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 \_\_\_\_\_.