

Mastery Series: Mechanism of Disease

1. 3 requirements of a pathogen to make us sick (mechanism of disease).
2. Define virulence (as used in microbiology class).
3. 2 ways bacteria adhere.
4. 5 ways bacteria avoid phagocytosis.
5. Give a pathogenic example for each of the 5 ways bacteria avoid phagocytosis.
6. Compare normal flora and pathogens in how they live on/in us.
7. Endotoxin versus exotoxin.
8. 4 types of exotoxins and how they work.
9. Symptoms of cytokine storm that may lead to septic shock.
10. Pathogenic example for each of the types of exotoxins.

Mastery Series ANSWERS: Mechanism of Disease

1. 3 requirements of a pathogen to make us sick (mechanism of disease).

Adhere, Avoid Phagocytosis, Cause Damage

2. Define virulence (as used in microbiology class).

Characteristics of a pathogen that increase its ability to make us sick.

3. 2 ways bacteria adhere.

Fimbriae, glycocalyx; flagella may help them remain in the tract

4. 5 ways bacteria avoid phagocytosis.

Capsule helps them hide behind our fibrin (*Staph aureus*); or hide behind our hyaluronic acid (*Strep pyogenes* and others); waxy cell wall (*Mycobacterium*); antigenic variation makes them hard to recognize as pathogens; secreting chemicals that calm immune reactions

5. Give a pathogenic example for each of the 5 ways bacteria avoid phagocytosis.

***Staph aureus*: Coagulase helps hide in fibrin clot**

***Streptococcus pyogenes*: hyaluronic acid in its cell wall makes it “look” like connective tissue**

***Mycobacterium*: waxy cell wall is hard to phagocytose**

***Influenza virus/helminths/Plasmodium*: vary their surface antigens so frequently that our WBCs don't recognize them**

***Helminths*: secrete “calming” chemicals that inhibit our WBCs**

6. Compare normal flora and pathogens in how they live on/in us.

Normal flora must be able to adhere and avoid phagocytosis; but unlike normal flora, pathogens also damage our cells.

7. Endotoxin versus exotoxin.

Endotoxin: Lipid A of the cell wall of Gram negative bacterial cells—released when the cells multiply or die

Exotoxins: toxins secreted out of a cell

8. 4 types of exotoxins and how they work.

Cytotoxins: damage RBCs or WBCs or both

Neurotoxins: inhibit or overstimulate neuronal signaling

Enterotoxins: cause vomiting and/or diarrhea

Superantigens: overstimulate immune response, causing systemic inflammation

9. Symptoms of cytokine storm that may lead to septic shock.

Inflammation, fever, body aches, inappropriate clotting, leaky blood vessels

10. Pathogenic example for each of the types of exotoxins.

***Streptococcus pyogenes*: cytotoxins destroy RBCs, and connective tissue**

***Clostridium botulinum*: neurotoxins inhibit muscle contraction**

***Clostridium tetani*: neurotoxins inhibit muscle relaxation**

***Salmonella typhi*, *Enteropathogenic E.coli*, *Vibrio cholera*: enterotoxins**

***Staphylococcus aureus*: superantigen**