LOVE YOUR LIVER AND GET MORE OUT OF LIFE!
WITH HEPATIC DETOX

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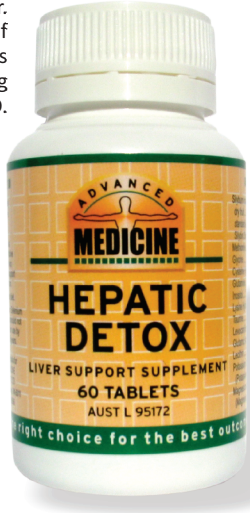
Our liver certainly is a hard worker. Treat it well, live longer and get more out of life. The liver is involved with many different functions of the body. Most of us understand that our liver is the major organ that carries out most of the detoxification, but it does a lot more. It is also responsible for bile production. In fact it produces up to a litre of bile per day. Bile needs to be at the right pH which is somewhere between 7.5 and 8.6. Bile consists mostly of bile acids, water, bile salts, cholesterol, bile pigments and a phospholipid called lecithin, plus several ions. Bile is required for emulsification of fats and for the activation of lipase enzymes needed for digestion.

The liver is the heaviest gland of the body and plays a major role in maintaining proper hormonal balance. It can chemically alter or excrete thyroid hormones and steroid hormones, such as estrogens and aldosterone. The liver is required to carry out detoxification of the bloodstream by degrading various waste materials no longer needed. There are two types of toxins. There are those, which come from outside the human body (exogenous), and those, which are generated by the processes within the body (endogenous). Xenobiotics are chemical compounds which are foreign to the body, (exogenous toxins) such as drugs, food additives and environmental pollutants. More than 200,000 xenobiotics that exist in our environment are metabolised predominately in the liver. This occurs through the cytochrome P450s enzyme pathways, where the xenobiotics are rendered water soluble, thus being readily eliminated from the body.

We (humans) belong to the ecosystem of this planet. In this sense, we are simply participants in the food chain. While we enjoy diversity from being at the top of the food chain, we experience disadvantages by way of bio-concentration of xenobiotic contaminants (Toxins from the environment). Our exposure to all the environmental toxins including food chemicals, additives, preservatives and drugs that we may take from time to time place a heavier work load on our liver.

The liver is especially important in maintaining a normal blood glucose level. When blood glucose is low, the liver can break down glycogen and release glucose into the bloodstream. The liver also has the ability to convert certain amino acids and lactic acid into glucose, as well as converting other sugars such as fructose and galactose into glucose. When blood glucose is high, as is the case just after eating a meal, the liver converts glucose into glycogen and triglycerides for storage.

The liver is required to carry out Lipid metabolism, as well as Protein metabolism especially the hepatocytes that synthesize most plasma proteins (Such as alpha & beta globulins, albumin, prothrombin & fibrinogen). Our liver is also required for the excretion of bilirubin, which is derived from the heme of the red blood cells. It is absorbed by the liver from the blood and secreted into Bile. Most of the bilirubin in Bile is metabolized in the small intestine by bacteria and eliminated in the feces. In addition, the liver is a prime storage site for certain vitamins, such as Vitamins A, B12, D, E, K and minerals iron & copper. As well as storage of Vitamin D, the liver is involved in synthesizing active forms of Vitamin D. The Kupffer cells of the liver phagocytize aged red and white blood cells and some bacteria.



Our current lifestyles, environmental toxins, consumption of alcohol, food additives and drugs all place our liver under enormous stress and would be impacting on our health and well being.

Some of the symptoms that may indicate that our liver is not detoxifying properly are:

- bowel wind
- constipation
- loose bowels
- dry hair, split ends, dry scalp
- nails splitting or lifting at the edges
- spoon nails
- light coloured stools
- poor appetite
- dermatitis
- psoriasis
- gout
- bad breath
- headaches
- nausea associated with fatty meals
- headaches
- immune weakness
- tiredness & fatigue
- sugar craving
- insomnia
- mood changes
- anxiety
- depression
- skin rashes
- joint pain
- pre-menstrual tension
- high copper levels
- loose bowels
- indigestion
- bloating
- fatty liver
- cirrhosis
- hepatitis
- tiredness
- obesity
- joint pains
- hormonal imbalances
- PMT
- Irritability
- Bile disturbances

So, it is easy to see that with all the toxins we encounter in our environment, plus the toxins that our own bodies produce it is extremely important to maintain a healthy liver.

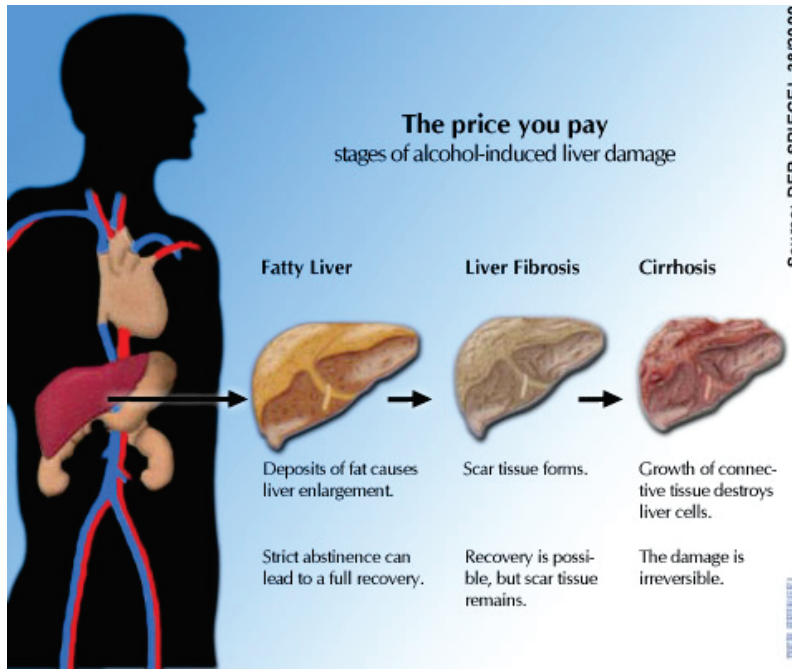
Cholesterol is synthesized in the liver through the H.M.G CoA reductase pathway. It produces about 700mg of cholesterol per day, while the remainder is derived from the diet. We produce HDL (the 'good' cholesterol), LDL and VLDL cholesterol in our liver, as well as the absorption of dietary cholesterol. All forms of cholesterol are not 'bad' all are necessary, as they are the precursors for steroids in the body (Such as corticosteroid, sex hormones, bile acids and vitamin D.). Problems with cholesterol arise when the ratio between the HDL, LDL & VLDL become unbalanced. Our liver can synthesize cholesterol, but it is also responsible for the removal of cholesterol. Our liver clears around 1g of cholesterol per day, which is eliminated through the bile.

Lecithin is involved with bile production and plays a major role in maintaining solubility of cholesterol. Solubility is important so that we do not develop cholesterol stones in the liver or gall bladder. While our liver can synthesize lecithin, dietary intake is also required.

So, as you can see, it is vitally important to maintain a healthy liver. In doing so, we are also more likely to be in a position of maintaining healthy cholesterol levels.

It is in my opinion, given the level of Xenobiotics in our environment, necessary to supplement with liver nutrients. It would be best to seek a supplement that contains Silybum marianum ext, L. Methionine, L. Glycine, L. Cysteine, L. Glutamine, Inositol, L. Lysine, L. Taurine, Levocarnitine and Glutamic acid, Lecithin, Potassium, Magnesium, Zinc, Selenium, Folic Acid, Pyridoxal -5-Phosphate, B6, B12, Ascorbic Acid, Hesperidin and Rutin. These can all be found in one tablet and would be known as Hepatic Detox.

Given all the work our livers are involved with, it stands to good reason to 'love your liver' and treat it well, so that you may get more out of life.



Silybum Marianum (St Mary's Thistle)
St. Mary's Thistle contains three principal biologically active compounds, which are known collectively as Silymarin. This herb has been found to have a wide range of effects on health. The main target of it's action is the liver, helping to protect this organ against damage from alcohol and other toxins as well helping in cases of Jaundice and cholestasis. However it also has been prescribed for pleurisy, problems with the spleen, dyspepsia, gallbladder problems, as antidote to deathcap mushroom poisoning, depression, psoriasis and hepatitis.

- It protects against lipid peroxidation.
- It improves the antioxidant status in the liver.
- It protects the liver against problems caused by an excessive alcohol intake.
- It helps to protect against liver hepatitis induced by drug and viral hepatitis.
- It protects against alcohol-induced hepatic fibrosis.
- It is beneficial in the prevention or treatment of liver dysfunction in patients undergoing anticancer therapy.
- It has protective actions against some cancers.
- It can reduce plasma VLDL- cholesterol levels.
- It protects against a range of toxins.
- It can modulate the inflammatory immune response.

L Methionine.
Methionine is a sulphur-containing, proteogenic amino acid. It is an essential amino acid. Within the body, the metabolically active form of this amino acid is s-adenosymethionine, which is a methyl group donor in transmethylation reactions. When Methionine is catabolised, cysteine is formed as the liver metabolites. Methionine has a protective effect on the liver, as well as protecting the liver against a range of toxic chemicals.

- It is effective in the treatment of alcoholic liver disease; its dietary requirements are increased in liver disease and alcoholic hepatitis.
- It helps to suppress the progression of induced liver fibrosis.
- It may protect liver against alcohol-related carcinogenesis.
- It is effective in the treatment of gallstones.
- It assists the liver with pesticide exposure.
- Methionine is useful in chemical sensitivity.

L Glycine.
Glycine is essential in the diet. As the nitrogen from Glycine can easily be exchanged with other molecules, Glycine can be used as a starting point for the synthesis of other amino acids.

- It assists in the detoxification through its promotion of glutathione availability.
- It has a protective effect on the liver in a wide range of toxins and chemical sensitivity.
- It has a role in protecting tissues against ischemia
- It has a protective effect in the liver inflammatory diseases.
- It protects against shock caused either by blood loss or endotoxin, reduces alcohol levels in the stomach and recovery from alcoholic hepatitis.
- It helps to protect the liver damage caused by hepatotoxic drugs.
- It can normalize fatty acid levels in the tissues.
- It reduces the free radical-mediated oxidative stress in the erythrocyte membrane, plasma and hepatocytes in alcohol-induced liver injury.
- It helps protect against obstructive jaundice.

L Cysteine.
Cysteine, an amino acid is a key molecule in sulphur metabolism in the body. Cysteine also has a sparing effect on Methionine for protecting mucosa linings and helping to protect the body against free radicals.

- It helps to protect the body against free radicals.
- It is involved in the production of glutathione within the liver, which reduce the oxidative damage in hepatocytes.
- It protects against toxic substances in the liver, including those from cigarette smoke.
- It protects against liver cholestasis.
- It reduces the oxidative stress of hepatitis C in the liver.
- It helps the liver in chemical sensitivity.
- It is useful in helping to protect the liver against liver disease.
- It is involved with reducing heavy metal toxicity.

L Glutamine.
Glutamine is one of the proteogenic amino acids. It can be synthesized from glutamic acid, a reaction that is important in the detoxification reaction that helps to remove the toxic ammonia from the body. Glutamine is an intermediate nitrogen, allowing its nitrogen to be transferred to other molecules in transamination reactions.

- It removes ammonia from the hepaticytes (liver).
- It is important for maintenance of cell function.
- It promotes storage of glycogen in the muscle.
- It is necessary for normal intestinal morphology and function.
- Decreased glutamine levels are associated with catabolic stress and are associated with increased susceptibility to infection.
- It protects the liver against toxic substances.
- It is useful in the treatment of chronic hepatitis.
- Anyone with defective liver function could benefit from supplementation with glutamine
- It is one of the building blocks for glutathione, important in the body's antioxidant defence.
- It helps in chemically sensitive individuals.

L Lysine

Lysine is an essential amino acid, one of the groups known as proteogenic. The biologcal active from this molecule is L-lysine, Advanced Medicine Australia Hepatic Detox only uses L amino acid.

- A deficiency of this amino acid can lead to a number of stresses in the tissues.
- L-lysine can suppress recurrent herpes simplex infection.
- It enhances calcium absorption from the intestines and reduces the losses of this mineral through the kidney.
- It helps the prevention of cardiovascular disease and osteoporosis.
- It has a protective action on the liver following haemorrhage.
- It helps in detoxification of lead.

L Taurine.

Taurine is an amino acid. It is a sulphur-containing molecule found in bile in combination with cholic acid. In the bile Taurine is one of the agents that help to emulsify lipids (fats), assisting their absorption and transport. Taurine assists in regulating the level of bile salt in the gall bladder, reducing the incidence of gall stones.

Taurine is useful in the treatment of fatty liver. In a study of fatty liver in children with simple obesity, it was found that taurine supplements in the diet were effective in treating their fatty liver. The authors suggested that taurine administration may be helpful as an adjuvant therapy for fatty liver.

Taurine helps to protect against liver fibrosis which is the result of excessive protein deposition by hepatic stellate cells. In a study it was found that taurine supplementation prevented the development of fibrosis of the liver.

Taurine seems to protect the liver against some deleterious changes during hepatocarcinogenesis. This was discovered in a study of rats fed taurine supplements, and where hepatocarcinogenesis was induced. In this study, taurine not only inhibited lipid peroxidation in the liver, but also altered defence enzymes and protected the liver against membrane disintegration during the hepatocarcinogenesis (You JS, Chang KJ, 1998).

Taurine is one of several amino acids that have been found to be essential in disease states, and to form substrate in the stressed patient for anabolic processes in the liver, immune system, and at injured sites (Soeters PB et al, 2004).

- It protects the tissues and liver tissue against oxidative stress.
- Its levels are reduced when the liver is diseases or stressed.
- It is useful in the treatment of fatty liver.
- It protects the liver against liver fibrosis.
- It involved with the detoxificition of chemical toxins.
- Involved in bile synthesis.
- It facilitates the passage of calcium, potassium, sodium, and magnesium ions in and out of cells.
- It is useful in gall bladder disease.
- It protects against cholesterol gallstone formation.
- It protects the liver against some deleterious changes during hepatocarcingenesis.
- Taurine helps to protect the liver against fatty liver.

L Carnitine.

Carnitine is important for all tissues that have high-energy demand like the liver. In a study of patients with cirrhosis of the liver, Lapinski T, Grzeszczuk A (2003) found that carnitine lowered serum ammonia concentration and lipid metabolism in the liver. This reinforces the role of carnitine as a protective agent for the liver. Carnitine facilitates the removal from mitochondria of short-chain and medium-chain fatty acids that accumulate as a result of normal and abnormal metabolism. One other function of Carnitine is to remove potentially toxic acyl groups from cells by promoting the formation of acylcarnitine from acyl-CoA. This system is important for removing the toxic acyl groups.

- It removes potentially toxic acyl groups from cells.
- Carnitine has been used in senile dementia, metabolic nerve diseases, HIV infection, tuberculosis, myopathies, cardiomyopathies,

renal failure and anemia.
- It lowers serum ammonia concentrations and improves lipid metadolism in the liver.
- It protects against hepatic encephalopathy.
- It prevents lipid preoxidation.
- It reduces lipid accumlation in the liver.
- A deficiency in carnitine has been implicated in the development of non-alcoholic related fatty liver disease.

L Glutamic acid

Glutamic acid has its main role is in the transport of potassium in the brain, and in the detoxification of ammonia in the brain. In the liver, it modulates the rate of ammonia detoxification into urea.
- It promotes glycogen storage.
- It is needed for the synthesis of glutathione within the liver, a critical antioxidant for the body.
- It protects against free radicals in the liver.
- It is needed in alcoholics and cirrhotics and in acute liver failure.
- Its ability to reduce ammonia levels in the brain protects against hepatic encephalopathy.

Inositol

Inositol is necessary for normal cellular proliferation (cell division). Inositol deficiency may promote fatty liver disease. The impaired release of plasma lipoprotein increases fatty acid mobilization from adipose tissue and enhanced fatty acid synthesis in the liver. Inositol deficiency has causative factors in the occurance of hepatic triacylglycerol accumulation. Very little is known about calcium signaling through the Inositol receptor, which is a mechanism in cells to regulate their function. However, it is known that this receptor is lost from cholangiocytes in cholestatic liver disease and this may have significance in cholestasis. In turn, this suggests that any deficiency in Inositol may have a negative impact on the development of cholestasis.
- A potent ability to reduce hepatic lipid levels and regulate blood lipids.
- It protects the liver against toxins.
- It protects the liver against fatty liver.
- It is necessary for normal cellular proliferation (cell division).
- It has a protective effect against cancers in the liver and lungs and possibly also in the mammary gland and colon.
- It may help in the treatment for diabetic neuropathy.

Lecithin

Lecithin is a phospholipid, specifically a glycerophospholipid, which is derived from phosphatic acid. Lecithin supplementation has a protective effect on the liver against fatty liver. In a clinical trial of patients with fatty liver, where the fat deposits in the hepatocytes were disruptive of their function, it was found that lecithin supplementation minimized this insult on the hepatocytes (Turecky L et al, 2003). Lecithin helps to prevent gallstone formation by stimulating bile formation and biliary lipid secretion, particularly of cholesterol. Lecithin has its effect of solubilisation of cholesterol within the bile, preventing the formation of gallstones.
- It has significant properties that help to protect the tissues against oxidative damage.
- It protects against fatty liver disease.
- It decreases oxidative stress in the liver by helping to restore glutathione levels.
- It helps prevent and reverse hepatic (liver) fibrosis.
- It helps to prevent gallstone formation.
- It has beneficial effect on the vascular system though modification of hepatic cholesterol homeostasis and lipoprotein metabolism.
- Lecithin which is a good source of phosphatdylcholine.

Potassium

The regulation of potassium levels in the body is of crucial importance. One of the ways potassium is regulated is through an insulin-mediated uptake and release from the liver and muscles, helping to regulate the distribution of this molecule between the intercellular and extracellular fluid compartments (Decaux G al, 1988). In studies on humans, these authors found that liver damage decreased uptake of potassium into the liver, despite there being more than adequate amounts of insulin available to promote this. Fasting also decreases the levels of potassium in the liver. It has been found in studies that potassium may help to protect the liver from tumor necrosis factor.
- Fasting decreases the levels of potassium in the liver.
- It helps to protect the liver from tumor necrosis factor.
- It is one of the dietary measures that have been suggested as a way of reducing the risk of Alzheimer disease.

Magnesium.

Magnesium, a metal, is an essential micronutrient for humans. Magnesium deficiency has been noted when the liver is under environmental stress. It has been proposed that this could result from an inadequate dietary intake of magnesium, poor absorption of magnesium from the gut, or from loss of magnesium as a result of the use of natriuretic drugs (Oralewska B et al, 1996). These authors found deficiencies in 30% of children that they studied. It was further suggested that the fall in magnesium levels in the blood is a reflection of the extent of the damage to the liver cells. In another study with magnesium the authors found that insulin sensitivity was observed and insulin secretion was reduced with magnesium deficiencies. It also was observed that when magnesium supplementation was given, the insulin resistance restored to normal in the liver. They proposed that it was a result of magnesium having an early action on the interaction of insulin with the hepatic cells. These authors, (Rozycky J, Lewicki Z, 1978), found that low magnesium levels may promote the deposition of fat in the liver. Magnesium deficiency results in both proliferation and enlargement of Ito cells in the liver. These authors proposed that the lipid accumulation resulted from reduced levels of lipid metabolizing and transporting enzymes, which in turn was a consequence of the lack of magnesium needed in the enzyme structure.

- Liver stress may result in magnesium deficiency.
- Low magnesium levels may promote the deposition of fat in the liver.
- Magnesium supplementation is needed with insulin resistance within the liver.
- Magnesium deficiency may cause liver disease.

Aspartate

Aspartate in hepatic detox is found as magnesium and potassium aspartate. Aspartate is an amino acid. The main role in the liver is in the urea cycle and in purine and pyrimidine biosynthesis. Aspartate is important in assisting the liver to cope with toxins. In particular aspartate helps the liver clear toxic ammonia by promoting the formation of urea.

- It assists the liver to cope with toxins.
- It improves urea production, helping to detoxify the liver of ammonia.
- It may have clinical usefulness in patients with acute or chronic liver failure.

Zinc

Zinc is a metal that is essential for growth and development, as it is an important component of many enzymes. Zinc deficiencies increase the susceptibility to some viral infections that attack the liver. In one study it was found that nutritional deficiencies, such as vitamin E, Folic Acid, Vitamin B6, Zinc, and selenium resulted in alteration of the immune system that eventually increase susceptibility to certain virus infection such as hepatitis B virus and hepatitis C virus (Poschl G,Seitz HK,2004). In another study it linked zinc deficiency to liver cirrhosis and diabetes mellitus. Zinc supplementation increased glucose disposal. It was proposed by these authors that zinc deficiency is linked between liver cirrhosis and "liver" diabetes mellitus (Grungreiff K, Reinhold D, 2005).

Zinc helps to protect against toxins like lead and cadmium, and Zinc also has a balancing effect with copper when in excess. Zinc and magnesium have a synergistic effect within the liver for many enzyme functions.

- Its deficiency increases the susceptibility to some viral infections that attack the liver.
- Zinc deficiency is a characteristic of both liver cirrhosis and diabetes mellitus.
- Diets deficient in zinc have an adverse impact on the liver.
- Zinc deficiency depresses glycogen catabolism in the liver.
- It helps to protect against some toxins.

- Alcohol consumption can lead to liver damage and adversely affect zinc levels in the liver.
- It can raise glutathione peroxidase levels in the liver, reducing the risk of lipid peroxidation in the hepatocytes and helping to maintain the integrity of the cell membranes of the hepatocytes.
- It protects against some cancers.

Selenium

Selenium is an essential nutrient for humans. It is an essential component of the enzyme glutathione peroxidase, which helps protect against oxidative damage in the liver and particularly in the membranes of the red corpuscles. Selenium is essential for normal liver function. One role in the liver is to combine with the amino acid cysteine to form selenocysteine, which is then incorporated into a class of proteins known as selenoproteins, which have both antioxidant and selenium transport factions. It has been demonstrated that inadequate levels of selenoproteins in the liver can result in hepatocellular degeneration, liver necrosis and death. Other papers report a protective effect of selenoprotein against toxins that can cause damage to the liver. The biochemical and physicochemical properties of selenium in the unique redox characteristics of selenocysteine and its use in antioxidant enzymes. In this context of a redox reaction is reduction of reactive oxygen metabolites by glutathione peroxidases, helping to maintain membrane integrity, reducing the oxidative damage to lipids, lipoprotein and DNA. Selenium has structural and enzymatic roles, and also influences a number of endocrine processes, most notably those involved in thyroid hormones synthesis and metabolism. Selenium is needed for the proper functioning of the immune system, a role in viral suppression, AIDS, and is implicated in delaying the aging process. Its deficiency has been linked to a number of disorders such as heart disease, diabetes and diseases of the liver. It is required for sperm motility and may reduce the risk of miscarriage. Selenium supplementation has moved from the realm of correcting nutritional deficiencies to one of pharmacological intervention, especially in the clinical domain of cancer chemoprevention. Selenium protects against aluminium toxicity; something that is useful as this metal can be neurotoxic. It also protects against cadmium poisoning in the liver as well as protects against lead toxicity. Selenium also has a protective role in the liver against a wide range of heavy metals. It was found that selenium within the liver helped to protect against mercury, silver, copper and cadmium. It had its effect in several locations within the cells. Mercury and silver preferentially accumulates in the nuclear, lysosomal and mitochondrial fraction of the hepatocytes, whereas copper and cadmium accumulates mainly in the cytosol. Cadmium impairs the liver of detoxification.

- It can positively influence the health status, symptomatic presentation and life span whose detoxification systems are compromised.
- It is essential for liver function.
- It protects against disease and aging.
- Exercise increases the requirement for selenium.
- It promotes antioxidant activity in the tissues.
- It protects against a wide range of toxins, including heavy metals.
- It protects against actions of the prednisolone and some chemotherapeutic agents in the liver.
- It has a protective action in alcoholic liver disease.
- It has a protective action against some cancers.
- It protects against some viral infections that attack the liver.

Folic acid

Also known as folate, folic acid is essential in the body. At least one-half of the folate stores in the body are found in the liver, with the level of these stores being influenced by the dietary intake of this vitamin. Folate deficiency does remove some protection from DNA strands and this can promote cancer within the liver. This is because folate, together with other molecules such as Methionine and vitamin B12, play an important role in DNA methylation and this methylation influences the expression of genes. The enzyme responsible for this methylation is methylenetetrahydrofolate reductase, which is responsible for the de novo synthesis of methyl groups. Its stated that diminished activity of this enzyme, which is derived from folic acid, is associated with an increased risk of developing atherosclerosis, neurological disorders, birth defects and may lead to liver cancer. Folic acid, together with vitamin B12, B6 and the activated form of B6 pyridoxine-5-phosphate has the role of reducing the effects of homocysteine in the blood plasma. The supplementation of these vitamins can reduce levels of low-density lipoprotein in cases of high hyperhomocysteinaemia, thereby reducing risk of atherosclerosis and possibly also diabetes and alcoholic liver disease. Folic acid helps to protect

the liver against some toxins. By providing folate it was found that it had important influence on toxins. It has effects on the glutathione level within the liver, an important antioxidant for the liver defense.

- Deficiencies in folic acid intake increase the susceptibility to some viral infections that attack the liver.
- Folic acid deficiency promotes the carcinogenic consequences of alcohol metabolism and cigarette smoking.
- It improves normal liver morphology.
- It helps the treatment or prevention of atherosclerosis and other condition in the people with certain genetic disorders.
- It helps to protect the liver against some toxins.
- It is a potent scavenger of free radicals and can significantly inhibit microsomal lipid peroxidation.
- It may have a role in the prevention of Alzheimer disease.
- It may help in the prevention of birth defect.

Vitamin B6 and Pyridoxal-5-Phosphate

Vitamin B6 is also known as Pyridoxine. Vitamin B6 and Pyridoxal-5-Phosphate is a water-soluble vitamin. The concentration is mainly found in the liver and kidneys. In the body this vitamin is important as a coenzyme in amino acid metabolism. Additionally pyridoxine and pyridoxal-5-phosphate is involved in the release of glucose from glycogen in the liver. In patients with fatty liver (cirrhosis) there is a decreased metabolism in the liver of vitamin B6 to pyridoxal-5-phsphate (the active coenzyme form of B6), which is reflected by low levels of this molecule in the plasma of these patients. However they found that oral supplementation with pyridoxine and pyridoxal-5-phosphate restored levels to normal range, indicating a supportive effect of the vitamin in the liver. In a related study, plasma levels of pyridoxal-5-phoshate were found to be significantly lower than normal in patients with decompensated cirrhosis or subacute hepatic necrosis, with no significant difference in plasma pyridoxal-5-phosphate levels between those with liver disease. All patients responded to supplements of pyridoxal-5-phosphate and vitamin B6. Vitamin B6 is involved with reducing the effects of homocysteine.

- Through its methylating ability it may prevent the development of some cancers.
- It mobilizes liver glycogen, resulting in an increase in serum glucose levels.
- It has an impact on the metabolism of both lipids and proteins.
- Deficiency states can be caused by alcohol and fasting.
- Deficiencies of B6 may have a role in causing fatty liver.
- Deficiencies in vitamin B6 intake increase the susceptibility to some viral infection that attack the liver.
- Vitamin B6 reduces the effect of homocysteine.

Vitamin B12

Also known as cobalamin, or extrinsic factor, vitamin B12 is one of the water-soluble B group vitamins. This vitamin was the first naturally occurring biologically active molecule found to require cobalt as a part of its molecular structure. In nature bacteria synthesize this vitamin, while green plants contain none of the vitamin. The main dietary sources are egg yolk and milk, which means that some strict vegetarians may become deficient in this vitamin. Absorption of this vitamin from the gut requires the presence of a molecule referred to as intrinsic factor, which resides in the gastric mucosa. This factor forms a pepsin resistant combination with the vitamin B12, allowing it to be absorbed in the lower intestine. Pernicious anemia develops when intrinsic factor is defective. Vitamin B12 binds to other groups to have a range of biological effects in the body. Cyanocobalamin (vitamin B12) is needed to prevent the development of pernicious anemia. Vitamin B12 forms a coenzyme needed for the methylation of

Hepatic Detox is a comprehensive liver support nutrient required for good liver function and helps support detoxification.

RNA, a process that is important in protein synthesis. Vitamin B12 and folate are needed as coenzymes for DNA methylation, which are methyl donors during DNA synthesis. DNA methylation is an intracellular process that can influence the expression of some genes and can therefore effect cellular metabolism. The transmethylation metabolic pathways, which provide or removed the methyl groups closely, interconnect the important methyl group molecules; chorine, Methionine, methyltetrahydrofolate, vitamin B6 and vitamin B12. Abnormal DNA methylation has been associated with liver cancers (Brunaud Let al, 2003). This means that deficiencies in any of the major dietary sources of methyl groups (such as Methionine and chorine), or a deficiency in vitamin B12 which is needed as a coenzyme in the methylation process, may result in the development of liver cancers as well as other cancers. Deficiencies in vitamin B12 disrupt metabolism within the liver. In a study of livers it was found that this disrupted normal glucose and glutamic acid metabolism, possibly though an inhibition on the citric acid cycle (Toyoshima S et al, 1996). A deficiency in B12 results in decreased folate incorporation in tissues of the liver. It also results in depressed synthesis in Methionine and lecithin. Lecithin is an important protective molecule in the liver. These changes can result in alterations in membrane lipoid composition and therefore in cellular function. Deficiencies in a range of nutrients including vitamin B12 can result in hyerhomocysteinmia, which is a component of several disorders including cardiovascular disease, neurodegeneration, diabetes and liver disease. Hyerhomocysteinmia increases production of intracellular superoxide anion causing oxidative stress and induces endoplasmic reticulum stress, which can result in apoptosis, fat accumulation and inflammation.

- Through its methylating ability it may prevent the development of some cancers.
- Liver disease can result in a loss of vitamin B12 from the liver.
- Deficiencies in vitamin B12 disrupt metabolism within the liver.
- Some toxins and disease states result in disturbances in vitamin B12 metabolism.
- It protects against some of the action of toxins on the liver.
- Its supplementation may have a role in the prevention of Alzheimer disease.
- B12 supplementation may help reduce hyerhomocysteinmia.

Ascorbic acid

Also known as vitamin C, ascorbic acid is a water-soluble vitamin essential for health. As it cannot be synthesized in the body, it must be ingested. This vitamin is important in the body in many hydroxylation reaction (such as that involving the conversion of the amino acid proline into collagen). It is critical for maintaining the structure of the walls of blood vessels because of its role in collagen biosynthesis. Because vitamin C is a potent antioxidant, it helps to protect all tissues in the body. This is because many toxic agents exert their effects in the body by increasing the levels of damaging free radicals in the tissues and antioxidants are able to scavenge these free radicals to protect the tissues. Vitamin C assists in the mitigation of heavy metal toxicity. In one study it looked at cadmium and arsenic, two particularly toxic chemicals, it was found that ascorbic acid protects against the effects of arsenic on mitochondria. Vitamin C also appears to be protective against lead toxicity. The liver is a target organ for 3,4-methylenedioxymethamphetamine (MDMA, 'Ecstasy'), resulting in toxicity in that organ when this drug is taken. This toxicity appears to result from impaired antioxidant defense systems, but it can be alleviated somewhat by increased levels of antioxidants such as vitamin C. Evidence supporting vitamin C on the liver was provided in a good study on ischaemic livers, where the vitamin C scavenging of free radicals helped to reduce injury to liver tissue. Similar results have been found in vitamin C and its effects to protect the liver following damage by toxicants. One of the consequences of oxidative stress is the induction of collagen synthesis, which in the liver could lead to reduced function of the hepatocytes. This fibrosis can be induced with alcohol. The authors concluded that a mixture of antioxidants, including vitamin C, is needed.

- It protects against heavy metal toxicity.
- It protects the liver against oxidative stress.
- It reduces the chance of fibrosis developing in the liver.
- It protects against the effects of alcohol on the liver.
- It protects against atherosclerosis and other diseases by preventing abnormal lipid metabolism.

Hesperidin

Hesperidin is a flavone. These are plant pigments that contain flavone ring system. Hesperidin is known as a bioflavonoid, Hesperidin has a range of

beneficial effect in the body. Because of their molecular structure, the bioflavoniods are antioxidants, and therefore help to protect tissues against oxidative damage. Indeed the pharmacological antioxidant properties of Hesperidin are similar to those of vitamin E. Dietary supplementation with Hesperidin has demonstrated the lowering of hepatic triglyceride content, as well as plasma cholesterol levels. The ability of Hesperidin to lower triglyceride levels in the liver has been demonstrated in studies. It was shown that dietary Hesperidin reduced the hepatic triglyceride accumulation induced by orotic acid (in rats) and this was associated with the reduced activity of the hepatic microsomal triglyceride synthetic enzyme, phosphatidate phosphohydrolase. In studies on diabetes, Hesperidin has been found to reduce oxidative stress in the tissues, demonstrating further the antioxidant properties of this bioflavonoid. In nature, bioflavonoids are found together with vitamin C. Vitamin C and the bioflavonoids have a bewildering array of application which makes them appear like the old medicine man's magic, something which doses not endear them to the orthodox thinkers. Dr Robbins of the university of Florida, investigated the antithrombic activity of bioflavonoids for about 6-7 years. He had research showing that bioflavonoids have anti-adhesive effects on blood cells. That is, they prevent blood cells from clumping together and forming blood cots, which can cause massive damage to the circulation through the heart, lungs, brain and liver. His experiments showed that bioflavonoids were indeed potent antithrombins.

- It lowers hepatic triglyceride content, as well as plasma cholesterol levels.
- It reduces oxidative stress in the tissues.
- It offers some protection against the early stages of diabetes mellitus and its complications.
- It is found in nature together with vitamin C and has a synergistic effect together with vitamin C.

Rutin

Rutin, like Hesperidin, is a flavone, also known as a bioflavonoid. Rutin is the most potent scavenger of superoxide anions, more potent than its near relative, Hesperidin. Rutin, together with other antioxidants, is important in protecting us from disease and aging. In situations where there is inadequate vitamin E (which normally is a potent antioxidant), Rutin and other flavonoids can take over from vitamin E as a major antioxidant in the liver. Rutin has a substantial protective effect on the liver. Dietary supplementation with Rutin has demonstrated to increase the antioxidant capacity of the liver. This study has been supported in a study of human volunteers who took Rutin supplements over six weeks. These studies indicate that Rutin could be a useful supplement for anyone whose liver is under assault by toxic agents. When there is an iron overload in the body, Rutin has been found to be protective possibly through the formation of inactive iron-Rutin complexes. In rat models that were studied, Rutin was found to substantially reduce free radical production in lipid microsomes.

- It protects against disease and aging.
- It is a potent antioxidant.
- It protects against oxidative damage to DNA and proteins.
- It has a substantial protective effect on the liver.
- It protects the liver against a range of toxic chemicals.
- It helps to protect against some carcinogens, including those in cigarette smoke.
- It protects against an iron overload in the body.

Each tablet contains:

Silybum marianum ext. equiv Dry fruit (St. Mary's Thistle) Standardised to contain *Silybin* *35mg*	3.5g
L. Methioine	100mg
L. Glycine	75mg
L Cysteine Hydrochloride	50mg
L. Glutamine	50mg
Inositol	50mg
L. Lysine Hydrochloride	50mg
L. Taurine	30mg
Levocarnitine	25mg
Glutamic Acid	25mg
Lecithin	40mg
Potassium Aspartate (potassium 5.4mg)	25mg
Magnesium Aspartate (Magnesium 1.7mg)	25mg
Zinc Amino Acid Chelate (Zinc 4mg)	20mg
Selenomethionine (selenium 5mcg)	12.5mg
Folic Acid	25mcg
Pyridoxal-5-Phosphate	2.5mg
Pyridoxine Hydrochloride (vitamin B6)	10mg
Cyanocobalamin (vitamin B12)	25mcg
Ascorbic Acid (Vitamin C)	50mg
Hesperidin	40mg
Rutin	10mg

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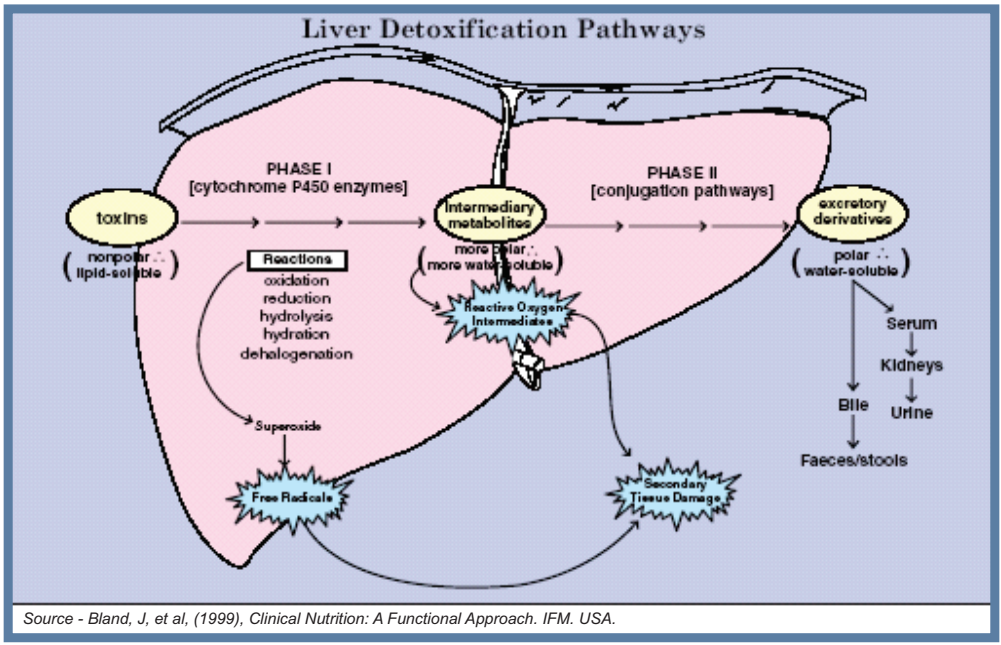
Suggested Uses for Hepatic Detox:

- Exposure to heavy metals & environmental toxins
- High copper levels
- Constipation
- Loose bowels
- Indigestion
- Bloating
- Poor appetite
- Food allergies
- Bad breath
- Psoriasis
- Nausea associated with fatty meals
- Fatty liver
- Cirrhosis
- Hepatitis
- Hangovers
- Alcoholics
- Bowel wind
- Headaches / migranes
- Sugar cravings
- Skin problems
- Dermatitis
- Acne
- Skin rashes
- Tiredness
- Fatigue
- Insomnia
- Immune weakness
- Diet high in processed foods
- Aging process
- Obesity
- Weight loss
- Stress
- Light coloured stools
- Hypercholesterolemia
- Dry hair
- Hair - split ends
- Dry scalp
- Gout
- Joint pains
- Spoon nails
- Nails splitting or lifting at the edges
- Hormonal imbalances
- Pmt
- Users of oral contraceptive
- Irritability
- Anger
- Depression
- Anxiety
- Drug use e.g. Paracetamol
- Bile disturbances



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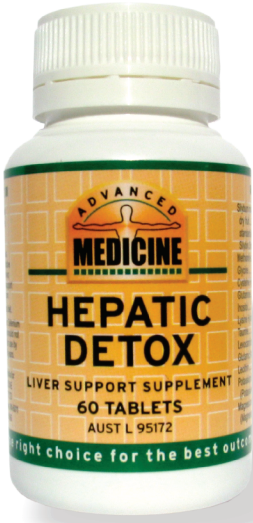

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