Jonathan Lam
Mrs. McTague
H. Bio. per. 3
3 / 23 / 15

Study Guide: Cells

1. **Explain the key <u>structural</u> differences between prokaryotic and eukaryotic cells.**
    a. The bacteria cell has a nucleoid— an area in which DNA is located, but not defined within a nucleus like eukaryotic cells.
    b. A prokaryotic cell is smaller.
    c. A prokaryotic cell does not have membrane-bound organelles.
    d. A prokaryotic cell can have a capsule, an additional hard protein shell that encases it similar to a plant cell wall, but is used for virility.
    e. Prokaryotes have plasmids and rings of DNA, while eukaryotic cells have chromosomes.
    f. Flagella are simpler in prokaryotes — not made of microtubules

2. **Average Sizes:**
    a. prokaryotic cell: 1-10 microns
    b. eukaryotic cell: 10-100 microns

3. **Explain why all cells contain DNA and ribosomes.**
    a. DNA and ribosomes are both at the core of creating proteins. Proteins are essential to carrying out almost every function in a cell, including building and breaking down molecules, making up tough structures, or transporting materials. DNA is the instructions for making all these essential molecules of protein, and ribosomes are the organelles that create the proteins

4. **Explain the function of every part of a bacteria cell.**
    a. capsule
        i. encases a virulent bacteria, so that it can avoid engulfment by white blood cells
    b. cell wall
        i. made of peptidoglycan, provide support for the cell
    c. cell membrane
        i. regulates what comes in and out of the cell
    d. ribosomes
        i. synthesizes proteins, which are essential to the cell
    e. pili
        i. help the cell grab onto things
    f. flagella
        i. move the cell (spiralling)
    g. nucleoid
        i. contain DNA (no true nucleus)
    h. cytoplasm
        i. store all the cellular organelles

5. **Shapes of bacteria cells.**
    a. cocci (spherical)
    b. spirilla (spiral)
    c. bacilli (rod)

6. **Arrangements of bacteria cells**
    a. di- (pairs)
    b. strepto- (strips, chains)

c. staphylo- (bundles)

7. Differences between archaea and bacteria.

a. eubacteria live in less harsh environments
b. eubacteria are much more common
c. eubacteria are virulent
d. eubacteria are larger than archaebacteria
e. eubacteria's cell walls contain peptidoglycan

8. Classifications:

a. bacteria:
    i. heterotrophic: consume other organisms, need outside food source
    ii. autotrophic: provide energy for themselves
b. bacteria:
    i. aerobic: need and thrive in oxygen
    ii. anaerobic: cannot live in oxygen
    iii. facultative anaerobic: prefer oxygen but don't have to live in it

9. Uses of bacteria:

a. cause disease by killing other cells and releasing toxins
b. can be used to clean up oil spills
c. can be used to create flavors in foods
d. decompose
e. change nitrogen
f. can be used to make insulin

10. Antibiotics work by:

a. interfering with ribosomes (different from eukaryotic ones) to affect protein synthesis
b. interfering with DNA to interfere with protein synthesis and reproduction
c. interfering with the synthesis of the cell wall so that the cell would burst

11. Examples of bacterial diseases:

a. salmonella and E. coli
b. H. pylori (stomach ulcers)
c. staphylococcus

12. Examples of viral diseases:

a. influenza
b. cold
c. ebola
d. hepatitis

13. Size of viruses:

a. 10-300 nm (much smaller)

14. Uses of viruses:

a. viruses are mostly virulent and not really beneficial
b. used a little bit in genetic engineering

15. Prevention:

a. bacteria:
    i. vaccines
    ii. antibiotics
b. viruses:
    i. vaccines

16. Vaccines give an immunity by:

a. giving the person a weakened pathogen or antigen that will not overwhelm their immune system
b. the person gets an immune response
    i. white blood cells create antibodies
    ii. memory cells store idea of antibodies
c. whenever someone gets pathogen again antigens quickly take it out

17. Vaccines are "safe" because:

a. weakened
    i. attenuated or weakened actual pathogen
        1. chemicals
        2. old age
    ii. a similar pathogen
        1. not as powerful
b. non-virulent
    i. toxoid
        1. weakened toxin
    ii. subunit
        1. uses a particle that will trigger an immune response
    iii. killed or inactivated
    iv. accelular

18. Vaccine is not only way to become immune— if you get the actual pathogen you will become immune as well.

19. A person has to have had the immune response to be immune, either by getting it themselves or through a vaccine. They will not be immune without having the illness.

20. Treatment of viral infections:

a. anti-viral medicines: slow down regeneration of viral particles so that they take longer
b. sleep and let immune system take care of it
c. antibiotics cannot be used— they target living organisms, specifically parts of bacteria

21. Lytic and lysogenic cycles:

a. both in DNA viruses
b. lytic the DNA forms its own ring
    i. ring is read and proteins are created for capsule and for DNA
    ii. viruses reproduce immediately
c. lysogenic viruses don't reproduce immediately
    i. DNA becomes a prophage, part or organism's (probably bacteria's) DNA
    ii. when environmental stimuli comes then it switches over to lytic cycle

22. Retroviruses are different because:

a. they are RNA viruses whose RNA translates to DNA which becomes a prophage and goes through a cycle very similar to the lysogenic cycle

23. Viruses are given at different frequencies because:

a. some are "stronger" — they stimulate a strong immune response because they infected more of you

24. They are considered living or non-living because:

a. living:
    i. can reproduce (with help)
    ii. have genetic material
        1. can evolve
b. non-living
    i. do not have all the essential properties of life

25. Theory of endosymbiosis:

a. eukaryotic cells were formed when larger prokaryotes engulfed smaller prokaryotes, and they formed a symbiotic relationship
    i. the larger cell engulfed the smaller one
    ii. the smaller cell started to produce energy or some other beneficial function to the larger prokaryote
    iii. the smaller cell stayed in the larger cell, and reproduced by itself
    iv. after many generations, the smaller cell lost the function to live by itself, can only live in the larger cell as an organelle
b. evidence:
    i. mitochondria and chloroplasts
    ii. double membranes
    iii. independent reproduction
    iv. have their own DNA and ribosomes
    v. similar in size to some bacteria

26. Explain the process of the creation of proteins in a cell.

a. a gene from DNA is read into mRNA
b. tRNA carries mRNA to a ribosome (rRNA)
c. ribosome reads mRNA in pairs of three by sliding it through its subunits
    i. finds start codon AUG
    ii. reads pairs of three to determine correct amino acid sequence
d. primary structure protein either
    i. goes out into the cytoplasm to be assembled there (if free floating)
    ii. goes to the rough ER (if attached to it)
e. in rough ER
    i. assembled into secondary and tertiary structures
    ii. some substances added to it
    iii. packages it in a transport protein to the cis side of a Golgi
f. in Golgi apparatus
    i. travels through membrane sacs
    ii. each membrane sac has different enzymes that add some finalizing touch to the protein
    iii. some membrane sacs add more proteins to the proteins (quaternary structure)

iv. packages it in:
    1. secretory vesicle: to transport out of the cell
    2. lysosomes: for storage of hydrolytic enzymes within the cell
    3. vacuoles: for storage of non-hydrolytic enzymes and other substances inside the cell

27. Differences between animal and plant cells:

a. plant cells:
    i. have cell walls (cellulose)
    ii. are more polygonal
    iii. have a central vacuole and decentralized nucleus
    iv. cells are right next to each other, cell walls attached to each other, cytoplasm flowing between cells through plasmodesmata
    v. have plastids
b. animal cells:
    i. are circular
    ii. have a central nucleus
    iii. have centrioles and flagella and cilia

28. Explain the importance of cellular organelles:

a. mitochondrial disease:
    i. cells do not get energy and can die
    ii. if there is no energy, there can be no functions done, and the organism dies
b. lysosomal disease:
    i. enzyme (Hurler) or enzymes (I-cell) missing from a cell
    ii. a molecule cannot be broken down
        1. causes buildup in the cell that impairs it
        2. can lead to a lack of the building blocks of the molecule
    iii. can cause an organism to die if enough of its cells do not function correctly

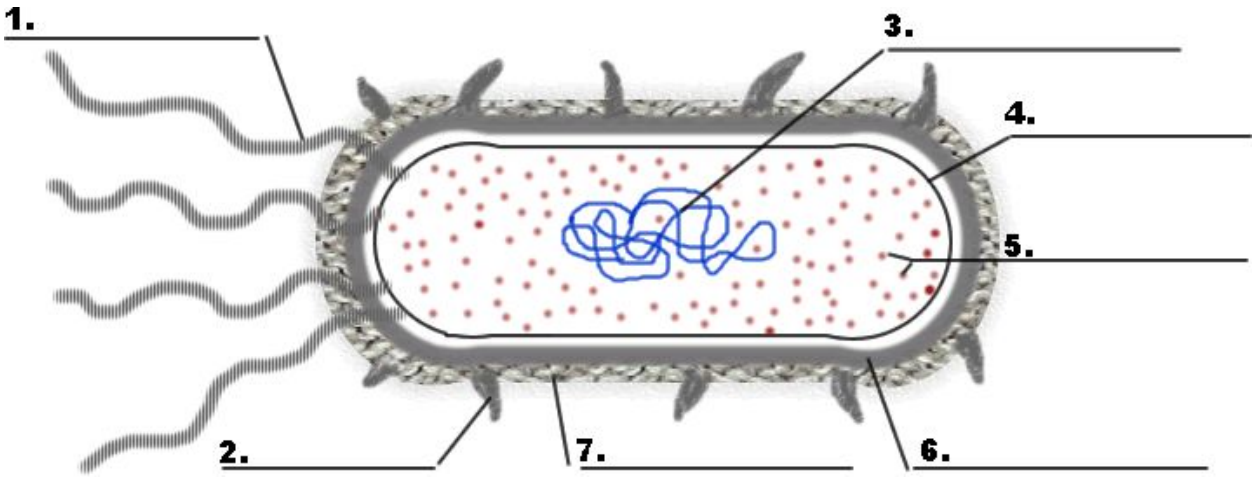
29. Predict what would happen in cells, and to the human body overall, if a given organelle was not present or not able to function properly.

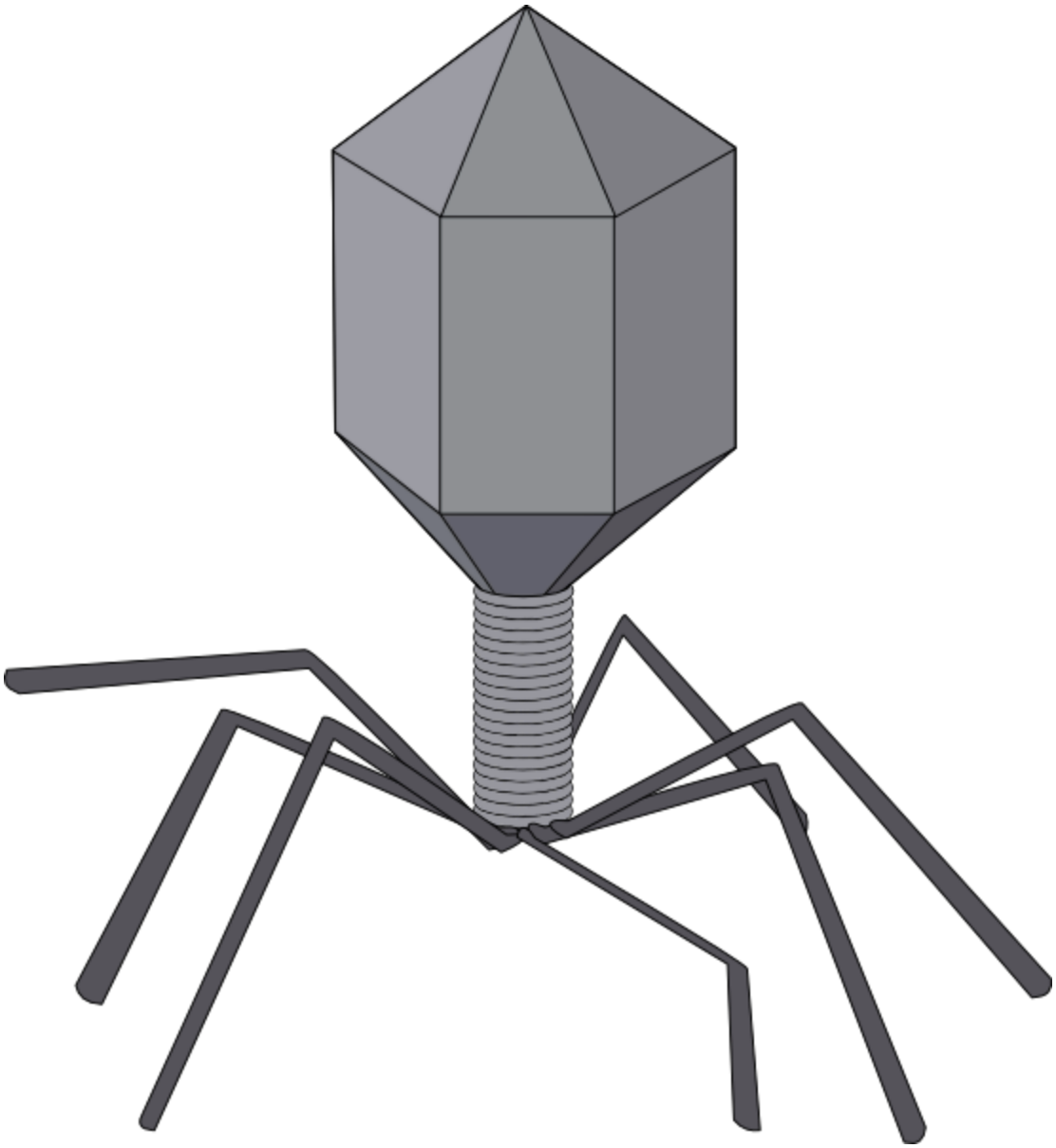
a. nucleus: reproduction
b. nucleus, ribosomes, rough ER, Golgi: protein synthesis
c. lysosome: waste buildup or lack of certain molecules.
d. cytoskeleton, cell wall: structure of cell would fail, collapse
e. cilia, flagella: no movement (wouldn't affect much in humans)

30. Explain the cell as the fundamental building block of life.

31.

Jonathan Lam
Mrs. McTague
H. Bio. per. 3
3 / 23 / 15





Jonathan Lam
Mrs. McTague
H. Bio. per. 3
3 / 23 / 15