

## Disorders of the Liver

The liver is the largest gland in the body. It weighs up to three pounds, is suspended behind the ribs on the upper right side of the abdomen and spans almost the entire width of the body. Being responsible for hundreds of different functions, it is also the most complex and active organ in the human body.

Since the liver is in charge of processing, converting, distributing and maintaining the body's vital 'fuel' supply (e.g., nutrients and energy), anything that interferes with these functions must have a serious, detrimental impact on the health of the liver and the body as a whole. The strongest interference stems from the presence of gallstones.

Besides manufacturing cholesterol, an essential building material of organ cells, hormones and bile, the liver also produces hormones and proteins that affect the way the body functions, grows and heals. The liver also makes new amino acids and converts existing ones into proteins. These proteins are the main building blocks of the cells, hormones, neurotransmitters, genes, etc. Other essential functions of the liver include breaking down old, worn-out cells, recycling iron and storing vitamins and nutrients. Gallstones are a hazard to all of these vital tasks.

Apart from breaking down alcohol in the blood, the liver also detoxifies noxious substances, bacteria, parasites, and certain components of chemical drugs. It uses specific enzymes to convert waste or poisons into substances that can be safely carried out of the body. The liver filters more than a quart of blood each minute. Most of the filtered waste products leave the liver via the bile stream.

Gallstones obstructing the bile ducts lead to high levels of toxicity in the liver and ultimately **liver diseases**. This development is further exacerbated by intake of pharmaceutical drugs, normally broken down by the liver. The presence of gallstones prevents their detoxification, which can cause 'overdosing' and devastating side effects, even at normal dosage levels. It also means that the liver is at risk of damage from the harmful chemicals of drugs that the liver breaks down. Alcohol that is not detoxified properly can cause similar problems.

All liver diseases are preceded by extensive bile duct obstruction through gallstones. The gallstones distort the structural framework of the liver lobules (see *Figures 1 in the section on the Pancreas and Figure 1* below), which are the main units composing the liver (there are over 50,000 of such units in the liver). Subsequently, blood circulation to and from these lobules, and the cells they are composed of, becomes increasingly difficult. In addition, the liver cells have to cut down bile production. Nerve fibers become damaged. Prolonged suffocation eventually damages or destroys liver cells and their lobules. There is a gradual replacement of damaged cells by fibrous tissue, causing further obstruction and an increase in pressure on the liver's blood vessels. If the regeneration of liver cells does not keep pace with damage, **liver cirrhosis** is imminent. Liver cirrhosis usually leads to death.

**Liver failure** occurs when so many liver cells are destroyed that an insufficient number remains to carry out the organ's various important and vital functions. Consequences of liver failure include drowsiness, confusion, shaking of hands (flapping tremor), drop in blood sugar, infection, kidney failure and fluid retention, uncontrolled bleeding, coma and death. The powers of recovery of the liver, however, are remarkable. If the gallstones are removed, and alcohol and drug intake discontinued, there will be no long-term problems, even though most of the liver cells have been destroyed during the illness. When the cells regrow, they do so in an ordered fashion that permits normal function. This is possible because in liver failure (as opposed to liver cirrhosis) the basic structure of the liver has not been substantially disturbed.

Acute **hepatitis** results when whole groups of liver cells begin to die off. Gallstones harbor large quantities of viral material, which can invade and infect liver cells, causing cell-degenerative changes. As gallstones increase in number and size, and more cells become infected and die, entire lobules begin to collapse, and blood vessels

begin to develop kinks. This greatly affects blood circulation to the remaining liver cells. The extent of damage that these changes have on the liver and its overall performance largely depends on the degree of obstruction caused by gallstones in the liver bile ducts. Cancer of the liver only occurs after many years of progressive occlusion of the liver bile ducts. This applies also to tumors in the liver that emanate from primary tumors in the gastro-intestinal tract, lungs or breast.

Most *liver infections* (type A, type B, and type non-A and type non-B) occur when a certain number of liver lobules are congested with gallstones, which can even happen at a very early age. A healthy liver and immune system are perfectly able to destroy virus material, regardless of whether the virus has been picked up from the external environment or entered the blood stream in some other way. The majority of all people exposed to these viruses never fall ill. However, when large amounts of gallstones are present, the liver becomes toxic and cannot defend itself against viral infection.

Gallstones can harbor plenty of live viruses. Once some of these viruses break free and enter the blood, they can cause chronic hepatitis. Non-viral infections of the liver are caused by bacteria that spread from any of the bile ducts obstructed with gallstones.

The presence of gallstones in the bile ducts also impairs the liver cell's ability to deal with toxic substances such as chloroform, cytotoxic drugs, anabolic steroids, alcohol, aspirin, fungi, food additives, etc. When this occurs, the body develops hypersensitivity to these predictable toxic substances, and also to other unpredictable ones contained in numerous medical drugs. Many allergies stem from such hypersensitivity. For the same reason, there may also be a drastic increase in toxic side effects resulting from the intake of medical drugs, side effects of which the Federal Drug Administration (FDA) or pharmaceutical companies may not even be aware.

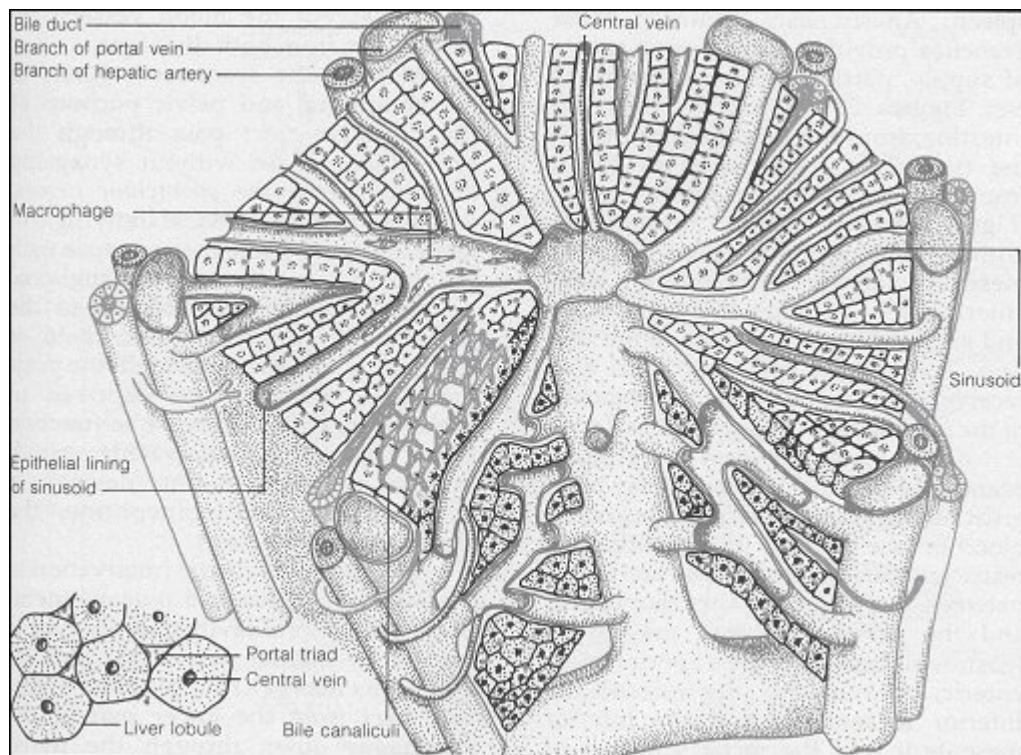


Figure 1: A liver lobule

The most common form of jaundice results from gallstones being stuck in the bile duct leading to the duodenum and/or gallstones and fibrous tissue distorting the structural framework of liver lobules. The movement of bile through the bile channels (canaliculi) is blocked and the liver cells can no longer conjugate and excrete bile pigment, known as bilirubin. Consequently, there is a buildup both of bile and the substances from which it is made in the blood stream. As bilirubin begins to build up, it stains the skin. Bilirubin concentration in the blood may be three times above normal before a yellow coloration of both the skin and the conjunctiva of the eyes becomes apparent. Unconjugated bilirubin has a toxic effect on brain cells. Jaundice may also be caused by a tumor in the head of the pancreas.