

Infectious Disease Pyramid

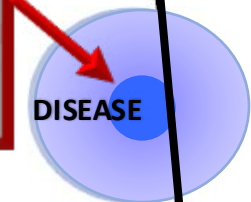
A given environmental condition interacts simultaneously and independently with the host, the host microbiome, and the pathogen in various ways, changing each of them and their interactions with each other. Environmental conditions include biotic (e.g., the environmental microbiome) and abiotic factors.



ENVIRONMENT

The pyramid contains a gradient of host susceptibility (from resistance and tolerance to high susceptibility), permeability of the host microbiome to the pathogen (from a complete barrier to a fully porous barrier), pathogen pathogenicity (from low to high infectivity and virulence), and environmental conditions (from low to highly favorable for disease) that each feed toward the center of the pyramid to influence disease outcome.

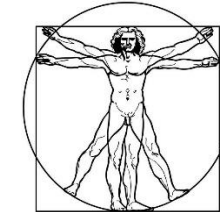
Disease is most intense in the center, where the greatest susceptibility, permeability, pathogenicity, and most favorable environmental conditions for disease are found



PATHOGEN



HOST



Susceptibility of the host

- Avoidance
- Resistance
- Tolerance



MICROBIOMA OF THE HOST

A permeable/porous host microbiome does not act as a barrier to pathogens, but allows the establishment, proliferation, and invasion of pathogens into the host.

INFECTIOUS DISEASE AVOIDANCE

- IPCS (Infection Prevention Control & Surveillance)
- Wash hands
- Avoid sharing personal belongings
- Cover your mouth
- Do not touch your face
- Wear a mask
- Use distancing measures
- Use quarantine forms if necessary
- Be vaccinated
- Consume safe foods
- Travel safely
- Practice safe sex
- Avoid zoonoses
- Being careful in the hospital

INFECTIOUS DISEASE TOLERANCE

- **Mechanisms of repair and maintenance encoded within the host**
- Organ support therapies
- Mechanical ventilation
- Oxygen therapy
- ECMO
- CRRT
- Vasoactive drugs
- Anticoagulants
- Fluids

- Maintenance of lung function
- Maintenance of oxygenation
- Maintenance of the functions of the other vital organs and physiological processes

HOST'S SURVIVAL

- Pneumonia
- ARDS
- Systemic hyperinflammatory extrapulmonary syndrome
- Immuno-deficiency
- Immuno-paralysis
- Dysbiosis

INFECTIOUS DISEASE RESISTANCE

- **Host immune response**
- Antibiotics
- Antivirals
- Inhibition of entry of viruses and bacteria into host cells
- Enhancement of the microbiota

ANTIVIRULENCE

- **Anti-inflammatory response encoded within the host**
- Immunomodulatory drugs

DISEASE CAUSING MICRO-ORGANISMS

IN YELLOW WHAT NATURE HAS GIVEN US TO DEFEND OURSELVES OR NOT FROM PATHOGENIC MICRO-ORGANISMS
IN WHITE WHAT MAN HAS BEEN ABLE TO DO TO DEFEND HIMSELF FROM PATHOGENIC MICRO-ORGANISMS

