

Chapter Three Study Guide

Cellular Form and Function – Part A / Tortora & Derrickson

1. What is the “modern cell theory”? When was this codified? What are the key ideas of the cell theory?
2. Cells have a variety of sizes, layers, and shapes. What names describe the basic shapes and layers of cells?
3. What are the primary units for volume, weight, and length in the metric system? (See Metric System Worksheet)
4. What is the common unit of measurement when working with cells?
5. What is the diameter of a “typical” human cell?
6. What is the diameter of a RBC?
7. How many cells make up a human body?
8. How far can a typical cell be from their source of nutrients before they die?
9. Define the following terms: cytoplasm, cytosol, cytoskeleton, organelles, intracellular fluid (tissue gel, matrix), extracellular fluid, plasma, and interstitial fluid.
10. The “fluid mosaic model ” is how we describe the plasma membrane and unit membranes that surround organelles within the cytosol. We commonly describe the plasma membrane to be a “phospholipid bilayer”, but it is much more complicated than this. What is the structure of the fluid mosaic model? How do these components contribute to the function and structure of the plasma membrane? What are intergral proteins or transmembrane proteins?
11. Many substances pass through “channels” to cross the plasma membrane. These channels function like gates and some are regulated to open and close. What are the three stimuli or forces that regulate these channels?
12. What are the componets of the cytoskeleton?
13. What is the structure and function of a “Second Messenger”?
14. Why must some “hormones” use a second messenger to alter the metabolism of a cell?
15. All plasma membranes of our cells have a “fuzzy exterior coat” that consist of sugar molecules (e.g. glycolipids). This is why our cells are said to be “sugar coated”! What is the name of this sugar coated layer?
16. What is the main function of this “fuzzy coat”?
17. What are microvilli and what are their primary function?
18. What is in the core of these microvilli? Function?
19. Cilia, like microvilli, are projections off the plasma membrane’s surface but they are longer and more “hair like”. What are the two functional types of cilia? There functions?
20. What is an axonen? What is the role of dynein in the axonen?
21. Explain cystic fibrosis as a pathology of a transmembrane protein and why it results in the dysfunction of the ciliated musoca in the trachea?
22. What is a flagella? What is the only human cell to have a flagella?
23. Plasma membranes are selectively permeable. What does this mean?
24. What are two ways in which a substance may pass through a unit membrane? (think in terms of energy)

25. What is diffusion? Is it active or passive?
26. What is osmosis?
27. What is filtration?
28. What human organ is the best organ to reference as an example for filtration?
29. What is the “primary” force which determines the direction of movement of a solute? List other “secondary” factors that affect the rate of diffusion.
30. Explain why osmosis has been described as the diffusion of water across a unit membrane. Why? What must be present in order to demonstrate osmosis?
31. What is the difference between hydrostatic pressure and osmotic pressure?
32. How can we define filtration in terms of osmosis?
33. What is osmolarity?
34. What is tonicity?
35. What is the osmolarity of our blood plasma? What will happen to a RBC if it is placed in each of these solutions: 1) 400 mOsm 2) 300 mOsm 3) 200 mOsm?
36. What term do we use to describe a solution's ability to change the volume of a cell?
37. Explain the role of these terms as they relate to “carrier-mediated transport”: a) receptor b) specificity c) saturation and d) transport maximum:
38. What are the three transmembrane carrier mediated transport systems? (note: they describe number of solute transported and direction)
39. Explain the function of these mediated transport systems: facilitated diffusion, primary active transport, and secondary active transport
40. Do large molecules (either liquid or solids) use channels or carrier mediated transport systems to cross the plasma membrane? Explain
41. What is the difference between endocytosis and exocytosis? Phagocytosis?
42. What is transcytosis?
43. What is an organelle?
44. What is the structure and function of these cell organelles? (nucleus, mitochondria, smooth endoplasmic reticulum, rough endoplasmic reticulum, Golgi complex, lysosomes, ribosomes, centrioles, peroxisomes, proteasomes)
45. What organelles are required to make a protein? Where is the information to make a protein stored? What are the “two different types” of proteins?
46. Trace the two different paths that protein follow during their formation?

Hot List Questions

1-2-4-5-8-9-10-11-12-13-15-17-19-22-23-24-25-26-27-31-33-34-35-36-37-38-39-40-41-42-43-44-45-46