Microbiology for nursing
Exam #1 Review

1. Matching lecture terms

Questions

1. Fill in the missing information on a table comparing the 5 different kingdoms.

Kingdom	Prokaryotic/ Eukaryotic	Sex Cycle	Cells in Organism	Autotrophic/ Heterotrophic	Cell Wall	# cells in gametangia
Monera	Prokaryotic	No	Single	A/H	Yes	None
Protista	Eukaryotic	Y/N	Single	A/H	Y/N	Single
Plantae	Eukaryotic	Yes	Multiple	A	Yes	Multi
Fungi	Eukaryotic	Y/N	Multiple /Single	H	Yes	Single
Animalia	Eukaryotic	Yes	Multiple	H	No	Multi

2. Contrast the terms parasite and host.
Host is the organism that is harboring (hosting) the parasite and gets damaged. Parasite is the organism that benefits.

3. Contrast the terms infection and disease.
An infection is that a pathogen has entered the body, does not have to be a diseased relationship.
A disease is when the body is dysfunctional (other then normal body function).

4. List and define the stages of disease.
Infection (pathogen enters host), Incubation period **(from infection -> first SxS)**, prodromal stage **(Symptoms first begin to appear, but are not well defined, person notices they do not feel good)**, period of invasion **(pathogen reaches highest level and greatest toxicity, symptoms most severe)**, convalescent period **(recovery)**.

5. What is a nosocomial infection?
Infections acquired in a hospital.

6. Contrast communicable and non-communicable diseases.
Communicable can be transmitted from person to person (cold, flu), non-communicable cannot (botulism)

7. Contrast acute, chronic and latent diseases.
Acute: Develop and subside rapidly. (Flu)
Chronic: Develop slowly over a long period of time. (Hepatits)

Latent: Remain inactive for a long period of time. (AIDS)

8. Contrast and define the terms pathogen and virulence.
Pathogen: An organism that causes a disease.
Virulence: The ability of a pathogen to cause a disease.

9. Explain what landscape epidemiology is. What factors are studied in landscape epidemiology to explain disease outbreaks?
Landscape epidemiology: The study of all factors that are needed for an infection and disease.
- topography
- weather
- environment
- vector distribution
- reservoir host distribution
- climate
- susceptibility of the host

10. Explain the difference between a retrospective study, prospective study and cohort group study.
Retrospective study – A study done after a disease outbreak has occurred.
Prospective study – A study that looks into the future and attempts to determine how the changes of conditions will cause future disease outbreaks to occur.
Cohort study – Study of a group that has had exposure to risk factors for a disease.

11. Contrast the terms endemic, epidemic, enzootic, epizootic.
Epidemic: A sharp rise in the incidents of infection of a disease in humans.
Endemic: A disease that is normally found in human populations at low levels.
Enzootic: A disease that is normally found in animals at low levels.
Epizootic: A sharp rise in the incidents of infection of a disease in animals other then humans.

12. Define the following measures of disease or infection: prevalence, incidence, intensity, morbidity rate or mortality rate
Prevalence:
$$\frac{\#\text{ of hosts infected}}{\#\text{ of hosts examined}} \quad \text{(as a percentage)}$$
Incidense:

# of new cases of infections per unit time
uninfected at the start of the time period (%)

Intensity:

# of a given type of disease organism or parasite in a given host.

Morbidity rate:

# of cases of a disease in a population
# of people in the population at risk (%)

Mortality rate:

# of people in pop that die from disease
# of people in population at risk (%)

13. What are the 6 basic steps in the science process.

A. Observe a pattern
B. Formulate hypotheses
C. Get rid of some hypotheses
D. Determine predictions for remaining hypotheses
E. Perform Experiments
F. Evaluate Results

14. Name two ways a hypothesis can be eliminated without testing. Are there any short comings to using these methods to eliminate a hypothesis? What is a hypothesis?

A. Non-material/non-observable
B. Inconsistent with known knowledge.

Shortcoming of known knowledge is that the known knowledge may not be correct.

Hypothesis is a tentative explanation for a pattern.

15. Give three reason why in a scientific investigation it is necessary to work with more than one hypothesis?

A. To reduce experimenter bias
B. Increase the likelihood you will find the factor causing the pattern.
C. More then one factor may be causing the pattern
D. You are more likely to control all of the factors that could be effecting the pattern.

16. List three things that could be done to increase your confidence in a supported hypothesis.

A. Falsify competing hypotheses.
B. Perform different experiments from different approaches (controlling different factors) that produce the same results.
C. Independent replication of experiments

17. Give two reasons why we are never 100% sure about a supported hypothesis in science?

A. Experiments may have biases in them

B. There may be another hypothesis with the same predictions as ours.

18. Why study microbiology? Give 3 resons.

A. Microorganism cause most of the important human and animal diseases on the planet.

B. Genetically engineered microorganisms produce many important disease treatments and can be used to clean up toxic materials in the environment.

C. Metabolic processes run by microorganisms produce many important food items like beer, wine, cheese, beer, yogurt, beer, wine, sauerkraut, beer, pickles, beer, wine, and bread.

D. Microorganism's are very important to the environment. They break down many wastes and toxic chemicals, and are involved in the cycling of nutrients.

19A. What is the germ theory of disease? What is the theory spontaneous generation? How did Pasteur and Tyndall disprove the theory of spontaneous generation?

Spontaneous generation: Suggests that life was regularly formed from non-living matter. Diseases were thought to be caused by people's behavior, not microorganisms.

Germ Theory: Diseases are caused by microbes not people's behavior.

Pasteur and Tyndall proved that if you sterilized a solution, disease and organisms did not grow in it.

19B. What is Koch's postulate used for? Explain the steps of Koch's postulate.

Koch's postulate is used to prove that a specific microorganism causes a specific disease.

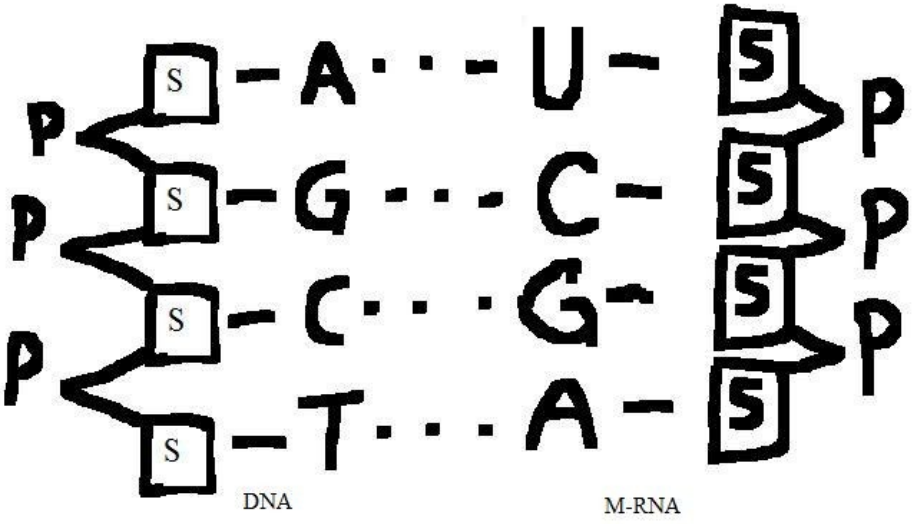
A. The microorganism must be present in every case of the disease.

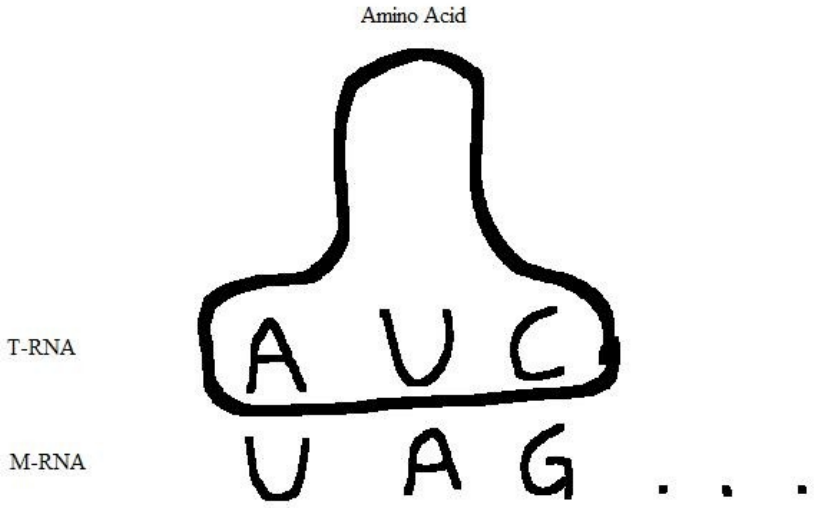
B. Isolate a pure culture of the organism.

C. The organism should produce the same disease when put in an uninfected animal.

D. Once animals have the disease you must recover the microorganism from the animal to be sure it is present.

20. Be able to draw simple models of DNA, M-RNA, and T-RNA.





21. Using the terms ribosome, transcription, and translation clearly explain the steps of protein synthesis.

a. [Transcription] First the DNA representing one gene is replicated into m-RNA. This process is called transcription, occurs inside the nucleus and is performed by separating the double helix DNA for the section that needs to be transcribed so that a small section of m-RNA can be created from it.

b. The m-RNA is then transferred outside the nucleus to the cytoplasm.

c. [Translation] The Ribosome locks onto one end of the m-RNA molecule.

d. **[Translation] The ribosome then reads three base sequences at a time (codon) which links to the proper anticodon on the t-RNA. Each t-RNA has a specific amino acid attached to it. Therefore the proper amino acid is attached in the proper sequence of amino acids for this protein. As each amino acid links to the amino acid next to it in the primary sequence, the Ribosome moves down the m-RNA to the next codon and the process continues.**
e. **[Translation] Once the ribosome has moved all the way down the m-RNA molecule all the amino acids have been put in place to make the protein.**

22. Explain the difference between prokaryotic and eukaryotic ribosomes.

Prokaryotic ribosomes: 70S in size (smaller), made up of a 50S and a 30S unit.
Eukaryotic ribosomes: 80S in size (larger), made up of a 60S and a 40S unit.

23. What are elongation factors and what do they do?

Elongation factors are enzymes which help the ribosome to move one codon over so that the next T-RNA can bond at the A site of the ribosome and continue the process of building the polypeptide chain of amino acids.

24. What is M-RNA splicing? Does in occur in both prokarotes and eukarotes? Which does it occur in?

M-RNA splicing only occurs in eukarotyic organisms. **M-RNA splicing is the process of removing the interon sections (inactive sections of the gene) and splicing together the remaining exon sections of the gene. This takes place after the transcription process is complete and before the M-RNA is transported to the ribosome in the cytoplasm.**

25. What is the smallest thing you can see with the light microscope and the transmission electron microscope?

Light Microscope: Max mag 2000x (typically max at 1000x), as small as 0.2 um.
Transmission electron microscope: Max mag 1,000,000x, as small as 0.5 nm.

26. Contrast the light, phase contrast, dark field, and fluorescent microscopes for how they work.

Light: incandescent/florescent light, shined through slide, stain required, 2000x (0.2 um)
Phase: type of light microscope, single phase of light

passed through slide, no stain required
Dark Field: type of light microscope, light passed through slide at such an angle only light scattered by the specimen can be seen.
Fluorescent: type of light microscope, object itself is fluorescent (light emiting), a UV light source is shined on the object activating it's fluorescent glow resulting in the image you can see.

27. Contrast the transmission electron microscope with the scanning electron microscope explaining how they work.
Transmission electron (TEM): 1,000,000x (0.5um), specimen must be sliced thin, coated with carbon, images of electrons passing through specimen. best used to see internal structures of cells.
Scanning electron (SEM): 100,000x (10nm), specimen dried, coated with a thin film of metal, image from electrons bouncing off the surface of the specimen.

28. Be able to arrange taxonomic groups in their proper order (i.e., kingdom, phylum, class, etc.)
Species → Genus → Family → Order → Class → Phylum/Division → Kingdom

28. Be able to write a scientific name in proper format.
A. Written in latin
B. Two parts, generic (noun) and specific (adjective)
C. Generic part is capitalized, specific is lower case
D. Both are underlined or in italics
E. Must be unique

29. Be able to write a common name for a species in proper format
A. Very from one region to another
B. If an organism is actually in a group the common name applies to, then the common name is written as two separate words, if not, then as one word.