



HOMEOSTASIS & NEGATIVE FEEDBACK

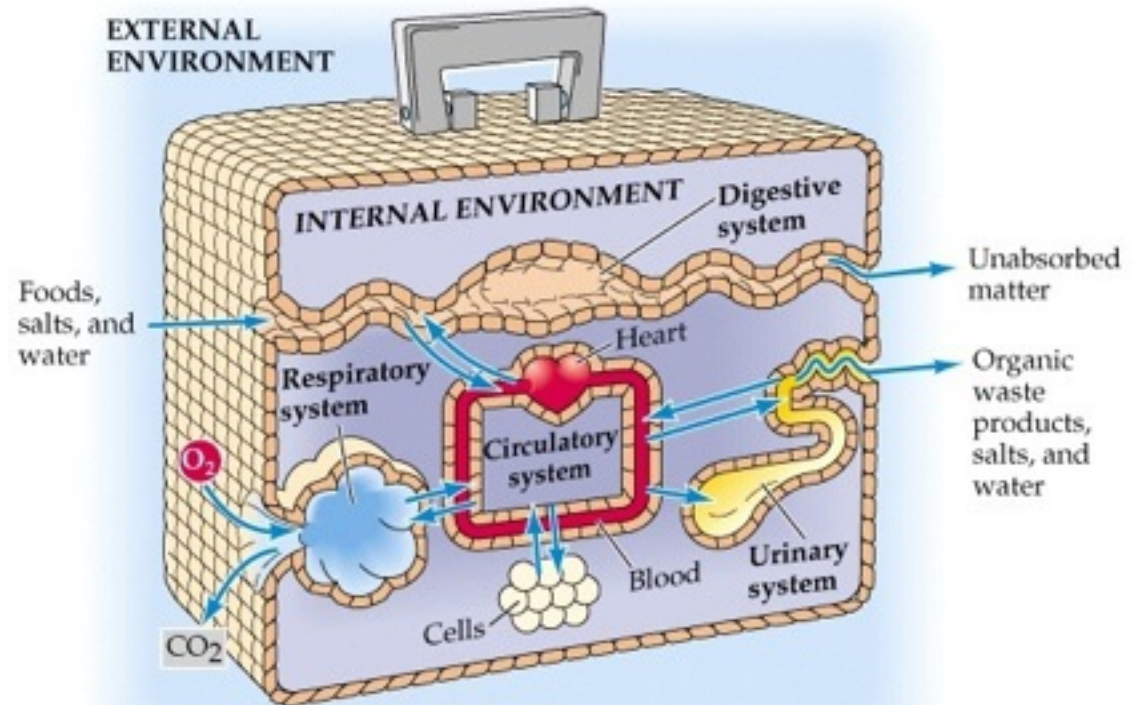
“Keeping Everything Balanced”

Video

- How Body Temperature is Maintained
- <https://www.youtube.com/watch?v=dJ8WXpsUXYQ>
(1:33)

Homeostasis

- **Homeostasis:**
 - process by which organisms keep internal conditions relatively constant despite changes in external environments.



What we need to keep the same in our body:

- Temperature (98.6 F)
- Blood pH (7.4) almost neutral
- Blood pressure (average 120/80)
- Heart rate (80 beats per minute)
- Blood sugar level
- Hydration/amount of water
- Amount of salts
- Amount of blood (2 pints per every 25 lbs)



Negative Feedback Loops

- Homeostasis is maintained by negative feedback loops
- **Negative Feedback Loops:** mechanisms that tell the body to stop what it is doing and return to the “set point” when conditions go outside the acceptable range.
 - EX) Thermostat in your house
 - Always has 2 different mechanisms, 1 for raising conditions and 1 for lowering conditions.

- If the temperature inside the house drops below the set point the thermostat turns on the furnace until set point is reached
- If the temperature rises above the set point, the thermostat turns on the air conditioner until the set point is reached.

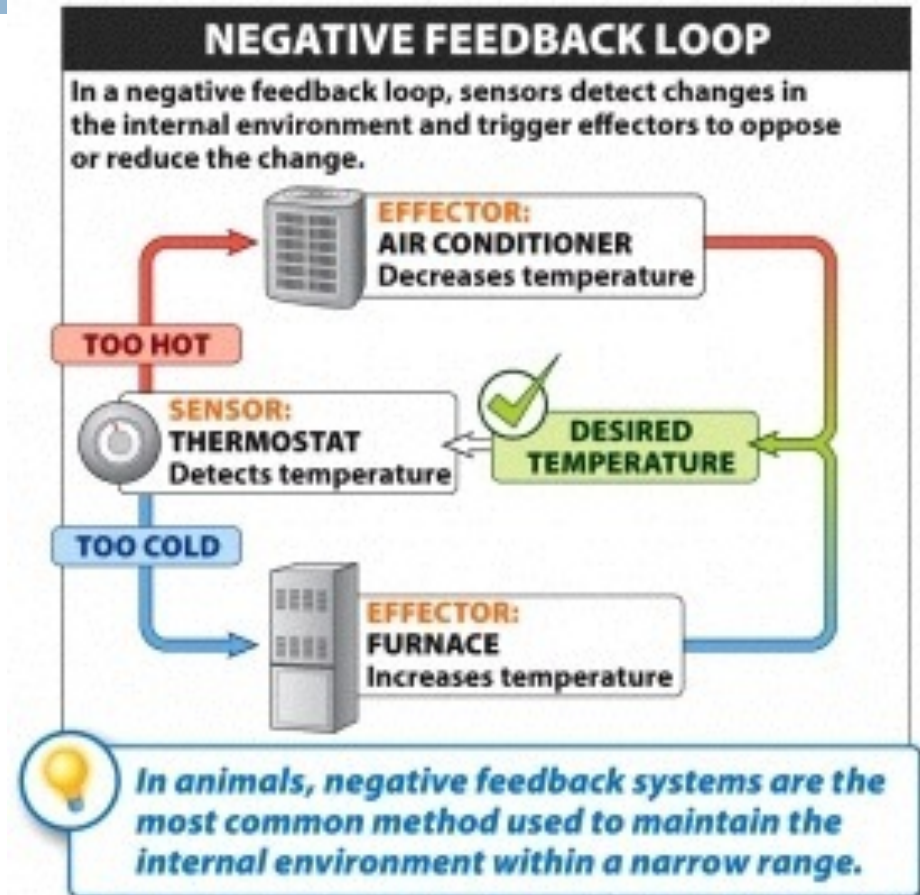


Figure 20-3
What Is Life? A Guide to Biology
© 2011 W.H. Freeman and Company

What it really means (in English!)

(DON'T COPY)

- The human body needs to maintain things like body temperature (98.6 F). If you get too hot or cold then your body will not thrive.
 - ▣ Too hot and your brain will overheat and “cook”
 - ▣ Too cold and your body’s systems will shut down



- Each system of the body contributes some aspect to maintaining homeostasis (stable internal balance)





NERVOUS SYSTEM

It is more than “the brain controls everything”!

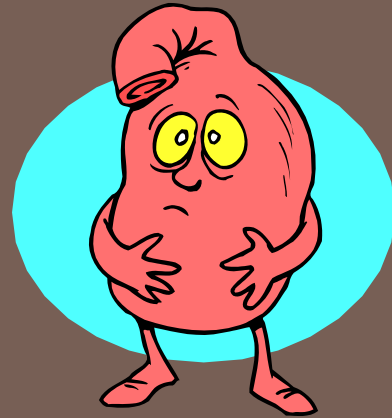
Nervous System

- Hypothalamus - controls body temperature with the following feedback loop:
 - ▣ Too low - causes shivering of muscles and reduced blood flow (blue skin) to create heat
 - ▣ Too hot - causes sweating and increased blood flow (red skin) to get rid of heat

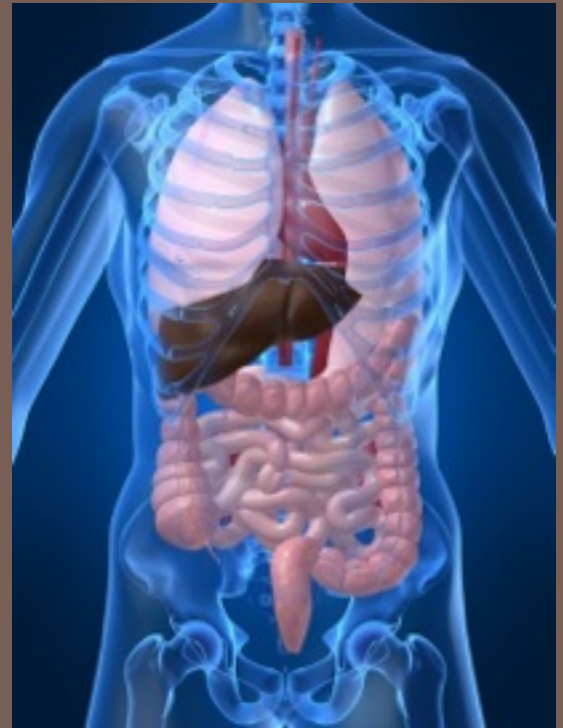


- Brain Stem - Controls heart rate with the following feedback loop:
 - ▣ Too low - increases nerve impulses to make heart beat faster
 - ▣ Too high - decreases nerve impulses to keep the heart rate at 80 beats per minute





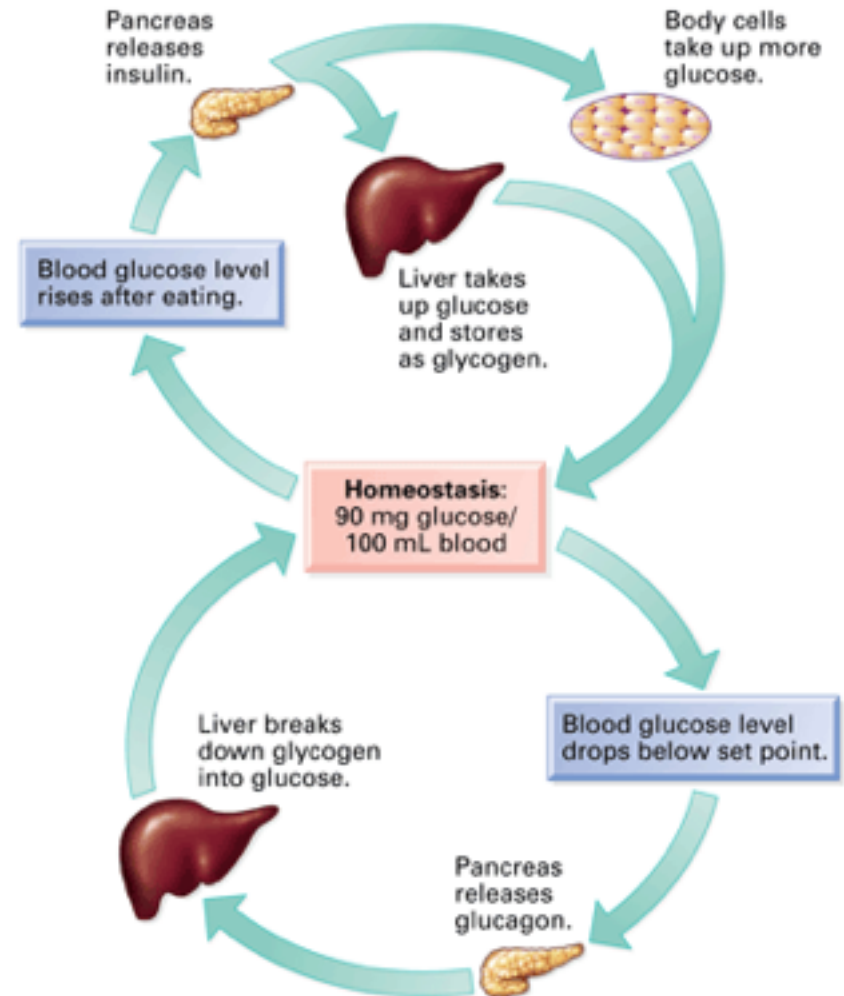
DIGESTIVE SYSTEM



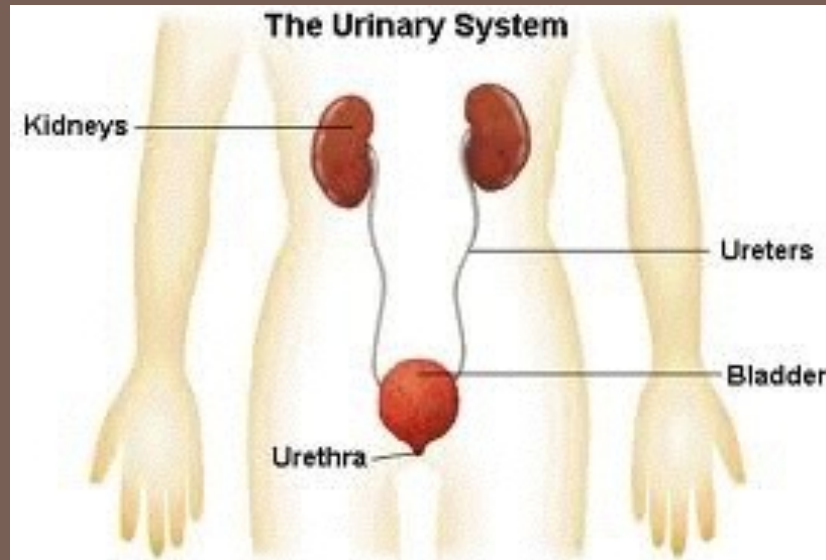
Doesn't just break down food so you can eat!

Digestive System

- Liver – Controls blood sugar level with the following feedback loop:
 - Too low - converts stored glycogen (glucose) into sugar
 - Too high - removes sugar from the blood and stores as glycogen



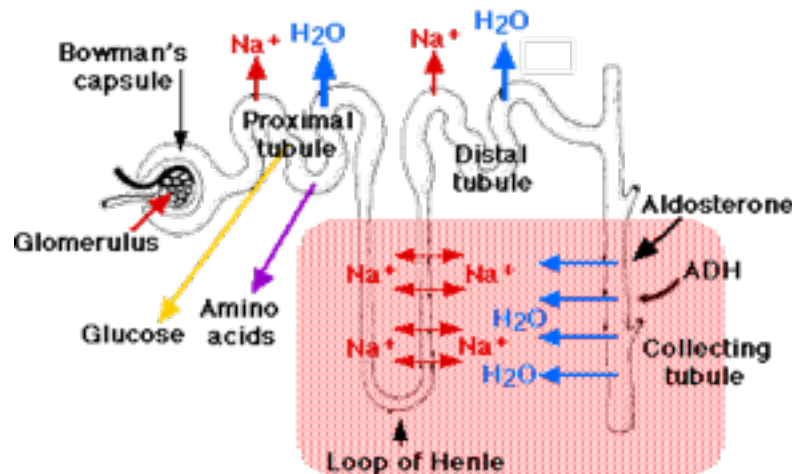
URINARY/EXCRETORY SYSTEM



Besides getting rid of wastes and filtering toxins out of the blood, it also.....

Urinary/Excretory System

- Kidneys - Controls amount of water and salt in body with the following feedback loop:
 - ▣ Too low - retains water/salt and keeps them from going to the bladder
 - ▣ Too high - pushes more water and salt into the bladder



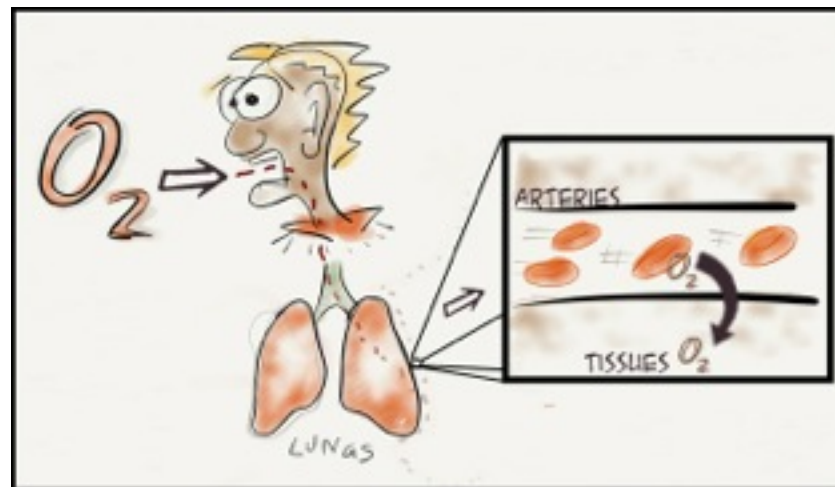


CIRCULATORY & RESPIRATORY SYSTEMS



Circulatory/Cardiovascular System

- Circulatory & Respiratory Systems – work together to maintain oxygen level
 - ▣ If oxygen too low – HR speeds up to take O_2 from the lungs to the tissues
 - ▣ If too high – HR slows down to decrease O_2 intake



Respiratory System

- Lungs - Controls blood pH, amount of carbon dioxide in blood using the following feedback loop:
 - ▣ If gets too low (acidic, pH below 7.4), gets rid of excess CO_2 (which caused the acid)
 - ▣ If gets too high (basic, pH above 7.4), retains more CO_2





Brainwork

Left page

- Answer the essential question(s)
- Pick one body system and construct a diagram showing the negative feedback loop in that system

Notes Summary

Right Page

Homeostasis is _____. The body maintains homeostasis by using _____ loops. The purpose of these loops is to _____. Examples of the conditions the body tries to keep stable include _____. If the body fails to maintain homeostasis, then _____.