

FEVER AS A RESPONSE TO AN INFECTIOUS DISEASE

MUTHUSAMY NITHYA

518 A



FEVER

DEFINITION:

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

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

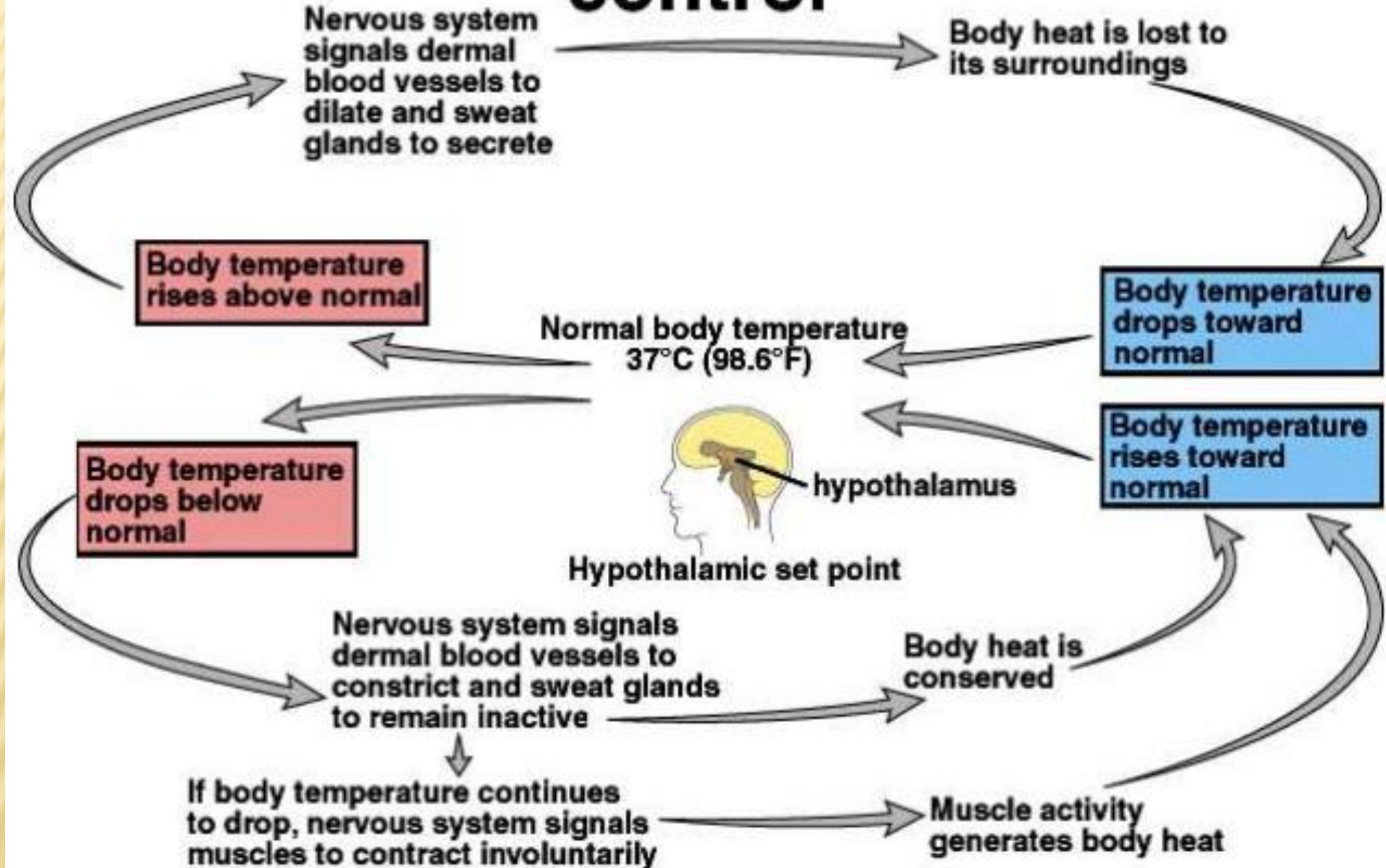


How to define fever clinically?

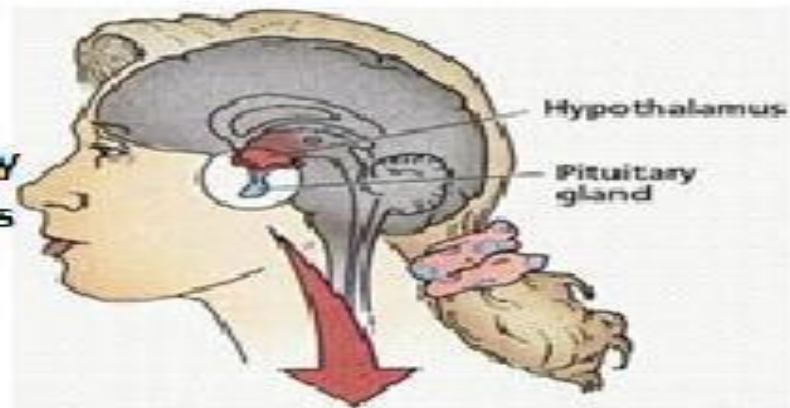


- Persistent elevation of body temperature above the normal levels in an individual.
- The child has fever if:
 - Rectal temperature >100.4 degrees F (38 C)
 - Oral temperature >99.7 degrees F (37.6 C)
 - Axillary temperature >99 degree F (37 C)

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

A gloved hand in a blue nitrile glove holds a clear petri dish. Inside the dish, a large, spiky, blue virus-like particle is the central focus. Other smaller, similar particles are visible in the background of the dish. A bright red light source is also visible within the dish. In the background, a person wearing a white lab coat and a blue surgical mask is looking towards the camera. The overall scene is set in a laboratory environment with a blue and white color palette.

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

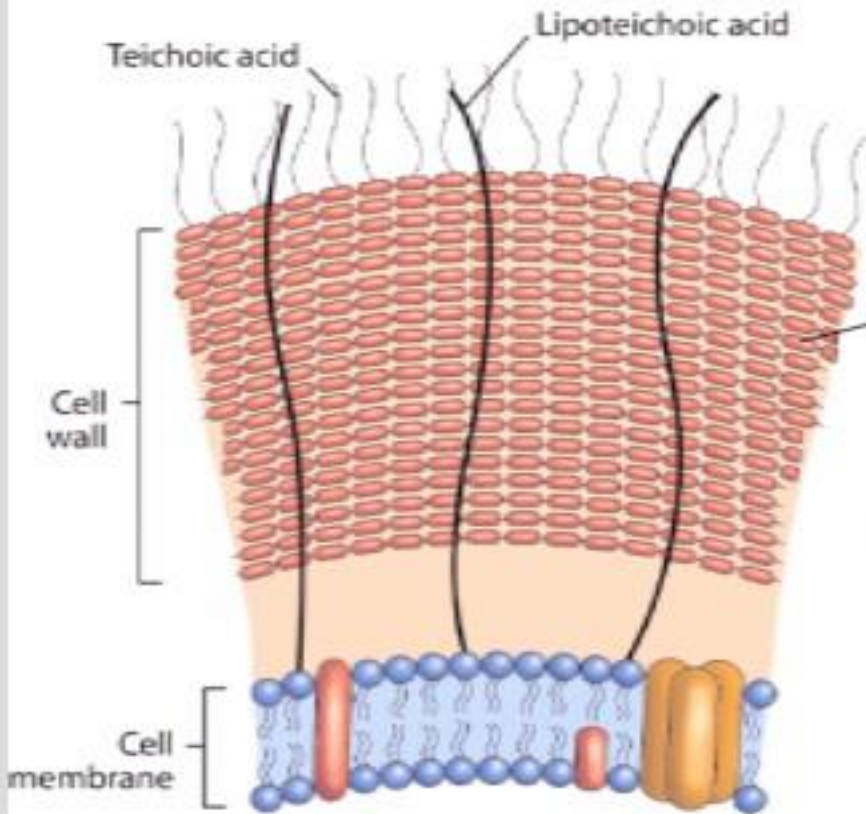
- Direct
 - Droplet
 - Aerosol
 - Skin to skin
- Indirect
 - Fomites (clothes, blankets, door handles etc)
 - Vectors (e.g. mosquitoes)
 - Food and water
 - Intermediate hosts (e.g. snails)

Microbiological Classification of Infectious Diseases

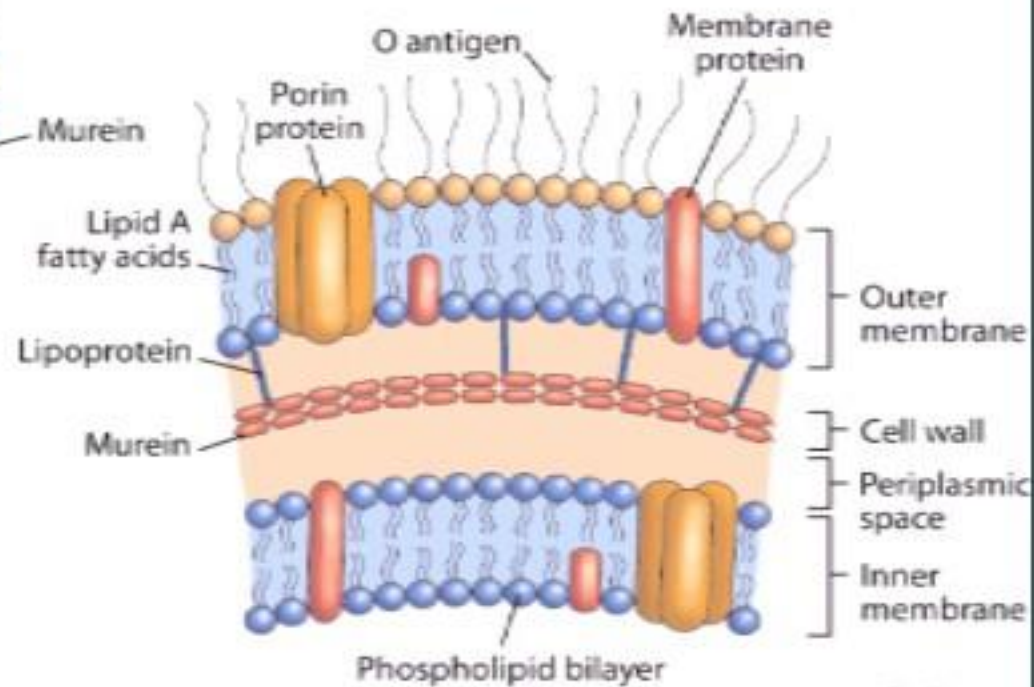
- Bacteria are classified by their Gram stain characteristics.
- Gram staining is the application of a crystal violet dye to a culture of bacteria. Bacteria that retain the color of the dye are called Gram positive; bacteria that don't are Gram negative.
 - The Gram stain attaches to peptidoglycan in 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

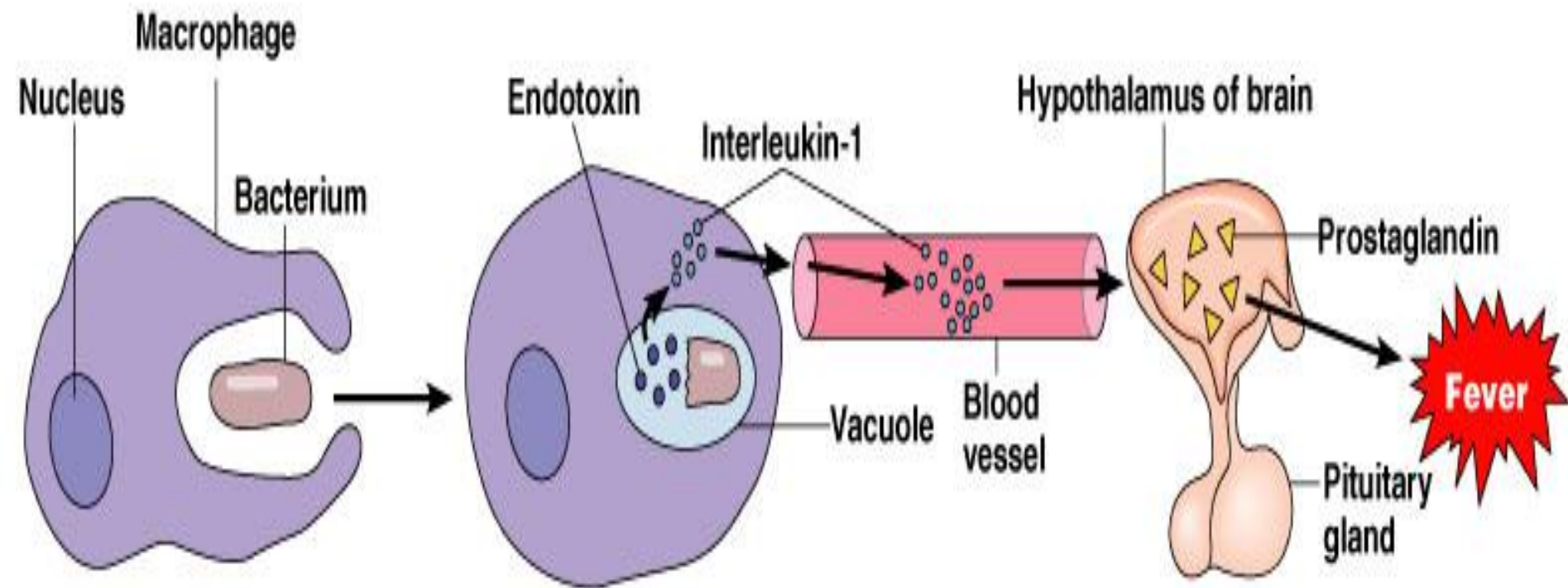
Signs of infection

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

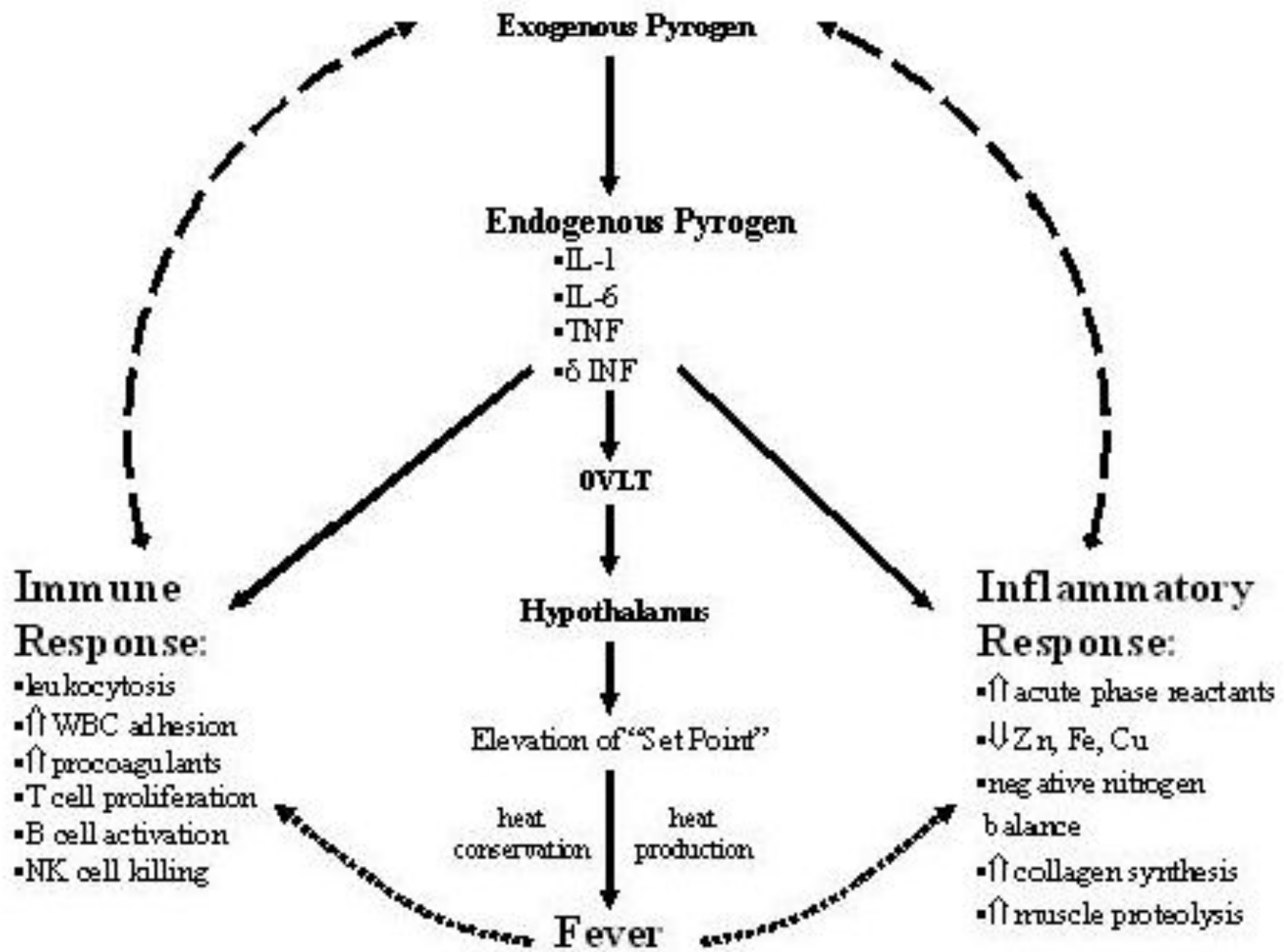


1 A macrophage ingests a gram-negative bacterium

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