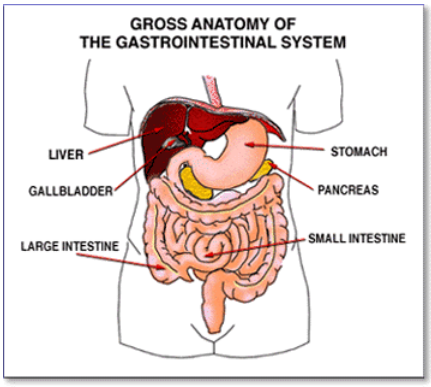
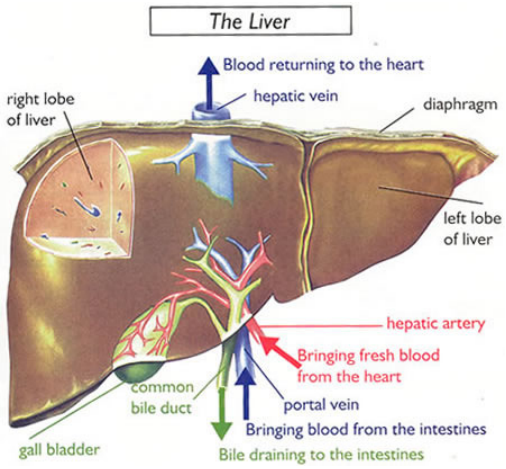
**What processes does the liver undergo to remove toxins?**

The liver is the largest gland in the body and is located in the upper right quadrant of the abdomen. The liver is an important organ that performs many functions necessary for survival. The liver breaks nutrients down and builds up body tissue. The liver also acts as a storage site for vitamins and minerals. Red blood cells and Kupffer cells are produced in the liver, the Kupffer cells help to eliminate harmful micro-organisms as they travel through the blood to help fight infection. Glycogen is produced in the liver and is regulated throughout the body. The liver is vital when it comes to metabolic processes and how it affects other organs and the body, including hormonal concentration levels and **disposal of toxins**.




Detoxification process:

The liver is one of the four major organs that eliminate toxins from the body. The other three organs involved are the kidneys, intestinal tract and skin. The liver detoxifies harmful substances whether they come from internal sources such as burning sugars, fats, protein, or from external sources like medications, drugs, hormone enhancers, food additives, preservatives, food colorings, sweeteners, flavor enhancers, chemicals used in agriculture, alcohols, volatile organic compounds, fumes, air pollution and many other factors. Many of the toxins that enter the body are fat soluble which means they dissolve only in fatty or oily solutions and not it water. They all must travel through the body and the first step in the detoxification process they will encounter is the liver. The liver has to convert fat soluble toxins into water soluble substances that can be excreted from the body.




The liver plays several roles in detoxification: it filters the blood to remove large toxins, synthesizes and gets rid of bile full of cholesterol and other fat-soluble toxins, and the live enzymatically eliminates unwanted chemicals. The enzymatic process to dispose of toxins occurs in two phases: phase 1 (Oxidations) and phase 2

(Conjugation). Phase 1 neutralizes the toxin or changes the toxic chemical to form activated intermediates which will then be neutralized by phase 2 of the enzyme system. This pathway converts a toxic chemical into a less harmful chemical and is achieved by oxidation, reduction and hydrolysis reactions. During this process, free radicals are produced and if there are too many it can damage the liver cells. With the help of antioxidant, it reduces the damage caused by free radicals. One important antioxidant for neutralizing the free radicals produced in phase 1 is glutathione (GHS) is oxidized to glutathione disulfide (GSSG). This antioxidant is required for one of the key phase 2 processes. When so many free radicals are produced from phase 1, the glutathione stops producing oxidative stress or liver damage. The toxins are then transformed into activated intermediates; therefore the rate at which phase 1 produces activated intermediates must be balanced by the rate at which phase 2 finishes their processing. Phase 2 is called the conjugation pathway because the liver cells add another substance such as cysteine, glycine, or a sulphur molecule to a toxic chemical to make it less harmful. As a result it makes the toxin water-soluble so that it may then be excreted from the body via watery fluids such as bile or urine. There are six phase 2 detoxification pathways:

1.Glutathione conjugation

2. Amino acid conjugation

3. Sulfation

4. Acetylation

5. Glucuronidation

These conjugation molecules join with specific enzymes to catalyze the reaction process. The liver is then able to turn drugs, hormones, and other various toxins into substances that are secreted from the body.

| ***Evaluation of the traits*** | |
|---|---|
| T*he **Focus** of this work is "Emerging"* | The author stays focused on the main topic but doesn't develop any of the sub-themes to support the main theme. Specifically, there should be more information about the 3 other organs involved in detoxification as well as the types of oxidation and conjugation reactions. She also got side tracked on the discussion of glutathione without having it really support the idea of how the liver detoxifies substances. |
| *The **Organization** of this work "Effective"* | There is a solid logical organization to the paper that works well. The second paragraph is a good example of the logical progression among topics within a paragraph. Nevertheless,the last paragraph has problems with the discussion wandering from Phase1 to Phase 2 reactions and back again. |
| *The **Voice** of this work "Developing"* | The voice in this paper is strong in that it uses a variety of sentence structures and the statements easily convey their meaning. Word choices are also appropriate for this level of writing |
| T*he **Convention** of this work is "Developing"* | Two major problems with the convention in this paper; the inappropriate use of figures and the punctuation errors. As for the figures, they are not discussed in the text and therefore serve no real purpose other than to take up space. Also, their sources are not cited and constitute an example of plagiarism. It is also apparent that the understanding of the antioxidant role of glutathione is not well understood. Mechanically, there are numerous punctuation errors that should have been corrected. |