Symptoms, signs, disease processes & the host-pathogen relationship

FEVER

Morning Sickness

Key points: 1) Consider possible benefits of the trait
2) Consider how competition between host and pathogen affects the phenomenon

Should doctors treat with anti-emetics?

Fever

- 5 year old male comes to the ER with ear tugging, and fever of 102.1
- Doctor, are you going to give him some tylenol?
- Yes or no?

Fever

- 75 year old male comes to the ER with burning on urination, back pain, confusion and a fever of 102.1
- Doctor, are you going to give him some tylenol?
- Yes or no?

An iguana comes to the ER

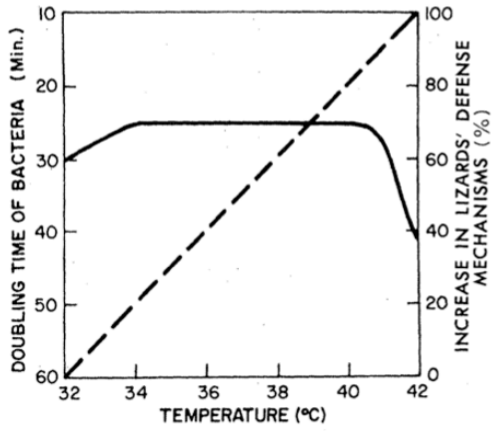
Matthew Kluger

- *Dipsosaurus* iguanas

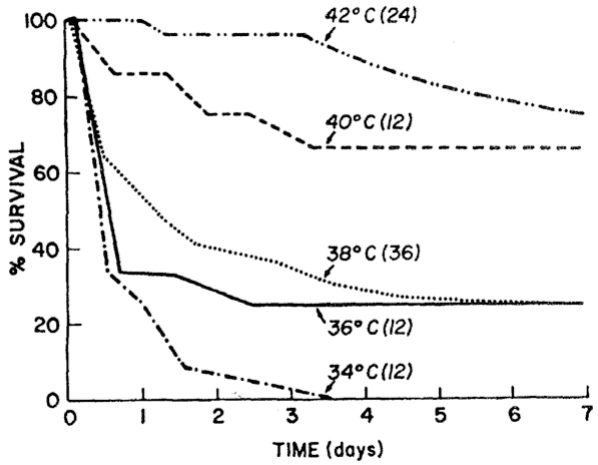
Injected each with *Aeromonas* bacteria

Those iguanas that increased their body temperature by moving closer to a heat source survived. The others died

Temperature and bacterial growth



Temperature and lizard survival



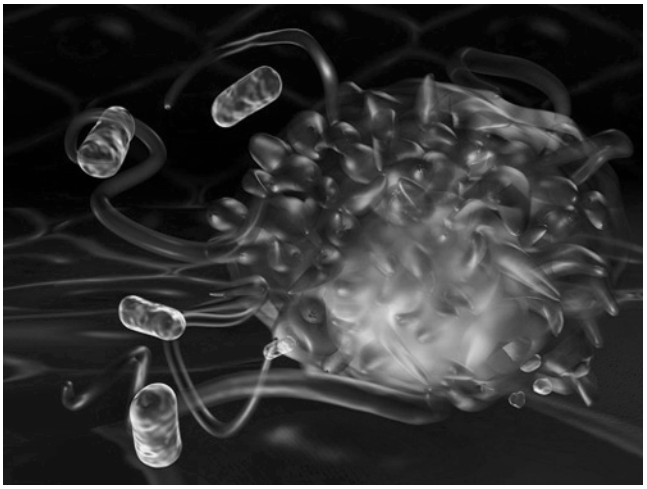
Possible mechanisms

- Enhancement of host defenses
- Increased phagocytic activity
- Leukocyte migration
- Humoral immunity

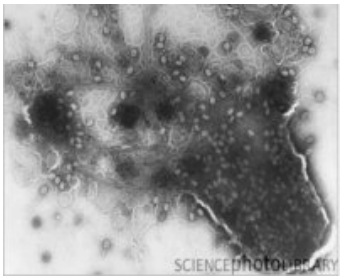
Seriously ill humans

- Sepsis – patients do worse if their body temperature is normal or low.
- Suggests a benefit to high temperatures.

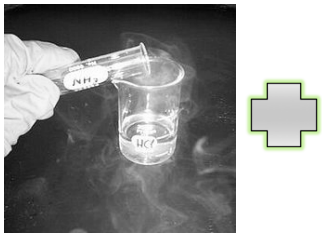
Phagocytosis

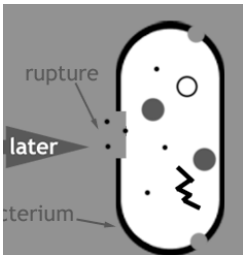


High temperatures destabilize bacterial cell membranes



High temperatures + acid have synergistic killing of bacteria





Membrane lipid homeostasis in bacteria
Yong-Mei Zhang, Charles O. Rock
Nature Reviews Microbiology 6, 222-233 (March 2008) doi:10.1038/nrmicro1839 Review

Should doctors use tylenol?

A 55 year old male complains of an acid taste in his mouth worse after certain foods and heartburn symptoms for 1 month.

- Diagnosis:?

Diagnosis: Acid reflux
Symptom: Heartburn

With what we know – how might acid affect the host pathogen relationship?

Could there be consequences of preventing acid production in the stomach?

Proton pump inhibitors

- Interfere with H+/K+ ATPase pump in gastric parietal cells.
- Commonly prescribed drug – now over the counter

Bacteria make proton pump inhibitors!

- If pathogens produce the stuff, should we be taking it?
- H. pylori (the bacteria that causes ulcers) manufactures a PPI in its cell membrane!
- We treat H. pylori with PPIs
- Is that logical?

Side effects of proton pump inhibitors:

- Increase the risk of Clostridium difficile infection
- Increase the risk of pneumonia in hospitalized patients.

What about ibuprofen?

- Impairs host defenses and barrier function in the gut.
- Causes endotoxin leakage into bloodstream.
- Combination of PPI and NSAIDs is very common! Could it be dangerous?

Summary

- Think about the host-pathogen interaction and how medical interventions affect them.
- Symptoms might represent host defenses OR pathogen virulence factors.