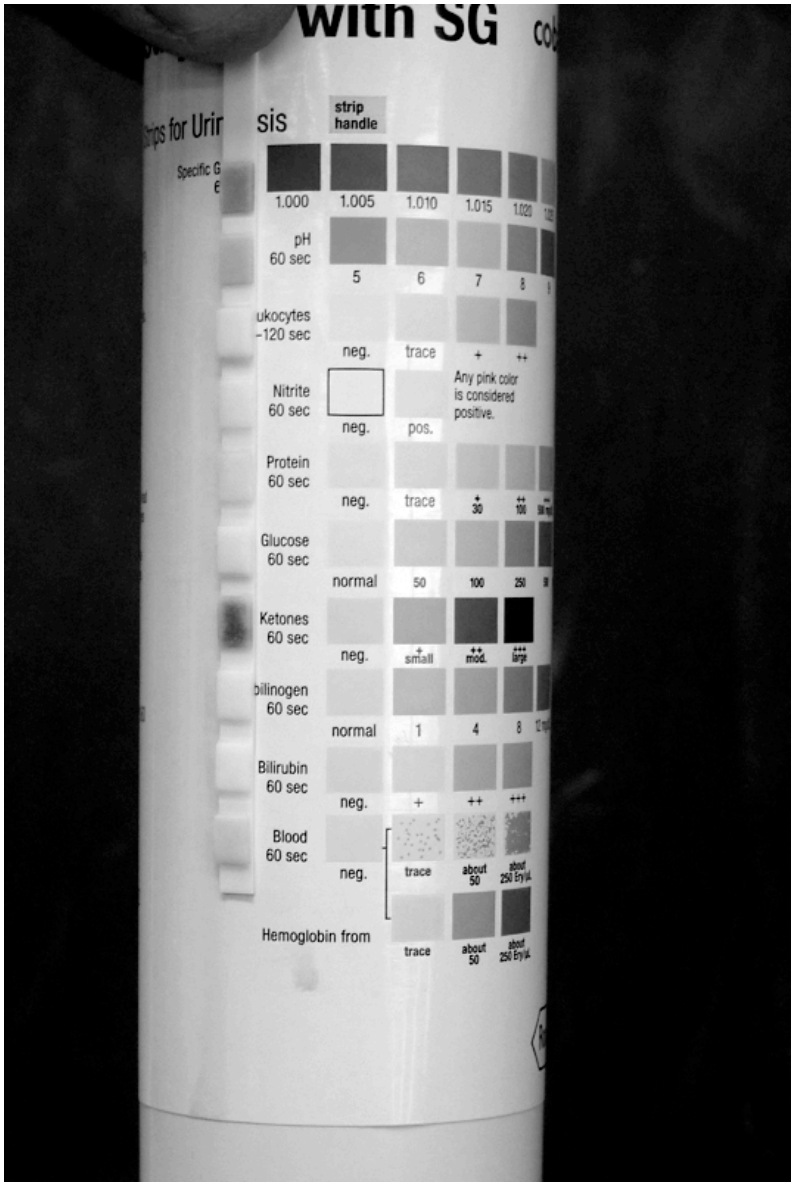
Water
Red blood cells
Glucose
Bicarbonate ion
Cl^-
Uric acid
Na^+
K^+
Bilirubin
H^+

68) You do urinalysis on a patient who has been exercising hard (but who has stayed hydrated and nourished while they were exercising). What two urinalysis abnormalities would you expect to find in this patient? Justify your answers.

69) A patient has an autoimmune disease that causes swelling of the renal corpuscle (the "filter" at the start of the nephron). What urinary abnormality would you expect to find, and why?

70) A patient drinks lots of cranberry juice. What urinary abnormality would you expect to find, and why?

71) Inspect the urinalysis dipstick and the list of patients shown below. Using the letters on the list of patients, which patients may have donated the urine sample? _____



a) A patient that has been exercising hard.

b) A patient that has been on the Atkins diet.

c) A patient that has liver disease.

d) A patient that has nephritis.

e) A patient that has diabetes insipidus.

f) A patent that has acute kidney failure.

g) A patient that has severe diarrhea.

h) A patient that is completely healthy and eats sugary meals

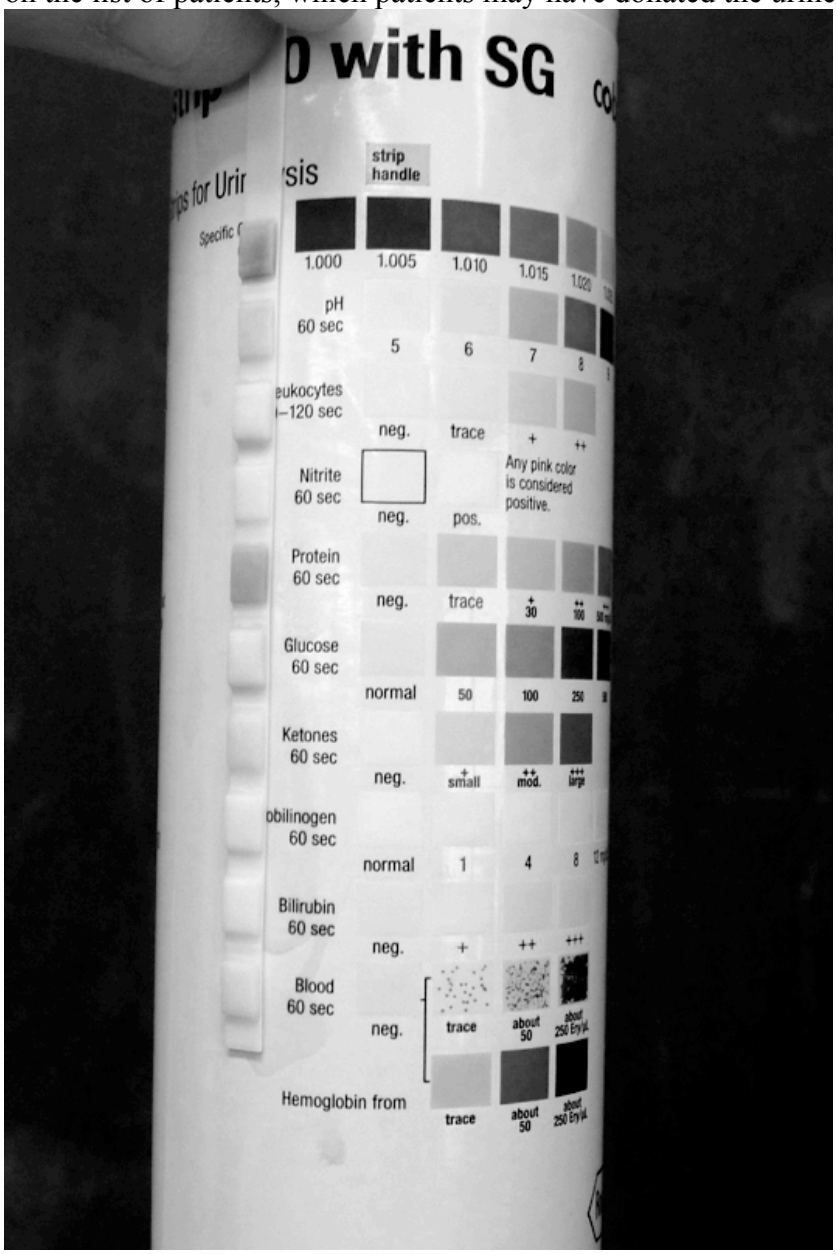
i) A patient that has atherosclerosis.

j) A patient that has malaria.

k) A patient with uncontrolled diabetes mellitus who eats sugary meals.

Justify your answers.

72) Inspect the urinalysis dipstick and the list of patients shown below. Using the letters on the list of patients, which patients may have donated the urine sample? _____



a) A patient that has been exercising hard.

b) A patient that has been on the Atkins diet.

c) A patient that has liver disease.

d) A patient that has nephritis.

e) A patient that has diabetes insipidus.

f) A patent that has acute kidney failure.

g) A patient that has severe diarrhea.

h) A patient that is completely healthy and eats sugary meals

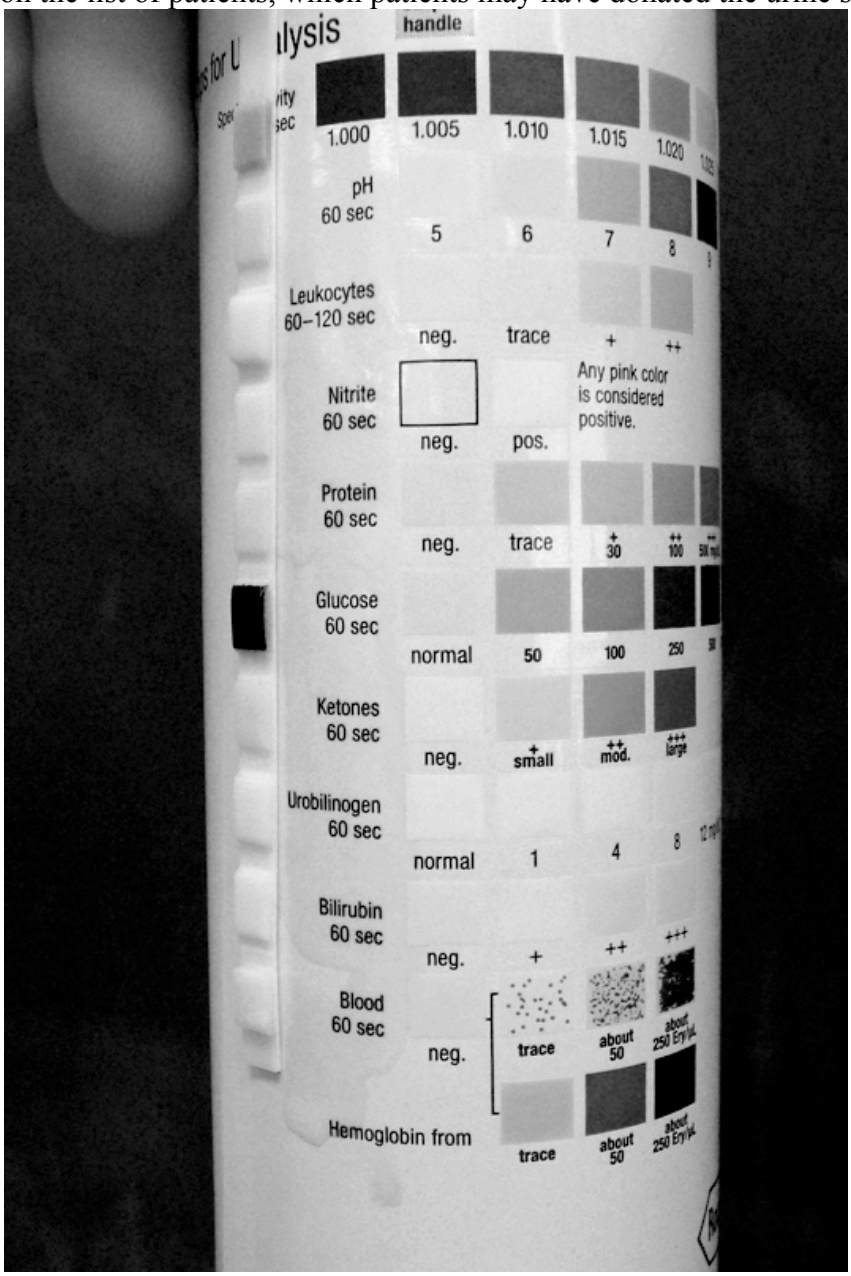
i) A patient that has atherosclerosis.

j) A patient that has malaria.

k) A patient with uncontrolled diabetes mellitus who eats sugary meals.

Justify your answers.

73) Inspect the urinalysis dipstick and the list of patients shown below. Using the letters on the list of patients, which patients may have donated the urine sample? _____



a) A patient that has been exercising hard.

b) A patient that has been on the Atkins diet.

c) A patient that has liver disease.

d) A patient that has nephritis.

e) A patient that has diabetes insipidus.

f) A patent that has acute kidney failure.

g) A patient that has severe diarrhea.

h) A patient that is completely healthy and eats sugary meals

i) A patient that has atherosclerosis.

j) A patient that has malaria.

k) A patient with who eats sugary meals.

Justify your answers.

74) You use the dipsticks to do urinalysis on a patient. After each urinalysis result listed on the left, write the letters of all matching conditions and behaviors on the right that could cause that urinalysis result. Blanks will require more than one letter.

Urinalysis result:	**Possible causes:**
1) Hemoglobin and RBC: _____	a) Bleeding in the ureters
2) Hemoglobin but no RBC: _____	b) Menstruation
3) RBC but no hemoglobin: _____	c) Malaria
	d) Sickle cell anemia
	e) Transfusion mismatch
	f) Bleeding in the kidney
	g) Heavy exercise

75) You use the dipsticks to do urinalysis on a patient. After each urinalysis result listed on the left, write the letters of all matching conditions and behaviors on the right that could cause that urinalysis result. Blanks will require more than one letter.

Urinalysis result:	**Possible causes:**
Hemoglobin and bilirubin: _____	a) Bleeding in the urters
Hemoglobin and RBCs but no bilirubin: _____	b) Menstruation
Bilirubin but no hemoglobin: _____	c) Malaria
	d) Sickle cell anemia
	e) Liver disease
	f) Transfusion mismatch
	g) Bleeding in the kidney
	h) Heavy exercise
	i) Blocked bile duct

76) Patient 1 just donated 2 pints of blood but then drank two pints of water to restore their blood volume. Patient 2 just donated two pints of blood but did not drink any water. Patient 3 drank two pints of water but did not donate any blood. You do urinalysis on the three patients. After each patient listed on the left, write the letters of all matching urinalysis results on the right. Blanks will require more than one letter.

Patient:	**Possible urinalysis results:**
1) Patient 1: _____	a) High urine volume
	b) Normal urine volume
	c) Low urine volume
2) Patient 2:_____	d) High urine specific gravity
	e) Normal urine specific gravity
3) Patient 3:_____	f) Low urine specific gravity

Answers for Review Questions for Clinical Urinalysis topic:

1) A

2) A

3) B

4) D

5) B

6) C

7) D

8) D

9) A

10) B

11) E

12) D

13) A

14) A

15) A

16) D

17) B and C

18) C

19) A, D, and E

20) C

21) B

22) C

23) C

24) a) Urinalysis = Examination of the urine contents as a medical diagnostic tool.

b) Renal Corpuscle = The glomerulus and the area of the nephron that surrounds the glomerulus. Functionally, renal corpuscles are the filter for the blood in the kidney.

c) Renal threshold = The concentration of a substance in the blood above which it appears in the urine.

d) Proteinuria = The presence of proteins in the urine.

e) Glycosuria = The presence of glucose in the urine.

f) Ketonuria = The presence of ketone bodies in the urine.

g) Hematuria = The presence of RBCs in the urine.

h) Hemoglobinuria = The presence of hemoglobin protein in the urine.

i) Bilirubinuria = The presence of bilirubin in the urine.

j) High concentration urine = Urine with high specific gravity (above 1.025) and low volume (below 500 ml per day).

j) Low concentration urine = Urine with low specific gravity (below 1.010) and high volume (above 2500 ml per day).

25) Urine

26) Renal corpuscle

27) Water
Urea

28) a) 1 – 2 liters per day

b) 1.010 – 1.025 specific gravity

c) 5.0 – 7.5 pH

29) Reabsorbed

30) Higher
Smaller
Larger

31) (1) Hypertension (high blood pressure)

(2) Nephritis (inflammation of the nephron)

(3) Heavy exercise

32) Proteinuria means that proteins are being removed from the plasma and eliminated from the body in the urine. Removing plasma proteins lowers the plasma protein concentration in the blood. One function of the plasma proteins is to draw water out of the tissue fluid and into the blood (by osmosis). If the plasma proteins are too low in concentration, they are not able to draw water from the tissue fluid so the tissues become swollen with water, a condition known as edema.

33) (1) Recent sugary meal

(2) Uncontrolled diabetes mellitus

(3) Renal glycosuria

34) a) 70 – 100 mg glucose/100 ml of blood

b) 180 mg glucose/100 ml of blood

35) Yes. If a person had a plasma glucose concentration of between 100 and 180 mg/100 ml (for example, a plasma glucose concentration of 160 mg/100 ml) this concentration of glucose is well above the normal plasma glucose level but is not above the renal threshold of glucose (which is 180 mg glucose/100 ml blood). Since a solute will only appear in the urine if its plasma concentration is above its renal threshold, a person with plasma glucose of 160 mg/100 ml has abnormally high plasma glucose but does not have glycosuria (no glucose will appear in the urine).

36) a) The liver

b) Fatty acids

c) Ketone bodies are a fuel source for cells when the cells are not able to use glucose as fuel.

d) Starvation, low carbohydrate diets, and uncontrolled diabetes mellitus.

37) 1) Starvation

2) Low carbohydrate diet

3) Uncontrolled diabetes mellitus (circled)

38) When a person has uncontrolled diabetes mellitus, they can simultaneously have elevated ketone bodies and elevated glucose in their plasma. Diabetes mellitus is a malfunctioning of the insulin system. Without the insulin signal, cells are not able to import glucose, despite the high levels of glucose in the blood. Therefore the cells become starved for glucose even in the presence of large amounts of glucose in the blood. The body elevates the level of ketone bodies in the blood to provide the starving cells with an alternative fuel supply.

39) Smell the breath of the person. Many of the ketone bodies have a fruity smell. The presence of this fruity smell in the breath can alert a rescue worker that the person may be having a diabetic emergency.

40) Decrease

Many of the ketone bodies are acids, therefore increased production of ketone bodies tends to causes acidosis of the blood. The kidneys remove the excess acid from the blood, which has the effect of making the urine acidic. Acidic urine has a low pH.

41) 1) Bleeding in urinary tract

2) Heavy exercise

3) Menstruation

42) 1) Malaria and certain other parasitic diseases of the blood

2) Sickle cell anemia

3) Transfusion mismatch

43) The RBCs in the urine may lyse due to osmosis. The osmolarity of the urine can vary, depending on how much water the person has consumed. If the person has consumed large quantities of water, the urine can become hypotonic. If there are RBCs in the hypotonic urine, the RBCs will gain water by osmosis and could lyse as a result.

44) Bilirubin
Liver
Bile

45) Bilirubin isn't normally found in the urine. The liver keeps the amount of bilirubin in the plasma so low that bilirubin is undetectable in the urine.

46) 1) Liver disease

2) Blocked bile duct

47) 1) Malaria and certain other parasitic diseases of the blood

2) Sickle cell anemia

3) Transfusion mismatch

48) The heme groups from old worn out blood cells are converted into bilirubin. The liver removes almost all the bilirubin from the blood and uses it as a main ingredient in bile. The liver transports the bile into the GI tract where it aids in digestion of fat. If the liver becomes diseased, however, its ability to remove bilirubin from the blood deceases, which means bilirubin levels in the blood will rise to much higher than there normal levels. When bilirubin levels in the blood become elevated, bilirubin can be detected in the urine.

49) Jaundice

50) Liver disease. The liver removes bilirubin from the blood and the liver also makes many of the clotting factors. If the liver becomes diseased, its ability to perform both of these functions will decrease, resulting in jaundice and long clotting time.

51) Ketone bodies: C and E

Bilirubin: D and E

Glucose: B

Protein: A

52) pH
5.0 to 7.5 pH

53) 1) Excessive acids in diet

2) Acidosis (such as from increased production of ketone bodies)

54) 1) Vegetarian diet

2) Alkalosis (such as from excessive vomiting)

55) Large intestine absorbs ions from the feces, including bicarbonate ion. If a person has excessive diarrhea, the large intestine does not have time to absorb bicarbonate ion from the feces, leading to decreased bicarbonate ion in the plasma. Since bicarbonate ion is the part of the blood's buffer than controls acid levels, a decreased in blood bicarbonate ion due to diarrhea can lead to acidosis. Since the urine is derived from the blood, acidosis in the blood leads to acidic urine.

56) Severe vomiting results in loss of stomach acids. The loss of acids from the body can lead to alkalosis of the blood. Since the urine is derived from the blood, alkalosis in the blood leads to basic urine.

57) A person on a low carbohydrate diet would have ketonuria and acidic urine. When a person is not taking in carbohydrates in the diet, their blood glucose levels decrease. To provide an alternative fuel for the cells, the body mobilizes the fat reserves. This means that fatty acids from stored triglycerides are converted by the liver in molecules called ketone bodies. The liver releases the ketone bodies into the blood, where cells use them as an alternative fuel instead of glucose. This process is sometimes called ketosis. Because ketosis increases the concentration of ketone bodies in the blood, ketone bodies become detectable in the urine, thus leading to ketonuria. Furthermore, many of the ketone body molecules are acids, so ketosis also leads to increased acids in the blood. Increased acids in the blood lead to acidic urine.

58) A person with uncontrolled diabetes mellitus would have ketonuria, acidic urine, and glycosuria. The cells of a person with controlled diabetes mellitus are not able to use glucose for energy because the insulin system is not functioning correctly.To provide an alternative fuel for the cells, the body mobilizes the fat reserves. This means that fatty acids from stored triglycerides are converted by the liver in molecules called ketone bodies. The liver releases the ketone bodies into the blood, where cells use them as an alternative fuel instead of glucose. This process is sometimes called ketosis. Because ketosis increases the concentration of ketone bodies in the blood, ketone bodies become detectable in the urine, thus leading to ketonuria. Furthermore, many of the ketone body molecules are acids, so ketosis also leads to increased acids in the blood. Increased acids in the blood lead to acidic urine. Lastly, the diabetic person would have hyperglycemia because their insulin system would not be able to lower their blood sugar after a sugary meal. Blood sugar above the real threshold of 180 mg/100 ml results in glycosuria.

59) 1 – 2 liters of urine per day

60) Specific gravity
1.010 – 1.025

61) a) High, High. Low

b) Low, Low, High

62) High specific gravity (greater than 1.025)
Low volume (less than 500 ml/day)

63) Low specific gravity (less than 1.010)
High volume (more than 2.5 l/day)

64) If the test strip is held vertically. The color indicator dyes in each test square may drip downward, giving a false reading on the squares below.

65) It takes up to one minute for the colors to fully develop in each test square on the strip. Reading the strip too soon might therefore give false results.

66) The colors on the test squares fade after a few minutes. If you had dipped all seven test strips at the same time, several minutes would pass before you could complete the reading and recording of all the test strips. This would mean that the last strips you read would have faded colors and therefore might give false results.

67) Water (circled)
Red blood cells +
Glucose +
Bicarbonate ion
Cl^-
Urea
Na^+ *
K^+ (boxed)
Bilirubin +
H^+

68) Proteinuria and hematuria (RBC in the urine). Both of these urine abnormalities can be caused by heavy exercise. The exact mechanism is not understood.

69) Proteinuria. Inflammation of the renal corpuscle increases the size of the pores (the holes) in the renal corpuscle "filter". The larger pores allow plasma proteins to enter the nephron and therefore cause proteinuria.

70) Acidic urine. Cranberry juice is high in citric acid. Adding excess acids to the blood results in acidic urine as the kidneys remove the acids from the blood.

71) B. (The Atkins diet is a low carbohydrate diet. The patient's body would go into ketosis to supply the cells with ketone bodies as an alternative fuel source, leading to ketones in the urine). Note that K is **not** likely to be a correct answer. A patient with uncontrolled diabetes mellitus who eats sugary meals would probably have glycosuria (from their hyperglycemia) as well as ketonuria, and the dipstick shows only ketonuria.

72) A (Hard exercise can cause proteinuria).

D (Swelling of the renal corpuscle (nephritis) can allow proteins to enter the nephron and therefore cause proteinuria).

I (Atherosclerosis causes hypertension (high blood pressure, which can lead to proteinuria).

73) H (A patient who eats sugary meals would have severe hyperglycemia and therefore would have glycosuria.) Note that K is **not** likely to be a correct answer. A patient with uncontrolled diabetes mellitus who eats sugary meals would probably have glycosuria (from their hyperglycemia) as well as ketonuria, and the dipstick shows only glycosuria. Also note that E is not a correct answer. Diabetes insipidus is not a glucose imbalance disease. It is a water imbalance disease unrelated to diabetes mellitus.

74) 1) A, B, F, G

2) C, D, E

3) A, B, F, G

75) 1) C, D, F

2) A, B, G, H

3) E, I

76) 1) A F

2) C E

3) A F