

Microbial Pathogenicity and Diseases

۲ Year

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IMMUNOPATHOLOGY



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- ▶ The infected tissue often serves as an innocent bystander and immunopathology results. This can occur in acute and chronic infections. Over stimulation of cytokine production and complement activation by endotoxins can cause tissue injury in the absence of an immune response. Continuously generated antigens released from persisting viable microbes will subsequently elicit humoral antibodies and cell mediated immunity resulting in chronic immunopathology. Certain poorly degradable antigens (e.g pneumococcal polysaccharide and group A streptococcal cell walls) can maintain immunopathology even in the absence of persistence of live agents. Other bacterial antigens cross-react with host tissue antigens causing the development of autoimmunity (e.g. the M protein of *S. pyogenes* cross-reacts with mammalian myosin). Thus immunopathology can persist even after the infection and microbial antigens are eliminated.

The immune system in resistance to infection - examples

١. Extracellular parasites. Antibodies cause lysis of the organism and/or their opsonization by phagocytes at which point they are rapidly killed.

٢. Intracellular parasites are primarily killed by cell mediated immunity.

٣. Exotoxins can be neutralized by antitoxins. These can be elicited using

toxoid vaccines (toxoids are antigenic but not toxic). This occurs, for example, in vaccination against diphtheria.

٤. Certain organisms produce IgA proteases (including *H. influenzae*, *S.*

pneumoniae, *N. gonorrhoeae* and *N. meningitidis*) this helps survival on

external surfaces.

Some Organisms of Medical Interest

Gram negative aerobic cocci Gram positive cocci (facultative anaerobes)

Neisseria Streptococcus

Staphylococcus

Spirochetes Gram negative bacilli

Treponema *Pseudomonas*

Borrelia Bordetella

Leptospira Francisella

Spiral, Gram negative bacilli Gram positive bacilli

Campylobacter *Listeria*

Helicobacter Erysipelothrix



Gram negative bacilli *Actinomyces* and related organisms

(a) *Enterobacteriaceae* Corynebacterium *Escherichia* *Mycobacterium*

Salmonella , *Nocardia*

Shigella , *Actinomyces* , *Yersinia* Corynebacterium-like in appearance

Enterobacter Propionibacterium

Proteus **Fastidious Gram negative bacteria**

Serratia Brucella *Edwardsiella* Rochalimeae/Bartonella

(b) Others Chlamydia

Vibrio Rickettsia Hemophilus Mycoplasma Pasteurella

(c) *Legionellaceae* *Legionella* *Tatlockia*



Some major Exotoxins

Organism Disease Toxin

Bacillus anthracis Anthrax Edema toxin

Lethal toxin

Clostridium botulinum Botulism Botulism .toxin

Clostridium difficile Pseudo membranous colitis Enterotoxin

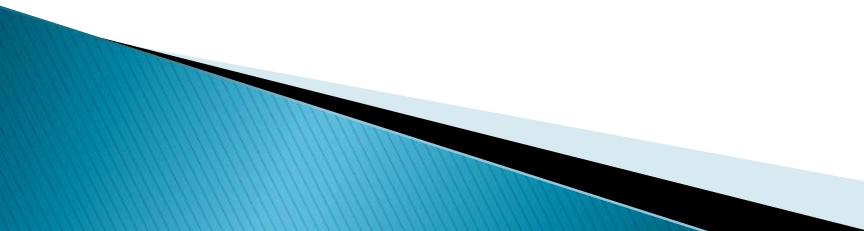
Clostridium perfringens Gas gangrene Alpha toxin Hyaluronidase

Food poisoning Enterotoxin

Clostridium tetani Tetanus Tetanospasmin

Corynebacterium diphtheria Diphtheria Diphtheria toxin

Escherichia coli Diarrhea (ETEC) Heat labile toxin



Heat stable toxins

Hemorrhagic colitis Vero toxin

Pseudomonas aeruginosa Diseases of compromised host Exotoxin A

Staphylococcus aureus Opportunistic infections Alpha-gamma toxins,
leucocidin

Toxic shock Toxic shock toxin

Food poisoning Enterotoxin

Scalded skin syndrome Exfoliatin

Streptococcus pyogenes , Scarlet fever Toxic shock Erythrogenic/pyrogenic toxin

Shigella dysenteriae , Bacillary dysentery Shiga toxin

Vibrio cholera Cholera toxin

End

