Biology 20 - Human Systems - The Excretory System - Lesson 1 - Anatomy of the Urinary System

- Excretion rids the body of wastes produced by the cells of the body

- organs involved in excretion of wastes:

Skin -

- sweat glands secrete perspiration
- perspiration is water, salt and **urea**
- Main purpose of sweating is **temperature regulation**, not waste excretion

Liver -

- Excretes bile created from hemoglobin breakdown
- **Deamination** - removal of an amino group from an organic compound (e.g. amino acids, nucleic acids)

protein

- Occurs when proteins are broken down
- ammonia (extremely toxic) produced from deamination is combined to make **urea** (not as toxic)
- Breaks down nucleic acids to produce **uric acid**
- Urea and uric acid are removed from the blood in the kidney and form urine

Lungs -

- Excrete **CO_2**

Large Intestine -

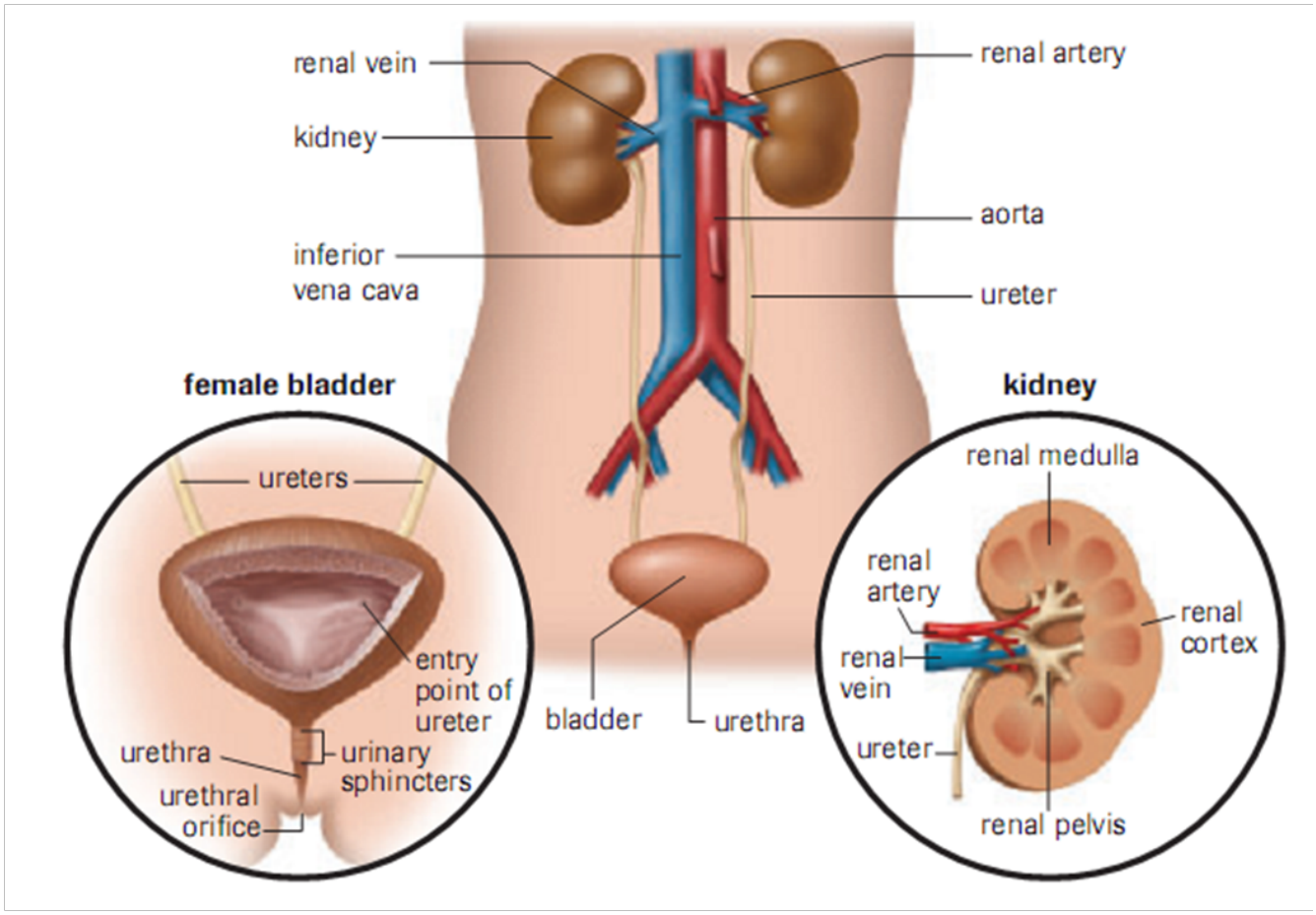
- Excretes non digestible products of the digestive system

- The **Urinary System** is the main system that excretes waste from our body

Anatomy of the Urinary System

- Kidneys are the major part of the urinary system
- The word **renal** refers to kidneys
- Produce urine which contains nitrogenous wastes, keeps water/salt balance and pH in a normal range
- 95% of urine is water and 5% dissolved solids (urea and salt)
- Urine is produced in **kidneys**
  - We have **2** kidneys, which are about the size of a **fist**.
  - Located on either side of the spine below the diaphragm
  - Kidneys have **3** regions
    a. Renal cortex - **outer layer made of connective tissue**
    b. Renal medulla - **middle layer of kidney**
    c. Renal pelvis - **central space where the urine drains into**
  - Fed by **renal artery**; branch off of **aorta**.
  - **Renal vein** leaves kidneys and enter the **inferior vena cava**.
  - Each kidney is made up of a million **nephrons** (tubes) where urine is produced
- **Ureters** are muscular tubes which carries urine from kidneys to the **bladder**.
  - Moves urine by **peristalsis**
  - five jets of urine into bladder per minute
- Urinary bladder is a hollow, muscular organ that expands as urine enters
  - can hold **600 ml** of urine
  - 2 **sphincters** control urine exit from bladder
  - when the bladder fills stretch receptors send messages to the spinal cord
  - spinal cord sends nerve impulses to bladder to contract and sphincters to relax
- urethra carries urine from bladder to external opening
  - differs in length between males (20cm) and females (4cm)
  - This is the reason females are more prone to getting bladder infections

http://www.nelson.com/ABbio20-30/teacher/protect/otr/Bio2030OTR/attachments/i_AnimationSimulation/urinary_system.html



Nephrons

- Nephrons are the functional unit of the kidney
- There are approx. 1 million in each kidney
- Each nephron is fed by a small **afferent** arteriole which branches off the renal artery
- The afferent arterioles branch into a capillary bed, called the **glomerulus**
- The glomerulus is surrounded by a funnel-like part of the nephron called the **Bowman's capsule**.
- The capsule tapers to a thin tubule, called the **proximal tubule**
- Urine is carried from the proximal tubule to the **loop of Henle**
- Urine moves through the **distal tubule** and then into the collecting ducts
- the **collecting ducts** collect urine from many nephrons that merge in the pelvis of the kidney
- The collecting ducts drain into the **ureters**