

1. Could you tell the difference between a normal cell and a cancer cell by comparing the cell's DNA? Why or why not? (10 pts)

Yes, the cancer cell would have several mutations in genes that produce proteins which regulate the cell cycle (positive and negative cell cycle regulators).

2. You are running an experiment where you show test subjects a 3x3 grid with pictures of faces. Some of the faces have a similar skin color to the test subjects, and some of the faces have a different skin color than the test subjects. Based on the experiments we looked at in class, which skin color would you predict that the test subjects could pick out more quickly, someone with similar or different skin color? Why? (10 pts)

Different, the experiment using electric shocks to make people nervous showed that people were generally nervous about threatening, fear-relevant, objects like snakes/spiders but also to people of different skin colors. We recognize threatening objects faster than non-threatening objects.

3. What limits the number of viruses that can exist in a certain area? Why is this the limiting factor?

The number of cells that can be infected. Viruses need living cells to reproduce, but the viral reproduction kills the cells. Without living cells, the virus cannot reproduce.

4. You and a friend are both sneezed on by someone who has tuberculosis, a bacterial infection. You were both equally exposed to the pathogen, and your friend got sick, but you did not. Why did you remain healthy while your friend got sick?

You have memory B-cells. Either you received a vaccine or were previously exposed to this pathogen, and your memory B-cells react so quickly that you never get sick.

5. If someone had short telomeres, what is **one** problem they might have?

Any one of: They will not be able to make more cells to replace damaged/worn-out cells. They are at risk for cancer because the short telomeres indicate that they have many mutation in their DNA either due to many cell divisions/replication errors or DNA damage.

6. Would a mutation making a non-functional negative cell cycle signal be inherited as a recessive or dominant trait? Why?

Recessive. You would need both copies to have mutations to not be able to make any of the negative cell cycle signal.

7. What evidence indicates that plants can tell what type of animal is eating them?

They make different volatile compounds depending on which insect is eating them.

8. If a tumor is malignant, would you expect all of the cancer cells to have poor cell adhesion? Why or why not?

No, mutations build up as the cancer cells divide. Some might have mutation in the cell adhesion genes, but others would not.

9. B-cells, by themselves, are not very effective at getting rid of a viral infection. Why?

Viruses replicate inside cells. B-cells and their antibodies only recognize antigens outside of cells.

10. If someone has the sickle-cell allele, what do you know about where they are from? What do you know about their ancestors? Explain.

We may not know anything about where they are from. But since most people with the sickle-cell allele come from areas with high rates of malaria, one of their ancestors might have been from an area with high rates of malaria like central Africa or India.