PEER Life Science Organ Systems Detoxification Notes Outline

**What We Know**

* Many products of bodily metabolism are \_\_\_\_\_\_\_ products that the body does not need or cannot use.
* The three organ systems that indirectly help to remove toxins from the body are:
  + \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ - removes toxic gases and volatile chemicals from the body
  + \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ - can remove toxins through sweating
  + \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ - eliminates toxins taken in by eating or drinking through feces
* The two organs with the biggest roles in detoxification are the \_\_\_\_\_\_\_ and \_\_\_\_\_\_\_\_\_
* Liver
  + The liver is unique because blood flows \_\_\_\_\_\_the organ from the gut.
  + The two steps that the liver takes to detoxification are
    - When \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ engulf/eat sludge trapped in the small spaces between cells
    - When Kupffer cells add materials to a chemical to make it non-harmful, a process called \_\_\_\_\_\_\_\_\_\_\_\_\_
* Kidneys
  + Blood goes from the liver to the heart and then to the \_\_\_\_\_\_\_\_\_.
  + Kidneys regulate the balance of \_\_\_\_\_\_\_, \_\_\_\_\_\_\_\_\_\_, and \_\_\_\_\_\_\_ in the body
  + About \_\_\_\_\_ liters of blood are pumped through the kidney every day.
  + Blood flows into the kidney through the \_\_\_\_\_\_\_\_\_\_\_\_\_\_ and leaves through the \_\_\_\_\_\_\_\_\_\_\_\_.
  + Each filtering unit in the kidney is called a \_\_\_\_\_\_\_\_\_.
  + The \_\_\_\_\_\_\_\_\_\_\_\_\_\_ is a cluster of small blood vessels that allow small molecules of waste and fluid pass through them into the tubule.
  + Water, minerals, and nutrients are \_\_\_\_\_\_\_\_\_\_\_\_ from the tubule into the blood.
  + Urine travels from the kidney through the \_\_\_\_\_\_\_\_to the \_\_\_\_\_\_\_ where it is stored. Then when urine is ready to leave the body, it exits through the \_\_\_\_\_\_\_\_\_.

**How We Know**

* Kidney Function
  + Medical technicians examine urine through a procedure called \_\_\_\_\_\_\_\_\_\_\_\_\_\_ to look for any abnormalities. Diseases that can be detected by this method include:
    - \_\_\_\_\_\_\_\_\_\_
    - \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
    - \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
  + The three ways we analyze urine are:
    - \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_: check for amount, color, clarity
    - \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_: check for acidity, density, amount of protein, glucose, ketones, nitrites, and white blood cells.
    - \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_: check for crystals, squamous cells, bacteria, and other large objects
  + A small amount of urine could indicate that the kidneys (are/are not) filtering blood well.
  + The presence of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ in urine could indicate infection of the kidneys, bladder, or other parts of the urinary tract.
* Liver Function
  + We can tell a lot about the liver by observing it:
    - Large \_\_\_\_\_\_\_ come into the liver from the gut
    - Blood flows past single rows of liver cells
    - The path of flow exposes blood to many \_\_\_\_\_\_\_\_\_\_\_\_ cells
  + We can also tell a lot about the liver by seeing how the chemical contents of blood change between entering and exiting the liver. The liver:
    - Makes \_\_\_\_\_\_, a protein waste product
    - Makes \_\_\_\_\_\_, which is released to from the gallbladder and makes fat easier to digest in the intestines
    - Removes low density lipids and adds high density lipids to blood, protecting against \_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
    - Converts and \_\_\_\_\_\_\_\_\_\_\_\_ many drugs and toxins
  + A symptom of poor liver function is yellowing of the skin and eyes, called \_\_\_\_\_\_\_\_\_\_, as well as prolonged bleeding, and swelling and hardening of the liver.
  + The most common causes of liver damage are \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ and \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Common Hazards**

* \_\_\_\_\_\_\_\_\_\_\_ is irritation/inflammation of the liver and can end up resulting in the death of liver cells and eventual replacement with scar tissue (\_\_\_\_\_\_\_\_\_\_\_).
  + Causes of hepatitis include
    - Excessive \_\_\_\_\_\_ or \_\_\_\_\_\_\_\_\_ consumption
    - Viruses
    - Our own \_\_\_\_\_\_\_ system
  + There are six different hepatitis viruses.
    - Hepatitis A - (does/does not) have a vaccine. Spread by \_\_\_\_\_\_\_ of infected person.
    - Hepatitis B - (does/does not) have a vaccine. Spread by \_\_\_\_\_\_\_ and \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ from infected person.
    - Hepatitis C - (does/does not) have a vaccine. Spread by \_\_\_\_\_\_\_ and \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ from infected person.
    - Hepatitis D - (does/does not) have a vaccine. Spread by \_\_\_\_\_\_\_ and \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ from infected person. Only occurs in presence of Hepatitis \_\_ infection
    - Hepatitis E - (does/does not) have a vaccine. Spread by \_\_\_\_\_\_\_ of infected person.
* Heavy metals like \_\_\_\_\_\_\_\_\_, \_\_\_\_\_\_\_\_\_, \_\_\_\_\_\_, and \_\_\_\_\_\_\_\_\_\_ are toxic to the kidneys and cause damage to the liver.
  + Lead
    - List 4 sources of lead exposure:
      * \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
      * \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
      * \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
      * \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
    - \_\_\_\_\_\_\_\_\_\_ are most susceptible to the effects of lead.
  + Mercury
    - The kidneys \_\_\_\_\_\_\_\_\_\_\_\_\_ mercury
    - Mercury \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ in food chains (it accumulates in organisms that eat other organisms that contain mercury). For example, eating large quantities of contaminated fish or shellfish can lead to mercury toxicity.
  + Cadmium
    - Cadmium damages kidney \_\_\_\_\_\_\_\_\_ (also causes \_\_\_\_\_\_\_\_ and \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ loss)
    - Cadmium reacts with \_\_\_\_\_\_\_\_\_\_ and accumulates in the kidneys.
  + Chromium
    - Chromium-\_\_ is an essential dietary requirement for humans, and is found in vegetables, fruits, meats, grains, and yeast
    - Chromium-\_\_ is toxic and can be found in the environment but is also produced by \_\_\_\_\_\_\_\_\_\_\_\_ processes.
    - Chromium is \_\_\_\_\_\_\_\_\_\_\_\_ by tubule cells and becomes very \_\_\_\_\_\_\_\_\_\_\_\_\_\_. It can also become corrosive and cause kidney failure.
* Free Radicals
  + Name 3 external sources of free radicals
    - \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
    - \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
    - \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
  + Free radicals can be both \_\_\_\_\_\_\_ and \_\_\_\_\_\_\_\_\_\_\_\_
  + At excessive levels, free radicals can damage cell parts like the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ and \_\_\_\_\_.