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## The Liver and Oxidative Stress

Our liver is capable of performing over 500 different functions and is made up of millions of tiny cells called hepatocytes. These hepatocytes contain abundant mitochondria and require a constant supply of oxygen and energy to function properly. They are also vulnerable to oxidative stress. Fortunately, our liver is capable of self-regeneration; however, this process can be overwhelmed if free radical attack is constant or if viruses inflict severe damage. MitoQ is a targeted antioxidant that works directly inside mitochondria to neutralise free radical production. When taken in conjunction with a healthy diet and exercise, MitoQ can help reduce oxidative stress.

Our liver is the largest internal gland in our body. Shaped like a cone, it is located beneath our diaphragm and sits on top of our stomach, right kidney and intestines. It consists of four lobes of unequal shape which are made up of thousands of lobules. Lobules are small - roughly 2mm in size- and contain millions of hepatic cells called hepatocytes. Hepatocytes are a hexagonal shape and fit together like a honey comb. They are the workhorse of the liver and each one is capable of producing bile to aid digestion, and detoxifying, metabolising, and synthesising a variety of crucial substances. In fact, the liver takes part in over 500 separate bodily functions. How's that for multitasking!

The liver receives a dual blood supply. The portal vein conducts oxygen-depleted blood from the stomach, intestines, spleen, gallbladder and pancreas to the liver. This blood is rich in nutrients and noxious materials absorbed in the intestine; blood cells and their breakdown products from the spleen; and hormones secreted by the pancreas. Oxygenrich blood is supplied to the liver from the hepatic artery.

In addition to oxygen, hepatocytes require a lot of energy to perform their many and varied functions, so it is no surprise that they contain abundant mitochondria. Mitochondria are responsible for the production of adenosine triphosphate or ATP which is the main form of energy used by our cells. The production of ATP also results in the formation of by products such as free radicals. Free radicals are also produced by our immune system in response to infection, irritation, and allergy. The metabolism of alcohol and many medicines also generates free radicals. Usually, these free radicals are neutralised by our

own body's production of antioxidants, such as coenzyme Q10 (CoQ10). Oxidative stress occurs when our own supply of antioxidants is unable to keep up with the numbers of free radicals being produced. Oxidative stress is associated with a number of different degenerative disease states, including liver disease.

Fortunately our liver has the capacity to regenerate. Symptoms of liver damage are usually not apparent until extensive, irreversible damage has been done. This may take many years or it may only take several months if damage is caused by viruses such as hepatitis that directly attack the liver.

The key to helping prevent long-term damage and to encourage liver rejuvenation is to decrease oxidative stress. We can do this by eating nutritious fresh vegetables and fruits, limiting our intake of processed and fried food, exercising, avoiding toxic substances such as cigarette smoke, and by taking a supplemental antioxidant such as MitoQ.

Research supports taking MitoQ in conjunction with a healthy diet and exercise to reduce oxidative stress. So take MitoQ today. Your liver will thank you for it!

Always read the label and use as directed. If symptoms persist see your healthcare professional.

## **Bibliography**

Liver functions <http://www.hepatitiscnewdrugresearch.com/your-liver-functions.html> Liver. Healthline Body maps. <http://www.healthline.com/human-body-maps/liver#1/10> !

Portal vein <http://www.britannica.com/EBchecked/topic/471037/portal-vein>

Smith R, Hartley R, Cocheme H, Murphy M. Mitochondrial pharmacology. Trends in Pharmacological Sciences 2012;33(6):341-352

Smith R, Murphy M. Animal and human studies with the mitochondria-targeted antioxidant MitoQ. Annals of the New York Academy of Sciences 2010;1201:96-103

The Liver. Histology. [www.courseweb.uottawa.ca/medicine-histology/english/gastrointestinal/Liver.htm](http://www.courseweb.uottawa.ca/medicine-histology/english/gastrointestinal/Liver.htm)

The Liver. Anatomy and functions. Ohio State University. Wexner medical Center. [http://medicalcenter.osu.edu/patientcare/healthcare\\_services/liver\\_biliary\\_pancreatic\\_disease/liver\\_anatomy\\_function/Pages/index.aspx](http://medicalcenter.osu.edu/patientcare/healthcare_services/liver_biliary_pancreatic_disease/liver_anatomy_function/Pages/index.aspx)