

FEVER AS A RESPONSE TO AN INFECTIOUS DISEASE

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FEVER

DEFINITION:

Fever is a rise in our body's normal temperature, which on average, is 98.6 degrees Farenheit.

Fever is part of our body's defense mechanism.

- **Fever is a symptom of an infection.**
- **Fever is a good thing.**
- **Fever is our body's natural response to fighting germs.**
- **The cause of the fever is quite an intricate process**



DISCOMFORT DUE TO FEVER

- **For each 1 °C elevation of body temperature:**
 - Metabolic rate increase 10-15%
 - Insensible water loss increase
300-500ml/m²/day
 - O₂ consumption increase 13%
 - Heart rate increase 10-15/min

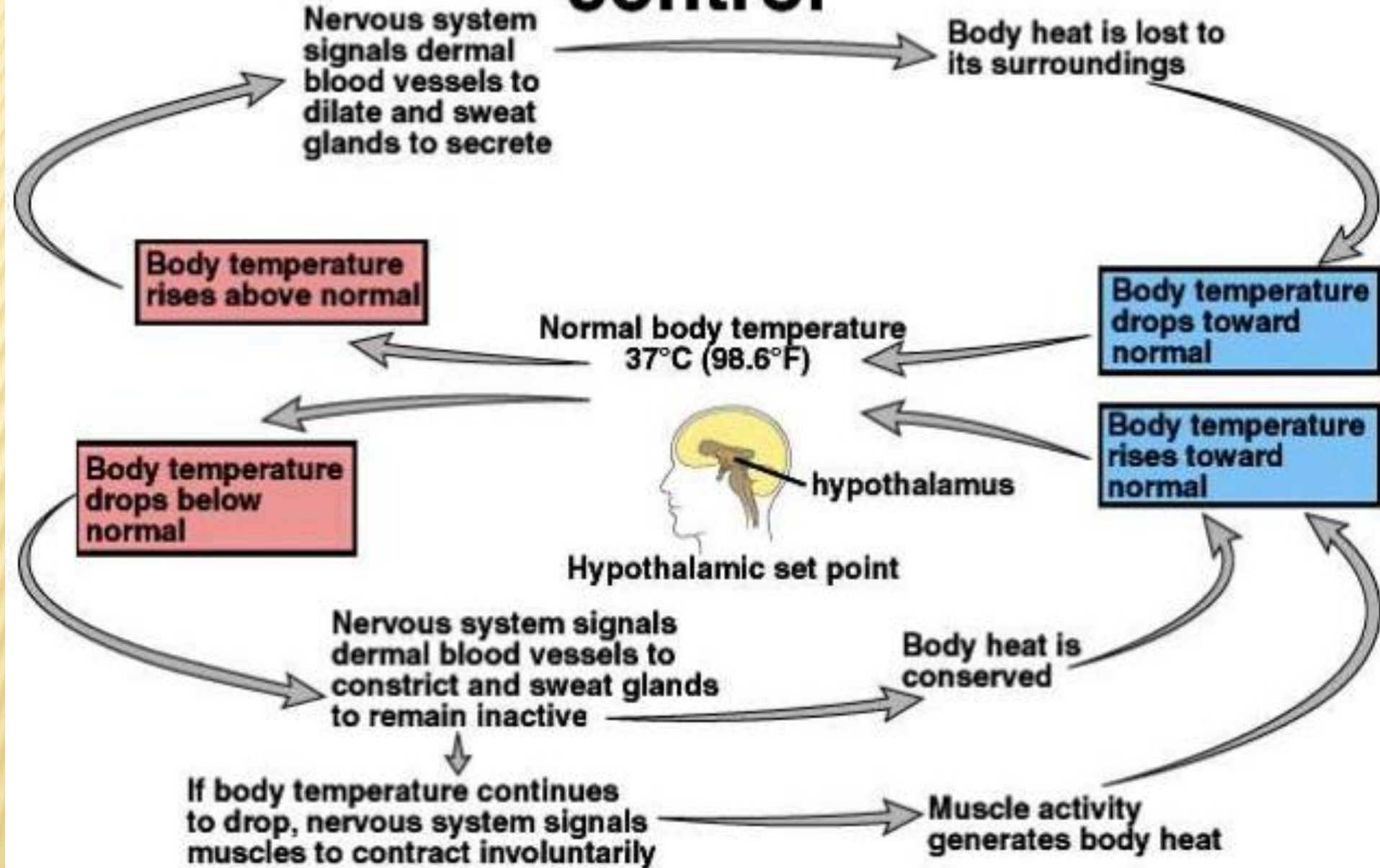


How to define fever clinically?

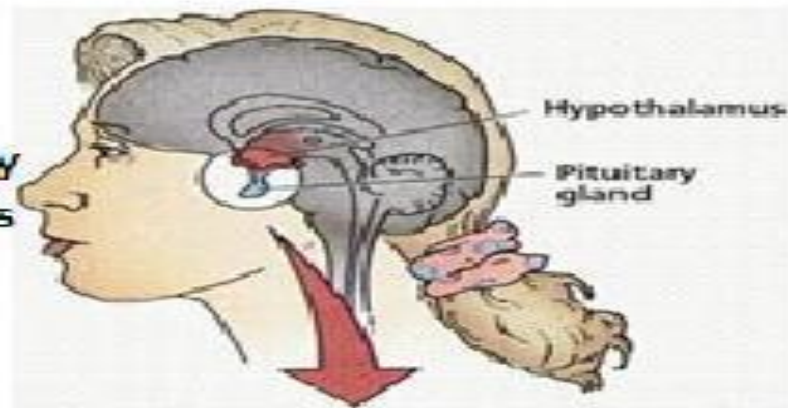


- Persistent elevation of body temperature above the normal levels in an individual.
- The child has fever if:
 - Rectal temperature >100.4 degrees F (38 C)
 - Oral temperature >99.7 degrees F (37.6 C)
 - Axillary temperature >99 degree F (37 C)

Homeostasis and temperature control



**Signal Received by
the Hypothalamus**



**Elevated the more regulatory
set point**

Heat Sensitive receptor

Heat conservation

**Vasoconstriction
behavioral changes**

Heat Production

**Involuntary muscle
contraction**

FEVER



Fever vs Hyperthermia

Fever

- Change in hypothalamic set point
- Involves cytokines
- Diurnal variation +
- Rarely exceeds 41°C
- Complications are rare

Hyperthermia

- Failure in thermoregulation
- Can exceed >41°C
- Can be detrimental
- Absence of diurnal variation



INFECTIOUS DISEASE

Infectious Diseases - Definitions

- ▶ **Disease** – a pathological condition of body parts or tissues characterized by an identifiable group of signs and symptoms.
- ▶ **Infectious disease** – disease caused by an infectious agent such as a bacterium, virus, protozoan, or fungus that can be passed on to others.
- ▶ **Infection** – occurs when an infectious agent enters the body and begins to reproduce; may or may not lead to disease.
- ▶ **Pathogen** – an infectious agent that causes disease.
- ▶ **Host** – an organism infected by another organism.
- ▶ **Virulence** – the relative ability of an agent to cause rapid and severe disease in a host.

CLASSIFICATION OF INFECTIOUS AGENTS (1 of 2)

- Bacteria – survive on appropriate media, stain gram-positive or -negative
- Viruses – obligate intracellular parasites which only replicate intracellularly (DNA, RNA)
- Fungi – non-motile filamentous, branching strands of connected cells
- Metazoa – multicellular animals (e.g. parasites) with complicated life cycles often involving several hosts

CLASSIFICATION OF INFECTIOUS AGENTS (2 of 2)

- Protozoa – single cell organisms with a well-defined nucleus
- Rickettsia – very small bacteria spread by ticks
- Prions – unique proteins lacking genetic molecules
- Chlamydia – bacteria lacking cell walls

MODES OF TRANSMISSION

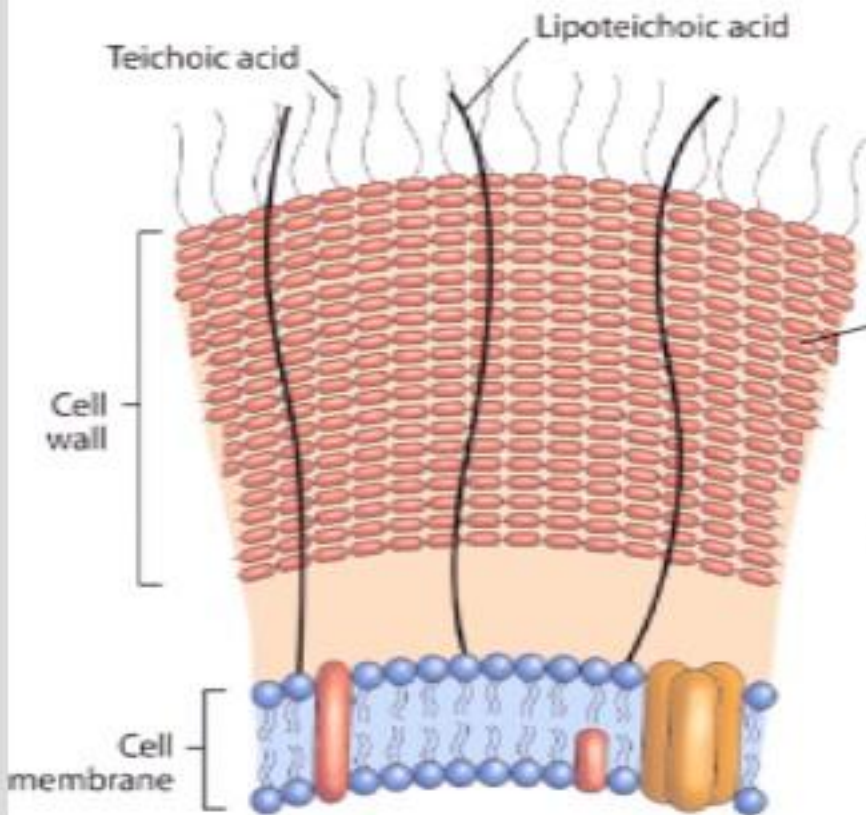
- Direct
 - Droplet
 - Aerosol
 - Skin to skin
- Indirect
 - Fomites (clothes, blankets, door handles etc)
 - Vectors (e.g. mosquitoes)
 - Food and water
 - Intermediate hosts (e.g. snails)

Microbiological Classification of Infectious Diseases

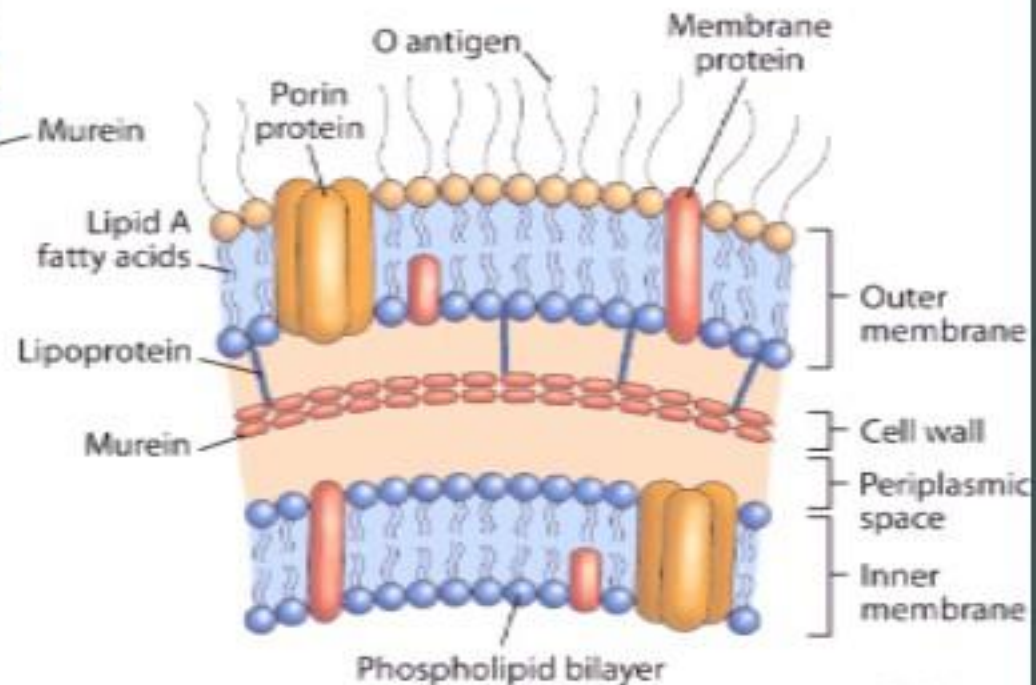
- Bacteria are classified by their Gram stain characteristics.
- Gram staining is the application of a crystal violet dye to a culture of bacteria. Bacteria that retain the color of the dye are called Gram positive; bacteria that don't are Gram negative.
 - The Gram stain attaches to peptidoglycan in the bacterial cell wall.
 - In Gram-negative bacteria, the peptidoglycan layer is protected by an outer membrane.

Microbiological Classification of Infectious Diseases

Gram +



Gram -



Microbiological Classification of Infectious Diseases

Cocci
(spherical)



Staphylococcus aureus



Streptococcus pneumoniae



Streptococcus pyogenes

Bacilli
(rods)



Bacillus anthracis



Haemophilus influenzae

Curved or
spiral



Vibrio cholerae



Borrelia burgdorferi

Gram-positive

Gram-negative

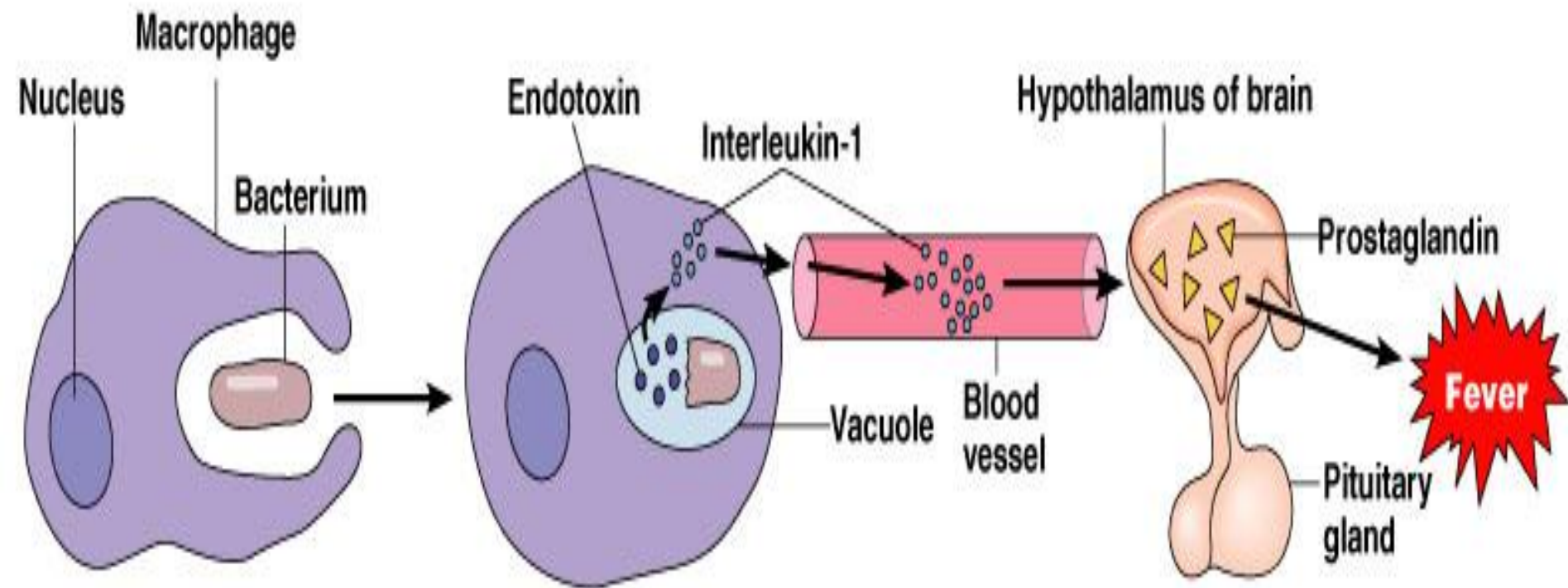
Signs of infection

Fever and a rash - a sign of many infectious diseases. They may appear singly or may be combined with each other.

Body's Response to Infection

- **Fever**

- Macrophages release endogenous pyrogens
- Hypothalamus releases prostaglandins
- Body temperature rises
- Heat speeds immune response

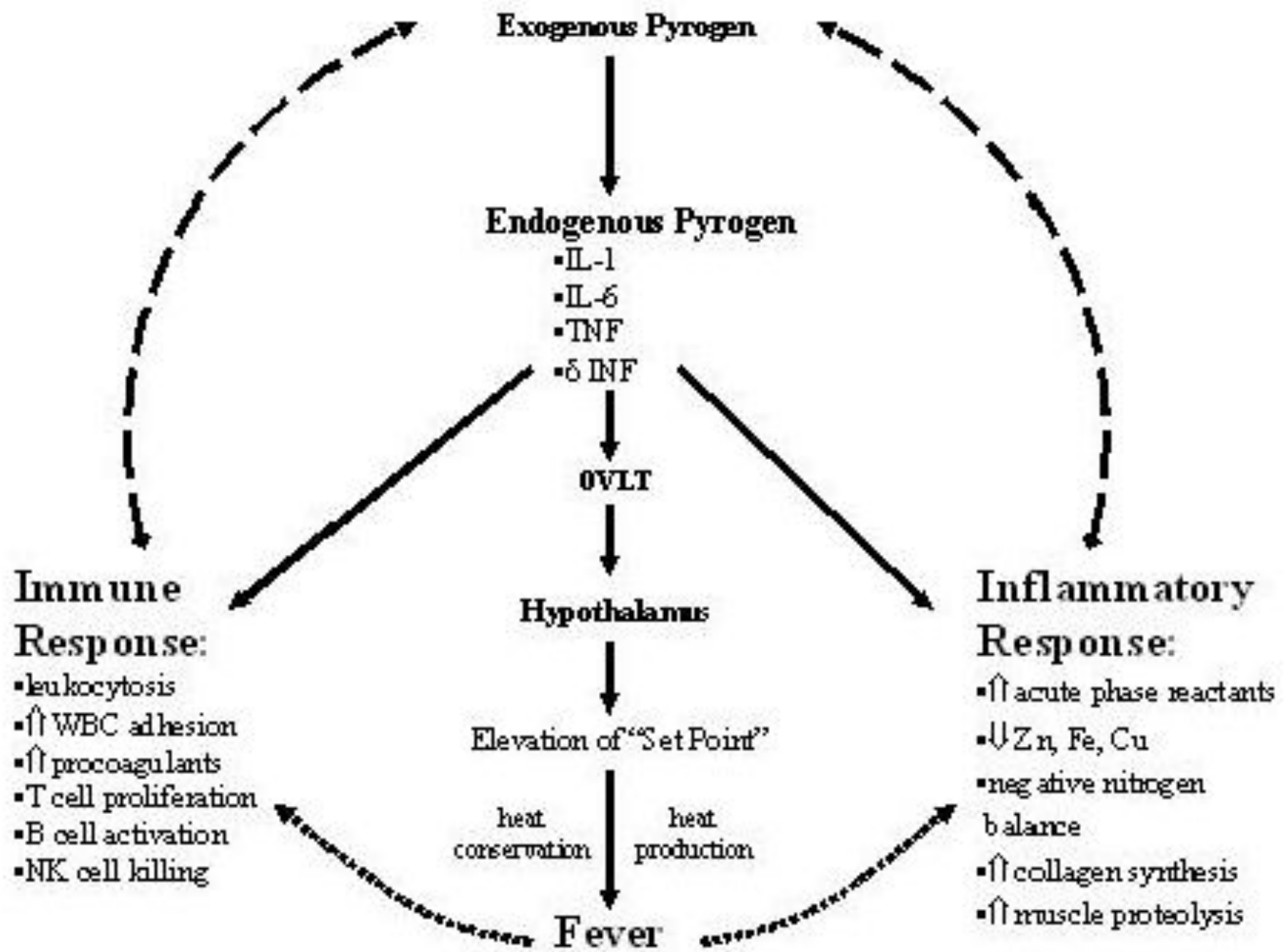


1 A macrophage ingests a gram-negative bacterium

2 The bacterium is degraded in a vacuole, releasing endotoxins that induce the macrophage to produce interleukin-1 (IL-1)

3 IL-1 is released by the macrophage into the bloodstream, through which it travels to the hypothalamus of the brain

4 IL-1 induces the hypothalamus to produce prostaglandins, which reset the body's "thermostat" to a higher temperature, producing fever





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Thank
You