Name: Date: Class:

Functions of the ECM Answer Key

Go to Khan Academy ECM Video. Or google Extracellular matrix Khan academy video. Then answer the following questions:

1. What is the relationship between cells and tissues?
   Cells work together to make up tissue, hierarchy of levels of organization of life.

2. What is the extracellular matrix?
   The analogous structure to the cytoskeleton found on the outside of the cell to help coordinate how the cells relate to each other.

3. What are the three main components of the ECM? Which one is most abundant in mammals?
   Fibers, proteins and glycoproteins; collagen in the most common protein in mammals.

4. What are the three roles of the ECM in the cellular environment?
   Help structure the cells into tissues, help inform the cells when to grow and divide, when to die or when to produce specific types of molecules.

5. Why is it important for the outside ECM to be connected to the inside of the cell?
   This helps cell signal through sensing tension, which can activate or deactivate cells depending on type.

Analyze "Cancer cells with trapped nuclei cut their way through the ECM" article. Read the article here and then answer the following questions:

1. Why are dendritic cells more likely to deform their nucleus?
   Because these cells have lower lamin concentration which corresponds to nuclei flexibility.

2. What are the nuclear lamins? What is their purpose?
   They are a dense fibrillar protein network, which associates with the inner face of the nuclear membrane and confers rigidity to the nucleus.

3. How do dendritic cells help facilitate their movement through small spaces?
   They do this through actin nucleation mediated by the Arp2/3 complex, dendritic cells can directly exert force on the lamina and thus alter the shape of their nucleus to facilitate movement through tissues.

4. Examine the picture in the article (Fig. 1): What is the difference in how cells behave in a matrix with large pores versus small pores?
   Lower nuclear deformation occurs in the large pore matrix versus the small pore matrix. Small pores lead to more nuclear tension and thus deformation.

Name: **Date:** **Class:**

5. What is the relationship between nuclear deformation and DNA damage?
   The tension on the nucleus can lead to double stranded DNA damage, if not repaired they can lead to cancer.

6. How are cancer cells different in terms of nuclear deformation, than normal cells?
   Cancer cell do not repair the DNA damage usually because the ESRT III endosomal regulators are low or missing.