

What is Homeostasis?

- Homeostasis is... the equilibrium of the internal environment within an organism.
- Disturbances in Homeostasis cause decreased function of the cell, organism and population.
- In essence, homeostasis is the desired constancy that allows the body to function in the most efficient way.

Who founded the theory of Homeostasis?

- Hippocrates (~460 BC 370 BC)
- Claude Bernard (1813-1878)
 Rabbit liver and the theater
 Temperature (vasoconstriction, vasodilatation)
- Walter B. Cannon (1871-1845)
 "The Wisdom of the Body"
 Founded the term "Homeostasis."

What needs to be regulated?

- Temperature (60°C 0°C)
- ∎ pH

- Ion concentration
- Pressure (Blood, Lungs, etc.)
- O₂, CO₂, nutrients, salts, waste products, water, etc.

What body systems contribute to Homeostasis?

- Circulatory
- Digestive
- Respiratory
- Muscular



- Nervous
- Endocrine
- Many others





Homeostatic Circuit Example

Dehydration

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- Osmoreceptors in Hypothalamus
- Pituitary Gland secretes ADH
- Kidneys retain water.



Negative Feedback

- The sensor detects a change in the factor.
- A signal is sent to the Integrating Center.
- The Integrating Center sends an effector signal to return the factor to the set point.



Blood Glucose regulation

- Increase in blood glucose causes Pancreas to release insulin.
- Decrease in blood glucose causes Liver to release Glucagon.





Child Birth

- Brain signals release of Oxytocin.
- Oxytocin increases contraction force and frequency.
- Stretch on the Uterus signals the brain and more Oxytocin is released.



Countercurrent Multiplier System

- Uses opposing flow and gradients to exchange desired solutes.
- Used for exchange of heat, O₂, CO₂, etc.
 Extremely efficient
- Extremely efficient and used throughout the body.



Endothermy

- Relatively constant internal temperature.
- Most mammals and birds (Humans).
- Usually a high internal body temperature (37°C 40°C).
- Heat created and maintained by muscular contraction. (30% energy efficiency, 25% Steam Boat)
- Use sweating to cool body along with radiation, convection and conduction (humans, dogs and mice).

Ectothermy

- Internal temperature similar to that of environment.
- Reptiles, Fish and amphibians all Ectotherms.
- Usually little insulation.
- Use radiation and conduction to heat body.

Cited Sources

- George, F. H., George, H. J. Shaum's Outline of Biology. New York: McGraw Hill, 2009.
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