

Key to Lecture Quiz #5

1. **Define reverse transcriptase**, explain how this protein gets into host cells (T-4 lymphocytes) and explain what it does.

Reverse transcriptase is one of three different types of enzymes carried into T-4 lymphocytes inside the HIV nucleocapsid (it is encoded by viral genes). This enzyme catalyzes the reverse transcription of the HIV genome (two single-strands of RNA) into two single strands of DNA. During this process it also degrades (takes apart) the viral RNA. Next, the enzyme replicates the DNA to form double-stranded DNA versions of the virus genome.

2. **Define antigenic shift as it was explained in lecture, describe how this occurs and explain how this can negatively impact the efficacy of vaccines.**

Antigenic shift is characterized by changes in the antigenic groups on the envelope surface of influenza viruses. The antigens are various versions of hemagglutinin and neuraminidase proteins encoded by viral genes. When these proteins are modified by **antigenic shift** it means genetic information from multiple different virus types has been combined within a single nucleocapsid. The degree of change is significantly greater than would be expected due to mutation.

Since antibodies bind very specifically with antigens, changes in the antigen types can make antibodies unable to bind with them. Vaccines typically stimulate antibody production, and if the antibodies formed are no longer able to bind and immobilize the viruses, the vaccines will no longer be effective for disease prevention (which is their intent).

3. **Define fractional sterilization**, name the person credited with developing this technique and explain how it is applied.

Fractional sterilization is a microbial control method also known as Tyndallization and can be used to eliminate virtually all viable cells from materials (liquids, food items, etc.). This method of microbial control was developed by John Tyndall and involves subjecting materials to 30 minutes of boiling and then cooling to room temperature and repeating this process over three consecutive days. Although Pasteurization will not render liquids sterile, Tyndallization will.

4. Viral envelope - If you answered "envelope" your answer was still correct.)
5. Integrase.
6. When the matching section used is provided on paper, the correct letter sequence is - E, D, G, B, C, H, F and I.
7. Freezing temperatures will prevent the metabolic processes of most cells because there is no liquid water available for hydrolysis and dehydration synthesis reactions. Large cells are also damaged by the formation of ice crystals during freezing. Freezing is **bacteriostatic** (will inhibit bacterial growth) but most bacteria are too small to be damaged by ice crystal formation so are not killed (freezing is not **bactericidal**). Most types of bacteria can remain alive, though metabolically inactive for extended periods of time at very low temperatures (e.g., -90° C). They are psychrotolerant.
8. Filtration/ ionizing radiation

9. Antiseptics/ biodegradable
10. Antibiotics
11. The β -lactam antibiotics **prevent the formation of peptidoglycan**. This will kill actively growing cells because the cells must partially degrade their peptidoglycan walls during elongation and then they cannot repair the damage./ Sulfa drugs
12. Aminoglycosides/ Polymyxin
13. Rifampin, Rifamycin or Rifampicin
14. The etiological agents of gas gangrene are identified as *Clostridium perfringens*.