

# What are "LFTs?"

by Dr A. Stevens



All Wilson's disease patients will be familiar with the term **LFTs**. LFTs is doctors' shorthand jargon for **Liver Function Tests**, which are tests done in the laboratory on a blood sample to see if the liver is functioning properly. There are other ways of investigating the liver, such as ultrasound and liver biopsy, but the liver function tests are the first line in the investigation of possible liver disease.

## First, a bit of revision about the functions of the liver.

In my article about the normal liver, I explained that the liver is a sort of large chemical factory, with many functions. The main functions are:-

1. the making of many substances which the body needs to function properly, e.g. proteins such as albumen and the chemicals (clotting factors) needed to make the blood clot when a blood vessel is torn, the clot preventing excessive loss of blood from the damaged vessel.

These substances are made by the liver cells, called **hepatocytes**, using raw materials supplied to the liver by the portal vein system. These raw materials (e.g. amino acids, simple sugars and fatty acids) are produced by the digestion of food in the gut, and then transferred to the liver where they are built up into much larger molecules by the hepatocytes. The chemical reactions in the hepatocytes require the presence of a range of different **enzymes** (see below) before they can take place;

2. the breakdown of toxic substances to harmless compounds which can be safely excreted from the body, mainly in the urine, without causing damage. These toxic substances can be either produced by the body itself (e.g. toxic ammonia compounds) or ingested by mouth (e.g. alcohol and some drugs). The breakdown of toxins by the hepatocytes also requires the presence of enzymes;

3. the production of bile. This is made in the liver from the compounds released when red blood cells die. Bile is passed from the liver, via the bile ducts and gall bladder, to the gut where it helps in the breakdown and digestion of food material, before being excreted in the faeces.

## Second, a note about enzymes.

Enzymes are important chemicals that are found in every cell in the body, but they are present in high concentration in cells which are biochemically active, and liver cells are packed with a wide range of them. Enzymes are vital for the chemical reactions which occur in cells, for they act as **catalysts** for the reactions. Catalysts are substances which increase the rate at which a chemical reaction takes place, but do not take part in the reaction, and are unchanged at the end of the process. They are the 'trigger' which gets the reaction moving quickly.

When a cell dies, the enzymes it contains leak out into the blood stream. In normal healthy tissues where cells are always dying but in very small numbers, the quantity of enzymes released into the blood stream is very small, but when there is disease, many cells may die at the same time and the large amount of enzyme which is released can be detected by blood tests. This forms the basis of some of the liver function tests.

## What liver function tests are done?

Here is a list of the standard liver function tests (LFTs):-

**Serum albumen** - this measures how competent the liver is at synthesising protein molecules. A low level is an indication that the liver has lost a lot of functioning hepatocytes, an indication of chronic liver disease. It suggests that the liver is failing to make a whole range of proteins as well as albumen, but albumen is the easiest to measure.

Note that there are other causes of a low albumen level; in some forms of kidney disease, the damaged kidney leaks excessive amounts of albumen out into the urine, at a rate that the normal liver cannot re-supply.

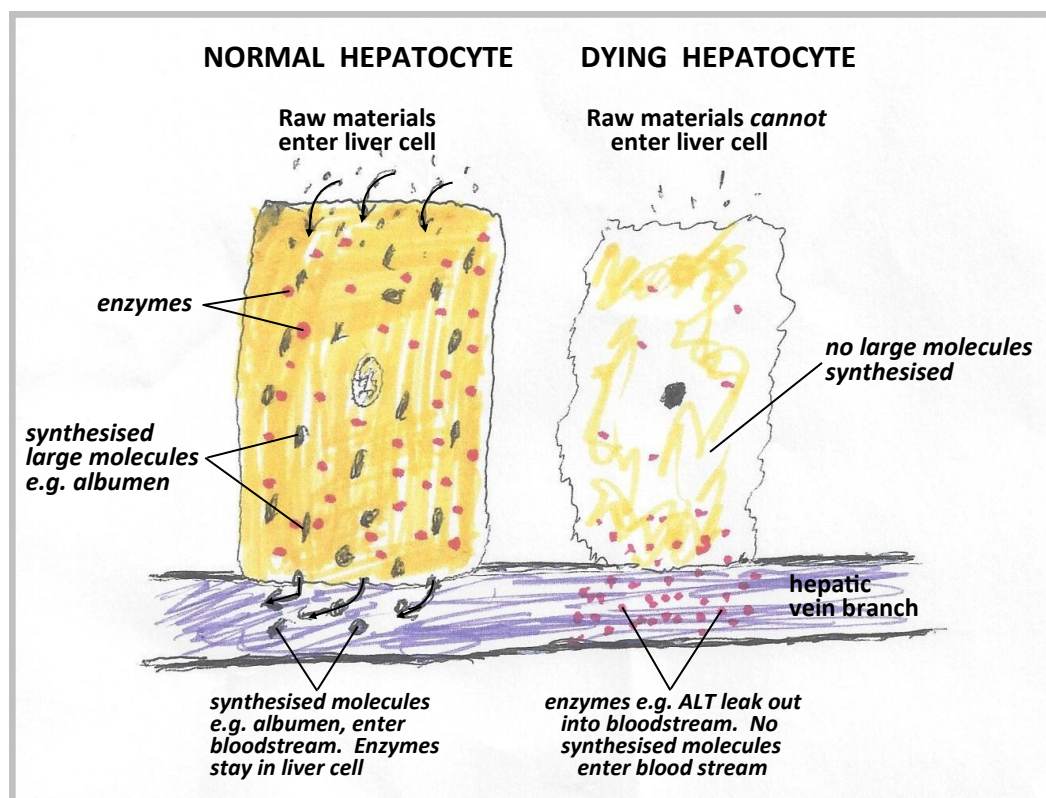
**Clotting studies (prothrombin time PT or international normalised ratio INR)** - these tests show whether the liver is making enough of the clotting factors essential to form blood clot and stop bleeding. It is another measure of whether the liver is synthesising substances properly.

**ALT (alanine aminotransferase)** - is one of the **enzymes** in liver cells. When large numbers of liver cells die at the same time, the level of this enzyme is raised in the blood. A high level is an indicator of active liver cell destruction, the higher the level, the more severe the destruction. The highest levels are seen in acute hepatitis.

**AST (aspartate aminotransferase)** - another **enzyme** released when liver cells are damaged. It is not as specific to the liver as ALT, and can be raised in other conditions e.g. after a heart attack

**Gamma GT (gamma glutamyl transferase) and ALP (alkaline phosphatase)** - are **enzymes** found particularly concentrated in the bile canals and ducts in the liver. They are raised when bile canals and ducts are damaged, impeding the free flow of bile around and out of the liver. High levels are found when the patient has jaundice due to liver disease.

**Serum bilirubin** - bilirubin is the major component of bile, and rise in blood level is indicative of actual or developing jaundice. It is usually associated with high GGT and ALP levels.



**Diagram: Explaining why liver damage causes low serum albumen and high serum enzyme levels.**

## Why are liver function tests done in Wilson's disease patients?

In Wilson's disease, excess copper is deposited in many tissues, but the main targets are the brain and the liver. In the liver, the excess copper acts as a toxin to the liver cells (hepatocytes), causing them to die in increased numbers. Liver function tests are done at the time of initial or suspected diagnosis to:-

- establish whether there is already significant liver damage;
- provide baseline measurements of current liver function, so that repeat LFTs in the future can assess whether there is deterioration, or whether there is improvement with treatment.

The LFTs do not prove the diagnosis of Wilson's disease, for many other diseases cause liver damage. Wilson's disease is diagnosed by more complex tests of copper metabolism.