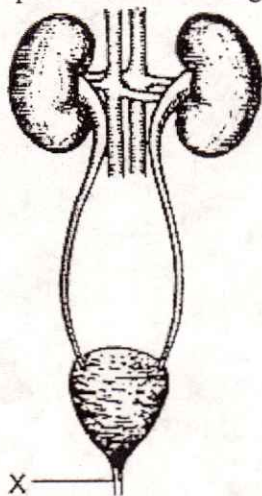


Do Now 3C

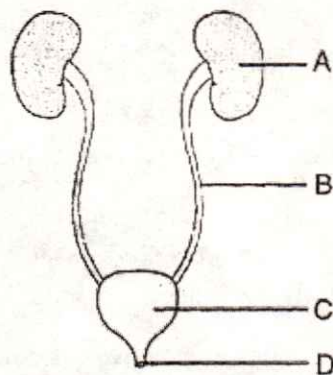
Name: _____

- The nephron is the structural unit of the human
 - lung
 - liver
 - kidney
 - intestine
- Which human organ is correctly paired with its functional subunits?
 - lung—alveoli
 - kidney—neurons
 - brain—nephrons
 - liver—ureters
- The kidney is an organ that collects wastes and excess water from the blood and sends them to the bladder where they are stored before being removed from the body. Which two systems work together to perform this function?
 - immune and respiratory
 - circulatory and excretory
 - skeletal and nervous
 - digestive and circulatory
- The correct pathway for urine to flow out of the human body is
 - bladder → ureter → kidney → urethra
 - kidney → ureter → bladder → urethra
 - urethra → bladder → kidney → ureter
 - kidney → urethra → bladder → ureter
- What is the principal function of structure X represented in the diagram below?



- filtration of cellular wastes from the blood
- transport of urine out of the body
- storage of urine
- secretion of hormones

- In addition to water, the principal components of urine are
 - amino acids and fatty acids
 - urea and salts
 - ammonia and bile
 - hydrochloric acid and bases
- Which statement most accurately describes the human heart?
 - It has two atria and one ventricle, and it pumps blood directly into veins.
 - It has one atrium and one ventricle, and it is composed of cardiac muscle.
 - It has one atrium and two ventricles, and it is composed of visceral muscle.
 - It has two atria and two ventricles, and it pumps blood directly into arteries.
- The absorptive surface of the small intestine is greater than that of other human digestive organs because of its length and the presence of
 - alveoli
 - neurons
 - villi
 - nephrons
- In the diagram of the human urinary system below, which letter indicates a structure responsible for filtering urea out of the bloodstream?

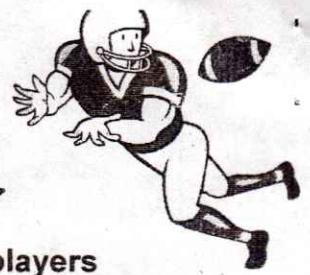


- A) A B) B C) C D) D

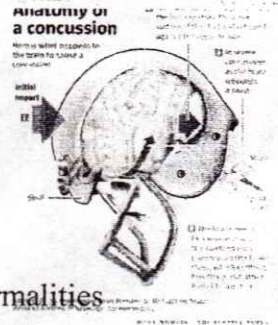
- During the process of photosynthesis, energy from the Sun is converted into
 - chemical energy in the bonds of inorganic molecules
 - chemical energy in the bonds of organic molecules
 - enzymes used to produce inorganic molecules
 - enzymes used to produce organic molecules

Name: _____

Activity 3C
15 points



High school football can damage the brain in just ONE season - even if players never suffer a concussion, study finds



- Researchers studied 24 high school players between the ages of 16 and 18
- none of the players were concussed during the season
- Researchers found abnormalities similar to the effects of mild brain injury

teenager - even if they don't suffer concussions.

2 Even though players were not concussed during the season, researchers found abnormalities similar to the effects of mild traumatic brain injury.

3 They called for more research into the area, which raises new questions over the safety of contact sports for young adults.

4 The study was presented today at the annual meeting of the Radiological Society of North America (RSNA).

5 'This study adds to the growing body of evidence that a season of play in a contact sport can affect the brain in the absence of clinical findings,' said Christopher Whitlow at Wake Forest School of Medicine, who led the study.

6 A number of reports have emerged in recent years about the potential effects playing youth sports may have on developing brains.

7 However, most of these studies have looked at brain changes as a result of concussion.

8 Dr. Whitlow and colleagues set out to determine if head impacts acquired over a season of high school football produce white matter changes in the brain in the absence of clinically diagnosed concussion.

9 The researchers studied 24 high school football players between the ages of 16 and 18.

10 For all games and practices, players were monitored with Head Impact Telemetry System (HITs) helmet-mounted accelerometers, which are used in youth and collegiate football to assess the frequency and severity of helmet impacts.

11 Risk-weighted cumulative exposure was computed from the HITs data, representing the risk of concussion over the course of the season.

12 This data, along with total impacts, were used to categorize the players into one of two groups: heavy hitters or light hitters. There were nine heavy hitters and 15 light hitters.

13 None of the players experienced concussion during the season.

All players underwent pre- and post-season evaluation with diffusion tensor imaging (DTI) of the brain.

DTI is an advanced MRI technique, which identifies microstructural changes in the brain's white matter.

14 The brain's white matter is composed of millions of nerve fibers called axons that act like communication cables connecting various regions of the brain.

15 Diffusion tensor imaging produces a measurement, called fractional anisotropy (FA), of the movement of water molecules along axons.

16 In healthy white matter, the direction of water movement is fairly uniform and measures high in fractional anisotropy.

17 When water movement is more random, fractional anisotropy values decrease, suggesting microstructural abnormalities.

18 The results showed that both groups demonstrated global increases of FA over time, likely reflecting effects of brain development.

However, the heavy-hitter group showed statistically significant areas of decreased FA post-season in specific areas of the brain, including the splenium of the corpus callosum and deep white matter tracts.

'19 Our study found that players experiencing greater levels of head impacts have more FA loss compared to players with lower impact exposure,' Dr. Whitlow said.

'Similar brain MRI changes have been previously associated with mild traumatic brain injury. However, it is unclear whether or not these effects will be associated with any negative long-term consequences.'

Dr. Whitlow cautions that these findings are preliminary, and more study needs to be done.

Questions:

1. How does Dr. Whitlow's study differ from the other older studies?

2. State one evidence of a negative effect of playing football for one season even though the players were not concussed.

3. Who did the researchers study?

4. How did the researchers monitor helmet impacts?

5. Explain DTI.

6. What was the conclusion of the study made by Dr. Whitlow?

7. Describe the brain's white matter.

8. Differentiate healthy white matter from one that has abnormalities.

9. Based on the results of the study, which group of hitters (heavy or light) was more affected due to impact. Why?

10. In your opinion, based on what you've read, would you let your child play football? Explain your answer. (Your explanation include a line from the article.) 3 points

11. Make a prediction of the different effects of playing football for too long. (3 points)
