



Osmoregulation & Excretion

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What is Osmoregulation?

Osmoregulation is the process by which animals control solute concentrations and water.

- Form of Homeostasis

Types!

- Pee
- Sweat
- Tears

Evolutionary Importance

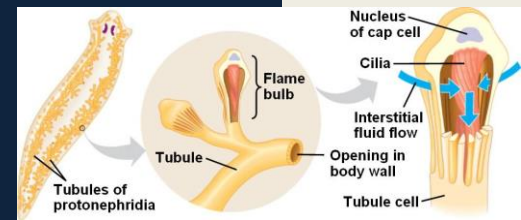
Osmoregulator- They control their

Osmoregulatory

Osmoconformer- They are isoosmotic with their surroundings

Animals that lay eggs can turn their waste into solutes to not hurt them

Excretory System



Protonephridia- a network of dead end tubules connected to external openings.

- occur in flatworms

Cilia attract water and solutes from the blood.

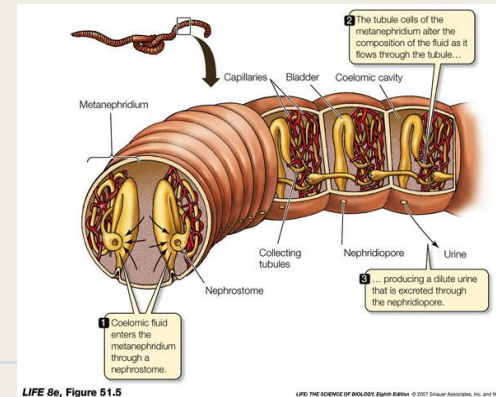
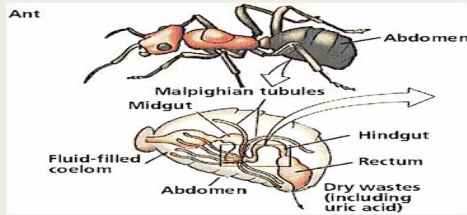
- then its excreted.
- low solute concentration.

Metanephridia- in excretory organs that open internally, cilia draw fluid into a collecting tubule, tubule opens to the outside (bladder).

- Found in earthworms

Malpighian tubules- way that arthropods excrete

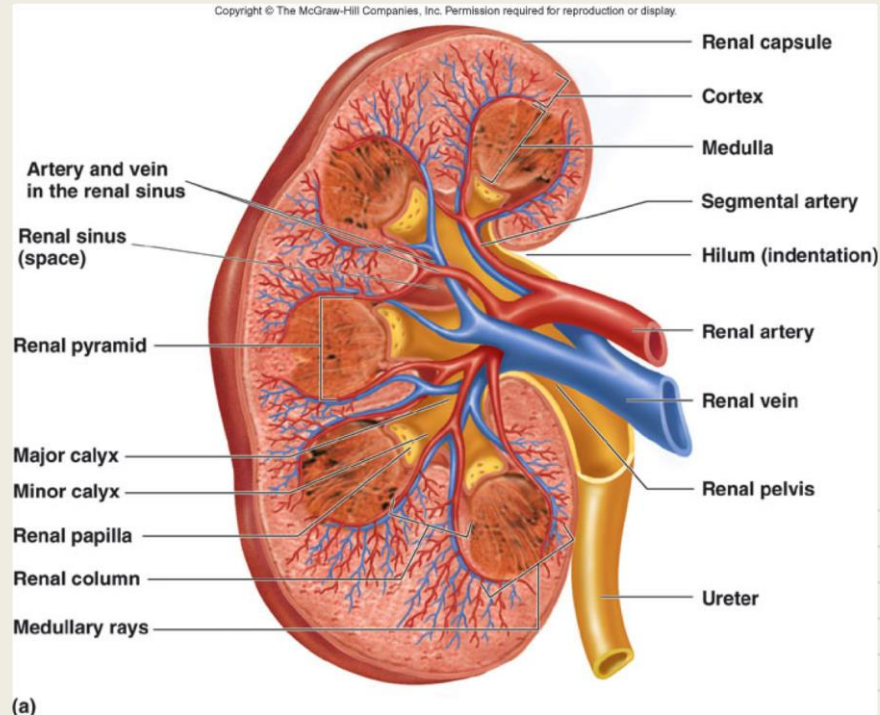
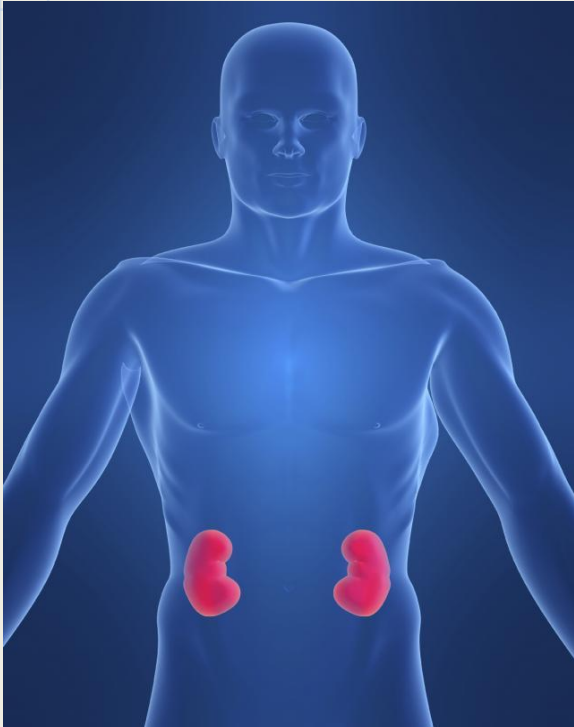
Kidneys- tubules carry urine out of the kidney to the bladder



LIFE 8e, Figure 51.5

Excretory System

Kidneys- Filters the blood, the waste is excreted



Kidneys Video

<http://youtu.be/apUeuBA8Rqk>

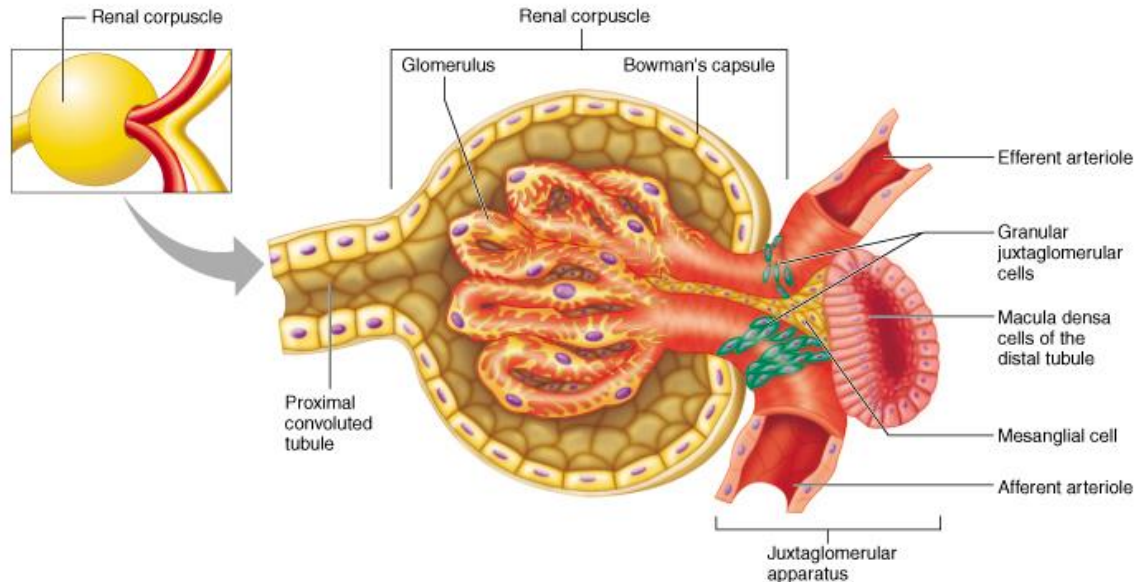
Bladder System

- The renal artery pumps blood through the kidneys
- The renal vein then drains the blood
- The Ureter is where the blood exits the kidney
 - Drains into the urinary bladder
- Exits through the urethra

Renin-Angiotensin-Aldosterone

-The RAAS involves a specialized tissue called the Juxtaglomerular apparatus (JGA), located near the afferent arteriole that supplies blood to the glomerulus.

-RAAS is a hormone system that regulates blood pressure and water balance



Diseases and Disorders

Kidney Cancer- cancer affecting your kidneys

Diabetes- can't produce your own insulin

Urinary Tract Infections- An infection in you're urinary tract

Antiphospholipid syndrome- your immune system attacks normal proteins in the blood, forms blood clots in the kidneys

Different types of Wastes

Ammonia- needs a lot of water, happens in aquatic creatures, toxic, excreted in large volumes

Urea- low toxicity, stored safely at high concentrations, little water loss, downside= costs a lot of energy to convert ammonia to urea

Uric Acid- in insects, reptiles, birds. non toxic, doesn't readily dissolve in water, semi solid paste excretion, very little water loss, requires more energy than urea

Energetics of Osmoregulation

- Osmoregulators expend energy to maintain osmotic gradients.
 - do this by active transport.
- If an animal has a very different osmoregularity than its surroundings, then it has to expend more energy.
- Osmolarity- the total solute concentration expressed as moles of solute per liter.

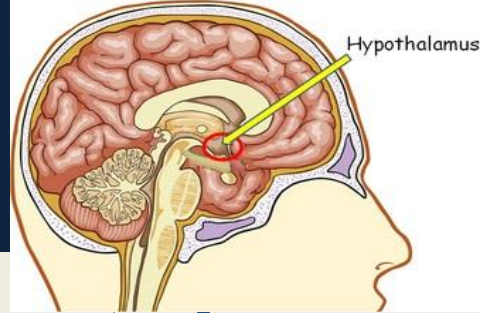
Transport Mechanisms

-Transport Epithelium- one or more layers of specialized epithelial cells that regulate solute movements, move specific solutes in controlled amounts in specific directions, usually arranged in complex tubular networks with extensive surface area.

Interdependence of the system with other body systems

- The kidneys rely on blood flow to remove waste
- The endocrine system is the major controller of the excretory system
- The circulatory system with blood helps move blood
- The urinary system relies on the digestive system to bring waste to excrete

Regulation Mechanisms



- The Hypothalamus monitors the amount of water in the body
- The Antidiuretic Hormone causes more water to be retained by the kidneys when water levels are low
- Aldosterone causes the retention of water in the body by increasing levels of sodium and potassium in the blood.

Urinalysis and Tests

- Its the analyzing of urine. It involves the examining the appearance, concentration, and content of urine
- 3 ways to analyze
 - Visual- simply looking at the urine
 - Dipstick test- Place a stick with chemical in the urine
 - Microscopic test- place it under a microscope



Osmoregulation and hormone control

- Antidiuretic Hormone- also called vasopressin and is produced in the Hypothalamus of the brain and stored in the posterior pituitary gland.
 - Osmoreceptor cells in the Hypothalamus monitor the osmolarity of blood and regulate the release of ADH to the posterior pituitary.
 - An increase in the osmolarity above 300 mOsm/L cause more ADH to be released into the blood stream
 - Eventually make the epithelium more permeable to water.

Thermoregulation

- Helps maintain core internal body temperature
- Endotherms- regulate own internal body temperature
- Ectotherms- Rely on the external environment to help with regulation of their own body

Citations- pictures

Hypothalamus picture-

<http://t0.gstatic.com/images?q=tbn:ANd9GcQDHCjHnb1Zq77R28KulB3bKZXaRhDW8hEpvLWZzOSBlmDIUnMO:brainmadesimple.com/uploads/7/8/8/5/7885523/1397040.jpg>

Urinalysis picture- http://t1.gstatic.com/images?q=tbn:ANd9GcT1gGtr1H_vxAipBGtCkcR9yW6ub8W9uGAIJL3jTAqcyPJuxszW:www.lifelearn-cliented.com/cms/resources/body/406/urinalysis-2.jpg

Juxtaglomerular apparatus- http://t1.gstatic.com/images?q=tbn:ANd9GcSxT_f8L0MXC-OsRT5KcZ_IVRaauVxYDGVouDwNsiMAkrx1tCnrw:apbrwww5.apsu.edu/thompsonj/Anatomy%2520%26%2520Physiology/2020/2020%2520Exam%2520Reviews/Exam%25204/JG%2520apparatus%2520diagram.jpg

Kidneys pictures-http://t1.gstatic.com/images?q=tbn:ANd9GcQww0FfpJOGWmxniuOeuz5ex1bChOnNjSgh2-Hh1nON8l-YHbQ:cdn.content.compendiumblog.com/uploads/user/3157f9c2-2ff9-4c34-a2d9-e574ae89a3ef/b812d970-5199-491b-ac32-8d4ab9382ac4/Image/4398f6c16d034ad72b84f433c6556fbd/istock_000003065800medium_w640.jpeg

Kidneys pictures- <https://classconnection.s3.amazonaws.com/544/flashcards/666544/png/kidney1322678111624.png>

Malpighian Tubules-

http://t2.gstatic.com/images?q=tbn:ANd9GcS4gSY1KqKdbVP1oKt9LhKJ_QjHtYEpMO0y2qNj5fPsfvcZJ1ME:sunny.moorparkcollege.edu/~econnolly/insectsF11_files/image014.gif

Protonephridia-

http://t1.gstatic.com/images?q=tbn:ANd9GcTwnFn_6S9hgn8tD2GD6g16nZjfsFYyAMw8psdYN07jtVkhTY9fFQ:bio1152.nicerweb.com/Locked/media/ch44/44_10Protonephridia_L.jpg

Metanephridia-

http://t0.gstatic.com/images?q=tbn:ANd9GcSKgRd8_zy2s0rbpzHMrEYt5FilZOlB5pIJyE2O4v5AVJ4UJSS:bcs.whfreeman.com/thelifewire8e/content/cat_010/f51005.jpg

Citations

Book

<http://www.healthline.com/health/thermoregulation#Overview1>

http://www.youtube.com/watch?v=_NO8n48AKJY&edufilter=kkHiX5SWPoV8aD8dgBdD5Q&safe=active