Excretory System

Function and Parts

Why is excretion necessary?

- In order for cells to stay alive, they must continually intake water and other molecules.
- The cells would continue to get bigger and bigger if they only took in molecules
- They must also export molecules
  - These molecules may be important signaling molecules such as hormones, or they may be molecules of glucose on their way to other cells, or they may be waste products of cellular metabolism that cells need to dispose.

Waste Products

- Carbon dioxide – a waste product of cellular respiration is dumped into the blood stream and eventually removed by the lungs
- Ammonia (NH_3) is removed through water
  - This waste comes from the cells breakdown of old proteins
  - It is also what makes bleach smell so in high concentrations it is poisonous to the cells and must be removed

Removal of Ammonia

- Once excreted into the blood stream by cells, it is carried to the liver where it is converted from ammonia into urea which is much less toxic
- It is then carried from the liver to the kidneys where it is removed

The Job of the Kidneys

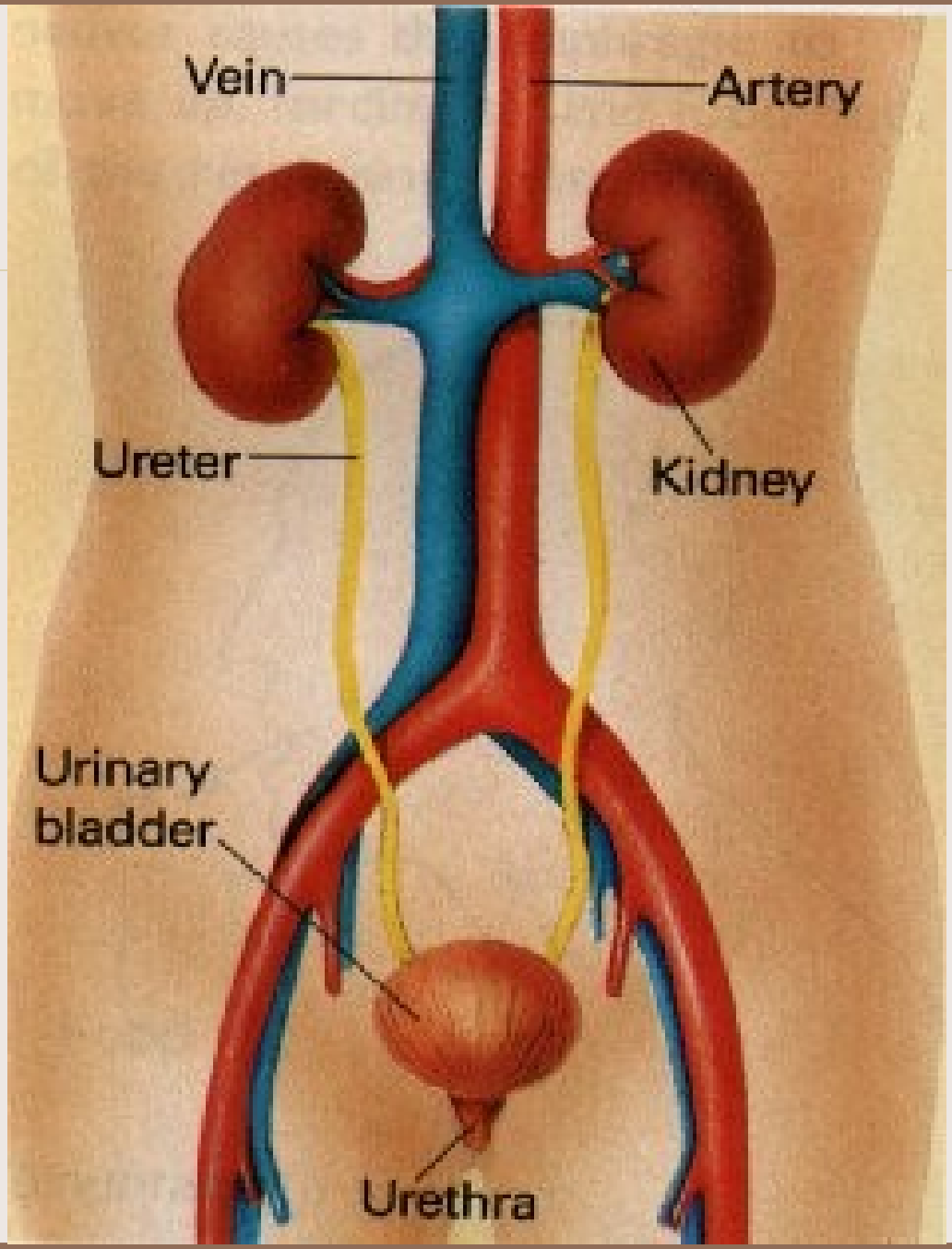
- They are responsible for cleaning the blood by removing metabolic wastes, excess solutes, and excess water and excreting them as urine
- Besides removing urea, it also removes excess salts or glucose, the remnants of drugs (reason for urine tests), and excess water.

Regulation of Water Levels

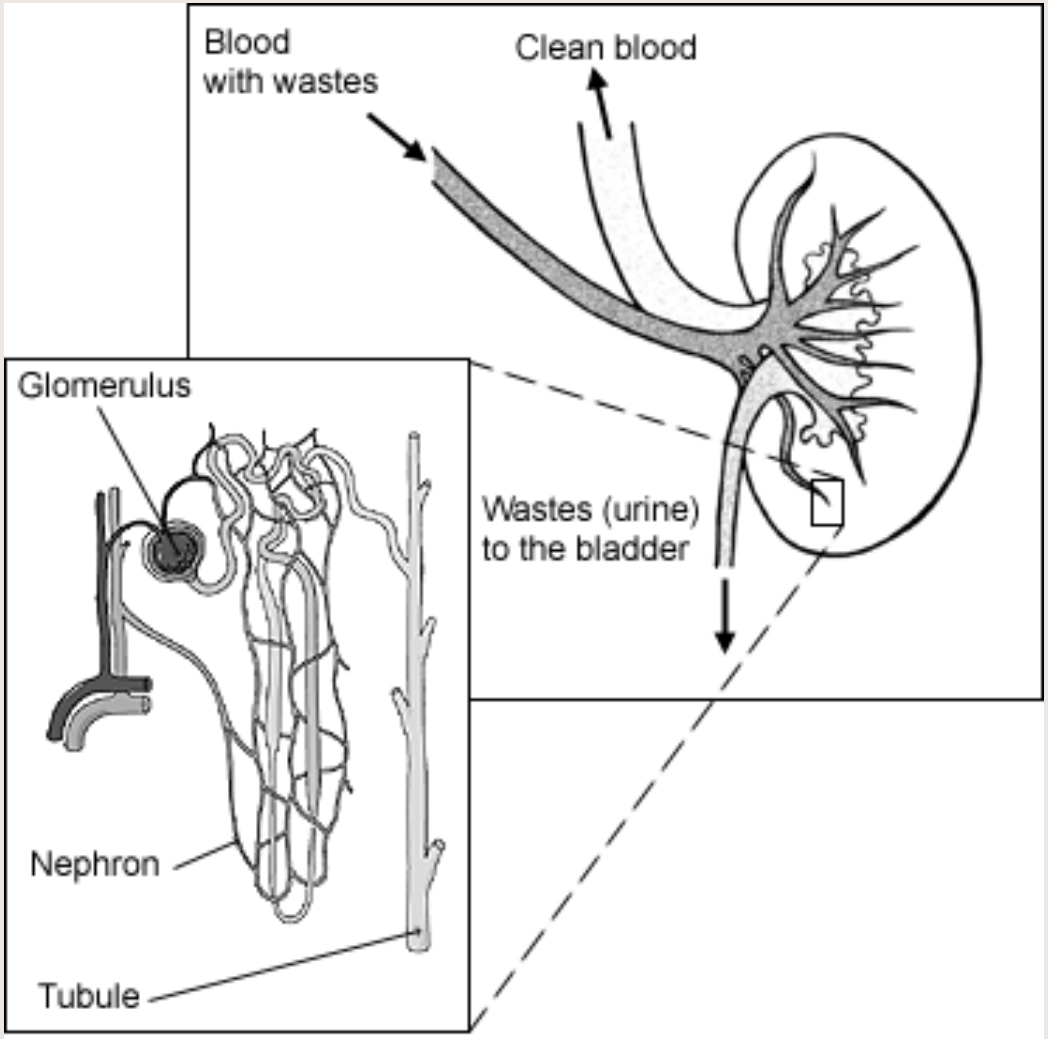
- If the blood becomes too dilute or too concentrated with solutes, then it can interfere with normal cellular activity.
- The kidneys are able to regulate water concentration in the blood by removing excess water if the blood is too dilute or conserving water in the blood if it is not dilute enough

The Hard-working Kidneys

- The two kidneys in the body receive between 1100 – 2000 liters (1160 – 2100 quarts or 500 gallons) of blood per day – about the volume of a car!
- Because the body has only about 5.6 liters of blood, your blood runs through the kidneys to be cleaned about once every four minutes.


Vein
Artery
Ureter
Kidney
Urinary bladder
Urethra

The Kidney


Blood
with wastes
Clean blood
Glomerulus
Wastes (urine)
to the bladder
Nephron
Tubule

Formation of Urine

- If there is too much water in the blood, then it is removed and put in urine.
- If there is not enough water in the blood, the kidneys will not remove it.
- If there is too much urea or other solutes in the blood, the kidneys will remove these excess solutes.
- By regulating solute numbers and water volume, the kidneys normally maintain homeostasis in blood solute concentration.

Factors that affect kidney function

- Antidiuretic hormone (ADH) – prevents excess water loss from kidneys
- Alcohol – inhibits secretion of ADH = more urine volume
- Aldosterone – prevents excess loss of sodium and water from kidneys
- Caffeine – increases rate of salt and water loss from kidneys
- Increased blood pressure – increase rate of water loss from kidneys.