

Life Extension Magazine September 2011

REPORT

Protect Your Body Against Today's Toxic Deluge

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Nearly 70,000 industrial chemicals¹ may now be found in everyday products, with 1,000 new synthetic chemicals introduced each year.² Only a fraction of these have been tested for safety in humans.

EPA estimates indicate that average Americans may be carrying approximately **700 industrial chemicals** in their bodies.³

In a Centers for Disease Control report, results from screenings of 2,500 Americans for **148** industrial chemicals were released.⁴ The startling findings reveal significant quantities of these chemicals were found in the bloodstreams of every individual tested.

As the body's primary detoxifier, your liver serves as the frontline defense against chemical agents. Extracts from the **milk thistle** plant are among the most potent defenders of liver function. They are capable of halting and even *reversing* externally induced liver damage.

In this article, you will discover recent data underscoring milk thistle's unique power to defend the liver against the effects of known toxins. You will also learn of research supporting its preventive effects against age-related diseases, including **atherosclerosis, cancer, neurodegenerative disease, and diabetes.**⁵⁻⁸

LIVER PROTECTION

The liver performs over **300** critical metabolic functions. It is your body's primary metabolic processor for virtually all substances, including those that are internally produced, like protein and cholesterol, and externally introduced substances like drugs and alcohol. Its central role in transforming or eliminating these chemicals makes the liver especially susceptible to chemically induced injury.

In addition to overexposure to thousands of synthetic chemicals in our post-industrial age,⁹ everyday drugs have been shown to dramatically increase the liver's chemical burden. More than **900** drugs have been implicated in liver damage, including statins, hormonal contraceptives, and antibiotics like erythromycin.⁹ The popular pain-relieving drug **Tylenol® (acetaminophen)** happens to be the number one cause of acute liver failure in the United States.¹⁰

Many drugs require liver function monitoring to ensure no damage has been inflicted. Unfortunately, the damage inflicted by many liver toxins (also known as *hepatotoxins*) often goes undetected. This makes routine blood testing of vital importance, particularly if you're taking a drug with potential hepatotoxic effects. Elevated liver enzymes in the blood indicate liver dysfunction, although liver damage can develop rapidly, before liver enzyme abnormalities manifest.

Silymarin, silibinin, and other milk thistle components protect against these and other chemical insults. They have been conclusively shown to counteract toxicity from a wide variety of toxic substances, including **ethanol,**¹¹ **organic solvents,**¹² **pharmaceuticals,**^{13,14} and mushroom-based poisons or **mycotoxins.**^{15,16} Milk thistle, for instance, produces superior survival rates from *Amanita phalloides* mushroom poisoning, compared with standard treatment.¹⁷

By altering liver cell membranes, silymarin inhibits toxin uptake and stimulates **cell regeneration.**^{18,19} Silymarin's potent antioxidant activity helps to quell inflammation and replenish **glutathione.**¹⁸ Glutathione is the chief antioxidant inside most living cells and is the main line of defense against free radical damage. It is found in high concentrations in the liver.



WHAT YOU NEED TO KNOW: SILYMARIN AND CHEMICAL OVERLOAD

- The liver is subjected to constant chemical assaults in the modern world.
- The phytonutrient silymarin, derived from the milk thistle plant, has been conclusively shown to both protect and heal the liver from multiple forms of damage induced by foreign compounds and infectious agents.
- Milk thistle also combats liver damage caused by metabolic burdens such as excessive alcohol and caloric intake.
- Recent research indicates a role for silymarin in combating cancer, atherosclerosis, and neurodegenerative diseases like Alzheimer's as well.

Human studies are equally confirmatory. Silymarin treatment has been shown to significantly reduce liver-related mortality in patients with alcoholic liver damage.^{17,20} Clinical evidence supports silymarin for alcohol-induced cirrhosis.^{16,21} Silymarin reduced the symptoms of biliary retention caused by acute hepatitis of various causes in humans.²²

In a review of viral hepatitis studies, silymarin decreased liver enzymes known as serum transaminases²³ and improved symptoms and general well-being.²⁴ Regarding activity against hepatitis C virus, silymarin and its components were anti-inflammatory. All compounds blocked virus-induced oxidative stress. Multiple assays suggest that numerous milk thistle compounds may help ameliorate hepatitis C disease.²⁵

A high-carbohydrate diet can cause excess blood triglycerides to lodge in hepatic cells, causing inflammation and oxidative damage.²⁶⁻²⁸ This in turn results in **nonalcoholic fatty liver disease** or NAFLD, a condition that afflicts roughly **one-third** of all Americans.²⁹

Left unchecked, NAFLD can progress to cirrhosis, carcinoma, and death. Clinical trials investigating silymarin showed **significant reduction in liver enzymes** alanine aminotransferase (ALT) and aspartate aminotransferase (AST), with no serious side effects.²⁹ The authors concluded that this inexpensive and readily available extract should be considered an adjunct therapy in the treatment of NAFLD.



NEUROPROTECTION

Milk thistle's constituents, including silymarin, are powerful antioxidants.³³ Beyond its utility as a liver tonic, milk thistle also protects against **nerve damage** and **abnormal brain aging**.

Silymarin helps protect certain cells of the central nervous system from free radical damage.³⁴ It may also help protect against brain injury caused by stroke.³⁵ Research in an animal model of dementia shows that silymarin reduces amyloid-beta deposition in the brain while improving behavior, a finding that suggests applications in preventing or slowing the progression of **Alzheimer's disease**.⁸

SILYMARIN AND MILK THISTLE: LIVER PROTECTION ACROSS THE MILLENNIA

Silybum marianum, or milk thistle, the source for the potent silymarin complex, has been used for over 2,000 years to treat liver disease. Currently, seed extracts are in common use to protect against liver damage from alcohol or pollutants and are prescribed for various liver conditions.

Milk thistle is approved in the German Commission E Monographs for inflammatory liver conditions. These monographs, compiled for the licensed medical prescription of botanicals in Germany, rank among the world's most respected and definitive evaluations of the safety and efficacy of various herbs and phytonutrient interventions.³⁰



Milk Thistle

PROTECTION AGAINST CARDIOVASCULAR DISEASE

Silymarin is also protective for those at high risk for **cardiovascular disease**. In animal models, silymarin's antioxidant properties were shown to reduce oxidation of low-density lipoprotein (LDL)—a finding with important applications for protecting against cardiovascular health.³⁶ Silymarin offers further atherosclerotic activity by inhibiting inflammation-induced adhesion molecule expression.³⁷

Silymarin benefits lipid (fat) metabolism and protects against the ravages of overeating. Animals placed on a high-fat diet to induce hardening of the arteries (*atherosclerosis*) exhibited significant benefit from silymarin: reduced **LDL**, total cholesterol, **triglycerides**; and increased **high-density lipoprotein (HDL)** and glutathione.^{38,39}

LDL and total cholesterol levels decreased in prostate cancer surgery patients who were administered silymarin (**570 mg**) with selenium (**240 mcg**).⁶

FIGHTING METABOLIC DISORDERS

A **4-month** clinical trial comprising **51** patients with type 2 diabetes showed that **200 mg** of silymarin **3 times** daily significantly lowered LDL, total cholesterol, and triglycerides, compared to placebo. It also lowered liver enzymes, fasting blood sugar, and **hemoglobin A1c**—a measure of long-term blood sugar control.⁵ In effect, silymarin may help your liver and your entire body cope with the trauma of excess food consumption. Benefits may also extend to diabetes⁵ and kidney injury.⁴⁰



COMBATING CANCER

The chemopreventive role of silymarin has been established in laboratory and animal studies. Silymarin interferes with cancer growth and immortality, and it exhibits anti-inflammatory and anti-*metastatic* activity (prevents cancer spread). Furthermore, silymarin and silibinin may be valuable adjuncts to established anti-cancer therapies, to mitigate toxicity from chemotherapy or radiotherapy.⁷

Silibinin demonstrates efficacy against numerous malignancies including those of the liver, colon, skin, and prostate.⁴¹⁻⁴⁵



Cancer cell

Both topical and internally ingested silibinin extracts show promise against skin cancer. Silibinin displays photoprotection against the skin cancer-inducing effects of ultraviolet (UV) radiation through anti-inflammatory and anti-angiogenic effects.⁴³ Silibinin may thus represent an important topical and internal agent for protecting the skin against the cancer-inducing effects of UV light.

Silibinin is an essential component for arresting replication of prostate cancer cells.⁴¹ Silibinin inhibited tumor growth, progression, local invasion, and distant metastasis of prostate cancer in mice. Research suggests that silibinin works in part by inducing cell cycle arrest.⁴⁴

Among the milk thistle flavonolignans, isosilybin B proved to be the most effective at inhibiting prostate cancer cell growth and maintaining healthy prostate cell division.^{46,47} Isosilybin B suppressed a genetic factor in human cancers and was active against both hormone-dependent and hormone-independent prostate cancers in the laboratory.⁴⁸ Isosilybin A and B together were effective suppressors of prostate-specific antigen (PSA) secretion, a marker of prostate cancer progression and recurrence.⁴⁶

Together, these findings argue strongly for silibinin's use as an adjunct to conventional chemotherapy.⁴⁹

MILK THISTLE'S ACTIVE COMPONENTS

Milk thistle's use is supported by research on its active ingredients. Several polyphenols called flavonolignans have been extracted from milk thistle. Collectively, these extracts are called silymarin and are under investigation for many health conditions.

The active compounds isolated thus far include silybin A, silybin B, isosilybin A, isosilybin B, silydianin, isosilydianin, silychristin and isosilychristin.^{31,32}

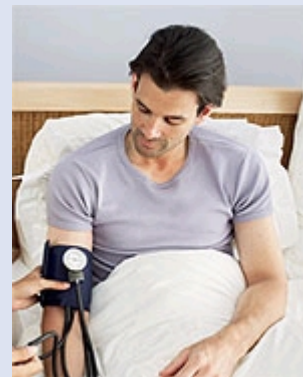


SUMMARY

The liver is subjected to constant chemical assaults in the modern world. Over 70,000 industrial chemicals of unknown safety and **900** drugs known to induce liver damage underscore the critical need for optimal liver support. Milk thistle extracts protect and heal the liver from multiple forms of damage induced by foreign compounds, metabolic burdens, and infectious agents. Recent research indicates a role for silymarin, silibinin, and other milk thistle components in combating cancer, atherosclerosis, and neurodegenerative diseases like Alzheimer's as well.

VITAL LIVER FUNCTIONS

- Detoxification
- Glycogen storage; blood sugar regulation
- Protein production/storage; regulation of protein metabolism
- Bile production
- Cholesterol production
- Production of clotting factors; red blood cell components
- Hormonal regulation
- Free-radical neutralization
- Storage of vitamins, minerals



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