

in the liver, which is called cholestasis. This means that bile cannot flow into the small intestine to aid in the digestion of fats. When this happens, fat is not absorbed but instead is excreted in large amounts in the feces, which become noticeably pale-colored and foul-smelling. This condition is known as steatorrhea. This loss of fat calories may also cause weight loss.

Special fat substitutes, such as medium chain triglycerides (MCT oil) and safflower oil can help alleviate this condition because they are less dependent on bile for intestinal absorption. They can be used like other oils in cooking, baking, and salad dressings.

Patients with steatorrhea may also have difficulty absorbing fat soluble vitamins A, D, E, and K. However, water soluble vitamins are absorbed normally. Supplementing the diet with fat soluble vitamins is possible, though it should only be carried out under the guidance of a physician. Vitamin A in excess of what is needed is very toxic to the liver.

**Wilson's Disease**, in which large amounts of copper build up in the body, is another liver ailment where diet can help. People with Wilson's disease should avoid eating chocolate, nuts, shellfish and mushrooms, all copper-containing foods. Medical treatment to remove excess copper from the body involves the use of prescription medication.

**Hemochromatosis** is a disease in which large amounts of iron are transported from the intestine and accumulate in the liver. Persons with this condition must avoid iron injections, all iron-containing foods, and are advised not to use iron cooking utensils. Aside from these precautions, those with hemochromatosis may follow a normal diet.

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## What is fatty liver and is it caused by eating too much fat?

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Fatty liver is not a disease but a pathological finding. A more appropriate term is "fatty infiltration of the liver." It is not caused by excessive eating of fats.

Nutritional causes of fat in the liver include: starvation, obesity, protein malnutrition, and intestinal bypass operation for obesity. Fat enters the liver through diet and from fat stored in the fatty tissue. Under normal conditions, fat from the diet is usually metabolized by the liver and other tissues. If the amount exceeds what is required by the body, it is stored in the fatty tissue. If fatty tissue is caused by diabetes, insulin will treat the problem. Fatty liver resulting from poor nutrition should be treated with a well-balanced diet of carbohydrates, proteins, and fats as specified by the physician. Fatty liver can also be caused by certain chemical or drug compounds, and endocrine disorders. In these cases, the treatment would be directly related to the cause.

Two ways to avoid fatty liver:

- Limit alcohol intake (alcohol can decrease the rate of metabolism and secretion of fat, leading to fatty liver);
- Watch the diet (starvation and protein malnutrition can result in fat buildup in the liver).

Most cases of fatty liver are due to obesity. Gradual weight reduction will reduce enlargement of the liver due to fat and associated liver test abnormalities.

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## What lies ahead?

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The relationship between nutrition and the liver

is under investigation. To what extent good nutrition and dietary practices can control or perhaps even prevent liver diseases can only be surmised at this time. Further research in this area could prove very beneficial and is being supported by the American Liver Foundation.

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## How can you help?

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The American Liver Foundation is a national, voluntary health organization dedicated to finding the causes and cures of liver disease. Prior to its formation, there was no organization that focused on the liver and liver diseases on a nationwide basis. Remarkable advances have been made in the past decade. However, chronic liver disease and cirrhosis still rank fourth as the leading disease-related cause of death for Americans between the ages of 25 and 44. Increased research and prevention education can reduce the suffering and economic burden posed by these diseases.

The American Liver Foundation strives to:

- Increase research efforts to find effective treatments and cures for more than one hundred liver diseases;
- Inform physicians of new treatments and diagnostic measures;
- Promote prevention education about substance abuse and hepatitis and the use of vaccines;
- Provide a network of chapters and support groups for patients with liver disease and their families.



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The American Liver Foundation is a nonprofit, national voluntary health organization dedicated to the prevention, treatment, and cure of hepatitis and other liver diseases through research, education, and advocacy.

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# DIET AND YOUR LIVER

**"Good nutrition can help the damaged liver regenerate new liver cells."**



## What does nutrition have to do with your liver?

Nutrition and the liver are interrelated in many ways. Some functions are well understood; others are not. Since everything we eat, breathe, and absorb through our skin must be refined and detoxified by the liver, special attention to nutrition and diet can help keep the liver healthy. In a number of different kinds of liver disease, nutrition takes on considerably more importance.

### Why is the liver important?

The liver is the largest organ in the body and it plays a vital role, performing many complex functions that are essential for life. Your liver serves as your body’s internal chemical power plant. While there are still many things we do not understand about the liver, we do know that it is impossible to live without it, and the health of the liver is a major factor in the quality of one’s life.

### Some important functions of the liver are:

- To convert the food we eat into stored energy and chemicals necessary for life and growth;
- To act as a filter to remove alcohol and toxic substances from the blood and convert them to substances that can be excreted from the body;
- To process drugs and medications absorbed from the digestive system, enabling the body to use them effectively and ultimately dispose of them;
- To manufacture and export important body chemicals used by the body. One of these is bile, a greenish-yellow substance essential for the

digestion of fats in the small intestine.

### Why is the liver so important in nutrition?

85-90% of the blood that leaves the stomach and intestines carries important nutrients to the liver, where they are converted into substances the body can use.

The liver performs many unique and important metabolic tasks as it processes carbohydrates, proteins, fats, and minerals to be used in maintaining normal body functions.

**Carbohydrates**, or sugars, are stored as glycogen in the liver and are released as energy between meals or when the body’s energy demands are high. In this way, the liver helps to regulate the blood sugar level, and to prevent a condition called hypoglycemia, or low blood sugar. This enables us to keep an even level of energy throughout the day. Without this balance, we would need to eat constantly to keep up our energy.

**Proteins** reach the liver in the simpler form called amino acids. Once in the liver, they are either released to the muscles as energy, stored for later use, or converted to urea for excretion in the urine. Certain proteins are converted into ammonia, a toxic metabolic product, by bacteria in the intestine or during the breakdown of body protein. The ammonia must be broken down by the liver and made into urea, which is then excreted by the kidneys. The liver also has the unique ability to convert certain amino acids into sugar for quick energy.

**Fats** cannot be digested without bile, which is made in the liver, stored in the gallbladder, and released as needed into the small intestine. Bile (specific bile “acids”) acts somewhat like a

detergent, breaking apart the fat into tiny droplets so that it can be acted upon by intestinal enzymes and absorbed. Bile is also essential for the absorption of vitamins A, D, E, and K, the fat soluble vitamins. After digestion, bile acids are reabsorbed by the intestine, returned to the liver, and recycled as bile once again.

### Can poor nutrition cause liver disease?

There are many kinds of liver disease, and the causes of many of them are not known. Poor nutrition is not generally a cause, with the exception of alcoholic liver disease and liver disease found among starving populations. It is much more likely that poor nutrition is the result of chronic liver disease, and not the cause.

On the other hand, good nutrition - a balanced diet with adequate calories, proteins, fats, and carbohydrates - can actually help the damaged liver to regenerate new liver cells. In fact, in some liver diseases, nutrition becomes an essential form of treatment. Patients are strongly advised not to take megavitamin therapy or to use nutritional products bought in special stores or by catalogue without consulting a doctor.

### How does liver disease affect nutrition?

Many chronic liver diseases are associated with malnutrition. One of the most common of these is cirrhosis. Cirrhosis refers to the replacement of damaged liver cells by fibrous scar tissue, which disrupts the liver’s important functions. Cirrhosis occurs as a result of excessive alcohol intake (most common), chronic viral hepatitis, obstruction of the bile ducts, and exposure to certain drugs or toxic substances.

People with cirrhosis often experience loss of

appetite, nausea, vomiting and weight loss, giving them an emaciated appearance. Diet alone does not contribute to the development of this liver disease. People who are not well nourished, for example, but drink large amounts of alcohol, are also susceptible to alcoholic disease.

Adults with cirrhosis require a balanced diet rich in protein, providing 2,000 to 3,000 calories a day, to allow the liver cells to regenerate. However, too much protein will result in an increased amount of ammonia in the blood; too little protein can reduce healing of the liver. Doctors must carefully prescribe the correct amount of protein for a person with cirrhosis. In addition, the physician can use two medications (lactulose and neomycin) to control blood ammonia levels.

### What other nutritional problems are caused by cirrhosis?

When the scarring of cirrhosis interferes with the flow of blood from the stomach and intestines to the liver, a condition called portal hypertension may develop. This simply means that there is back pressure in the veins entering the liver. Surgical “shunting,” or rerouting of blood away from the liver and into the general circulation can relieve this pressure, but it often causes a new set of problems. Because the shunted blood has bypassed the liver, it contains high levels of amino acids, ammonia, and possible toxins. When these compounds reach the brain, they cause a condition called hepatic encephalopathy, which means “mental impairment caused by the liver.” Patients become confused and some temporary loss of memory occurs.

### Can nutrition be used to treat hepatic encephalopathy?

Restricting the amount of protein in the diet has

been used in the past but may cause further malnutrition. Most physicians will prescribe lactulose and/or neomycin for patients with this condition.

Food to avoid: Shellfish, if uncooked, can be very dangerous for patients with cirrhosis. Either avoid shellfish or be careful. *Vibrio vulnificus*, a bacteria, can be contracted by eating raw oysters, etc.

### Can diet help in treating other complications of cirrhosis?

There are a number of complications of cirrhosis which can be helped through a modified diet.

Persons with cirrhosis often experience an uncomfortable buildup of fluid in the abdomen (ascites) or a swelling of the feet, legs, or back (edema). Both conditions are a result of portal hypertension (increased pressure in the veins entering the liver). Since sodium (salt) encourages the body to retain water, patients with fluid retention can cut their sodium intake by avoiding such foods as canned soups and vegetables, cold cuts, dairy products, and condiments such as mayonnaise and ketchup. In fact, most prepared foods contain liberal amounts of sodium, while fresh foods contain almost no sodium at all. A good-tasting salt substitute is lemon juice.

### Are there other liver disease where specific changes in diet can help?

Nutrition and a modified diet have been found to have a significant effect on a number of other liver diseases. Some types of liver disease, for example, cause a backup of bile