

Understanding Your Liver Health

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STORY AT-A-GLANCE

- Your liver weighs about 3 pounds, filters all of your blood each day, and when healthy is the only organ capable of regenerating; the liver performs nearly 500 functions, including regulating your cholesterol levels
- Three primary liver enzymes, AST, ALT and GGT, offer insight in the health of your liver; GGT is correlated with iron toxicity, increased disease risk and overall mortality, and has become a central factor in the life insurance underwriting process
- While iron is necessary for biological functioning, overload significantly damages your liver and may lead to heart disease, diabetes, cancer and neurodegenerative diseases
- Strategies to normalize your liver function include reducing your carbohydrate intake, balancing your omega-6 to omega-3 ratio, exercising, avoiding medications metabolized in the liver and optimizing your gut microbiome

Your liver weighs about 3 pounds and is located on the right side of your abdomen. Reddish brown in color, it's rubbery to the touch and protected by your rib cage.¹ Your liver is the largest solid organ and one of the largest glands in your body, carrying out over 500 essential tasks to maintain optimal health.²

One of the main jobs of the organ is to process and purify blood coming from the hepatic artery and the hepatic portal vein. The liver has two main lobes, each of which have eight segments.³ Each segment is made up of approximately 1,000 lobules connected by small ducts that eventually come together to form the common hepatic duct.⁴

In addition to filtering your blood, the liver regulates many chemical levels and excretes bile your intestines use to help break down fat.⁵ Your liver also produces cholesterol, stores and releases glucose as needed, and regulates blood clotting. As your liver metabolizes chemicals or breaks down harmful substances, they are released into the bile or blood.

Bile enters your intestines and ultimately leaves your body in stool, while blood by-products are filtered out by your kidneys and leave through your urine. Your body stores vitamins A, D, E, K and B12 in the liver,⁶ and the liver functions as part of the phagocyte system, a portion of the **immunological function** of your body.⁷

In other words, your liver is highly important to your health. It is also the only organ in your body able to regenerate.⁸ In mice, if two-thirds of the liver is removed, the tissue regrows to its normal size within seven days. In humans, as long as 25 percent of healthy tissue remains, it regrows without any loss of function in approximately 15 days.

What Do Your Liver Enzymes Tell You?

Although most health practitioners rely on reference ranges provided by a laboratory or defined by their hospital facility, there is an evidence-based set of optimal ranges that more readily predict underlying pathology. Dr. Brian Walsh is a naturopathic physician who has extensive training in molecular biological pathways.

In an interview posted in my previous article, "[What Basic Blood Tests Can Tell You About Your Health](#)," one topic we discussed were two of the tests commonly used to evaluate liver function — the liver enzymes aspartate aminotransferase (AST) and alanine aminotransferase (ALT). The laboratory value ranges for the high end for AST is 40 units per liter (U/L) and 56 U/L for ALT.⁹

However, Walsh believes the medical literature¹⁰ "very clearly show that, a) men and women should have different AST and ALT reference ranges, and b) [the ideal range] is not much above 20 U/L."

These two specific enzymes are found mainly in your liver. They are elevated when there is a form of liver damage or injury. A sudden acute jump may indicate injury to the liver, while chronically elevated levels may suggest ongoing damage.

Some of the more common diseases triggering elevated ALT and AST are viral hepatitis A, B or C, cirrhosis of the liver, alcoholic fatty liver disease, hemochromatosis (iron overload) or diminished blood flow from shock or heart failure.¹¹

Another measurement important in the prediction of mortality is gamma-glutamyl transferase (GGT). This liver enzyme is correlated with iron toxicity, increased disease risk and all-cause mortality.¹² In an interview with Gerry Koenig, chairman of the board at the Iron Disorders Institute,¹³ we discuss the [importance of GGT](#) and its involvement in glutathione metabolism and transport of amino acids.

GGT is an important measurement of liver damage, potentially greater than AST or ALT, and may also be used as a biomarker for excess iron and early death. Determining mortality risk is a chief responsibility of insurance underwriters who use laboratory values and biomarkers to assign risk scores.

Liver function tests, particularly GGT, have become a central factor in the life insurance underwriting process.¹⁴ GGT is necessary in the production of your body's primary antioxidant, glutathione. When elevated, it breaks glutathione down.¹⁵

Researchers have also found variations in enzyme levels are inheritable and may change by age and sex. To examine the genetic architecture, researchers sampled twins, their siblings, parents and spouses, and found the same genes influence liver enzymes, but the relative contribution to the variation differs in males and females.¹⁶

The Importance of Monitoring Your Iron Levels for Liver Health

Another factor associated with liver damage is iron overload. Iron is one of the most common nutritional supplements used today, as you may find it isolated, added to multivitamins and in fortified processed foods. While it's necessary for biological function, too much may do tremendous damage.

In fact, iron overload may be a more common problem, and far more dangerous, than iron deficiency anemia.¹⁷ Nearly all adult men and postmenopausal women are at risk for iron overload as there is no clear efficient iron excretion method. In other words, these populations do not lose blood on a regular basis.

Blood loss is the primary way to lower excess iron. If excess iron is left untreated it may contribute to cancer, **heart disease**, **diabetes** and **neurodegenerative diseases**.¹⁸ Iron triggers damage by catalyzing a reaction with hydrogen peroxide within the mitochondrial membrane, forming hydroxyl free radicals.

These are among the most damaging free radicals and cause severe mitochondrial dysfunction.¹⁹ This in turn is at the heart of many chronic degenerative diseases.

GGT may also be used as a screening marker for excess free iron,²⁰ as it is highly interactive with iron and will tend to raise GGT levels. When your serum ferritin and GGT are high, you have a significantly increased risk of chronic health problems.

Balance Your Omega-3 and Omega-6 Fats for Optimal Liver Function

The American Liver Foundation estimates nearly 25 percent of adults in the U.S. are affected by **nonalcoholic fatty liver disease** (NAFLD). The condition is associated with serious risks as it may cause the liver to swell (steatohepatitis) and may lead to liver cancer or liver failure.²¹

It often has no symptoms but may be suspected if you suffer from other associated conditions and your blood tests have high levels of liver enzymes. Progression from NAFLD to nonalcoholic steatohepatitis (NASH) is one of the leading causes of cirrhosis in adults in the U.S.²²

Excess amounts of omega-6 fatty acids are challenging to the liver.²³ Although both omega-3 and omega-6 are necessary for good health, dietary changes over the past several decades have increased the ratio of omega-6 to omega-3 up to 25-to-1, well above a healthier 5-to-1 ratio, or the 1-to-1 ratio recommended by some experts.²⁴

Experimental studies have suggested this divergence increases your body's ability to gain fat and, more importantly, increase systemic inflammation. Additionally, the lopsided ratio plays a role in the development of **obesity** through an increased activity of the cannabinoid system and AA eicosanoid metabolites.²⁵

Researchers have found this process may be reversed by increasing eicosapentaenoic acid (EPA) and docosahexaenoic acid (DHA), both components of marine-based omega-3 fat. Research has also found excessive amounts of damaged omega-6 are associated with inflammatory diseases such as NAFLD, cardiovascular disease, inflammatory bowel disease and Alzheimer's disease.²⁶

The primary therapeutic action of marine-based omega-3 is reducing inflammation, while omega-6 is needed to initiate the inflammatory response.²⁷ When the ratio is unbalanced in favor of omega-6, it increases the rate of inflammation. Other health benefits associated with a **healthy omega-3 to omega-6 ratio** include balancing low-density lipoprotein cholesterol and triglyceride levels,²⁸ reducing blood pressure²⁹ and preventing atherosclerosis.³⁰

In addition to reducing the risk of obesity and inflammation, balancing your omega-3 fatty acids against your omega-6 intake can also help reduce your GGT level,³¹ improve liver fat, reduce triglycerides and improve HDL levels in those with NAFLD or NASH, both inflammatory processes not triggered by alcohol intake.

Cholesterol Profile Reveals Challenges With Insulin Sensitivity

Your liver is responsible for cholesterol regulation, as it not only synthesizes cholesterol but also removes it from your body, converting it to bile salts to be eliminated in your feces.³²

When damaged, your liver is unable to regulate cholesterol levels normally.³³ This may result in atherogenic dyslipidemia, or elevated levels of triglycerides and LDL, with low levels of high-density lipoprotein (HDL) — levels commonly associated with the development of atherosclerosis plaques and heart disease.³⁴

However, there is also an association between **dyslipidemia** and insulin resistance.³⁵ Insulin resistance alters lipid metabolism, leading to the development of atherogenic dyslipidemia, contributing to atherosclerotic plaque formation.³⁶

One reason atherogenic dyslipidemia is a predictor of heart disease is because it indicates insulin resistance, which means in some ways your cholesterol panel may tell you more about your insulin resistance and glucose intolerance than anything else.³⁷

Normalize Your Liver Function Naturally

Dr. David Unwin, a low-carb advocate, was voted among the top 50 most influential general practitioners in the U.K. in September 2018.³⁸ In this short video, he discusses the health improvements patients in his practice have experienced, pertaining to insulin resistance and liver function, as they follow a low-carbohydrate diet.

Your carbohydrate intake has an effect on your glucose metabolism, liver function and your risk of heart disease, stroke and Type 2 diabetes. Reducing carbs to 50 grams for every 1,000 calories and increasing your intake of healthy fats is a powerful way to support your mitochondrial health and reduce your risk of chronic disease. Other ways of protecting your liver health include:

Optimizing your omega-3 to omega-6 ratio — Maintaining a balance of omega-6 to omega-3 fats as close to 1-to-1 is ideal. Omega-3 fat may be found in wild caught Alaskan salmon, herring, mackerel and anchovies. Consider using a high quality krill oil supplement if you don't eat these fatty fish on a regular basis. Reduce or eliminate processed foods, which are high in damaged omega-6 fats, and vegetable oils for cooking.

Giving blood — If you are male or a postmenopausal woman, giving blood twice a year helps lower your iron level and protect your liver from damage.

Exercising — Exercise helps burn triglycerides for fuel and may help reduce liver fat.³⁹

Take N-acetylcysteine (NAC) — This is a precursor to glutathione, a powerful antioxidant that helps reduce oxidative stress and is used in the treatment of chronic fatty liver diseases.⁴⁰

Avoid medications — Many drugs and hormones are first metabolized through your liver, including birth control and anabolic steroids — in fact, nearly 50 percent of all drugs on the market are metabolized by just one enzyme in the liver.⁴¹

Over-the-counter (OTC) medication such as Tylenol and cold and pain remedies are also metabolized through your liver, as are statins, acid blockers, antifungals and certain antibiotics — in all, over 1,000 OTC drugs and herbal medicines have been associated with drug-induced liver injury.^{42,43}

Avoid alcohol if you have NAFLD or NASH — It's important to drink alcoholic beverages responsibly, however if you already suffer from NAFLD or NASH, alcohol may increase your risk of cirrhosis and destroy your liver cells.⁴⁴

Optimize your gut — The release of undigested food and bacteria from a leaky gut condition eventually results in liver inflammation. Emerging evidence has suggested a strong relationship between your gut health and your liver.⁴⁵

Your liver receives nearly 70 percent of its blood supply from the intestines through the portal vein.⁴⁶ Researchers have also discovered up to 75 percent of those who suffer from chronic liver disease also suffer from microbiome imbalance.⁴⁷

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