



Each Tablet Contains: Proprietary blend 700 mg* of: Milk Thistle Extract (80% silymarin), Cordyceps Sinensis, Green Tea Extract (leaf), N-Acetyl Cysteine, Dandelion (root), Burdock (root).

Supportive Function: LV Renew boasts a powerful combination of Milk Thistle (80% silymarin) with synergistic nutrients known for their ability to support liver function. N-Acetyl Cysteine raises glutathione, the body's strongest antioxidant, the majority of which functions in the liver. Other ingredients, such as cordyceps sinensis, dandelion, burdock and green tea also contribute to the strength of the formula.

When is Liver Support helpful? Inflammation, Stagnation, Dysfunction, Fatty Liver, Detoxification, Liver Fibrosis, and any condition where optimizing liver function (and clearing toxic insults) can help.

Clinical Applications/Research:

Milk Thistle (*Silybum Marianum*) is a flowering *herb* native to the Mediterranean region. It has been used for thousands of years for many things, but historically it is utilized mostly for the support of liver function. Silymarin is a flavonolignan complex isolated from milk thistle (which also contains "silybin") that has been called "cytoprotective" (cell-protective), "immunostimulatory", "antioxidant", and "hepatoprotective" (liver protective) by researchers (Gharagozloo M, et al. Immunomodulatory effects of silymarin in patients with β -thalassemia major. *Int Immunopharmacol.* 2013 Apr 26;16(2):243-247.)

It is believed that silymarin exerts some of its effects through inhibition of free radicals and influence on inflammation. Scientists set out to assess liver function tests of 77 gas refinery workers chronically exposed to hydrogen sulfide gas before and after administration of silymarin (140 mg, three times per day for 1 month). A significant reduction of liver enzymes (blood AST, ALT and ALP) was observed after 30 days of consumption of silymarin. (Mandegary A, et al. Hepatoprotective effect of silymarin in individuals chronically exposed to hydrogen sulfide; modulating influence of TNF- α cytokine genetic polymorphism. *Daru.* 2013 Apr 8;21(1):28.)

Silibinin has been described as the most active component of the silymarin complex of flavonoids contained in milk thistle. According to Kostek et al. (2012), its mechanism of action is complex and highly beneficial for liver cells, blocking the penetration of various toxins into the hepatocytes. It decreases oxidative free radicals by increasing the activity of the enzymes superoxide dismutase and glutathione peroxidase, as well as by increasing the concentration of glutathione (the body's well known and powerful antioxidant found mostly in liver). Silibinin strengthens and stabilizes the cell membranes, inhibits the synthesis of prostaglandins associated with the lipid peroxidation and "promotes regeneration of liver" through the stimulation of protein synthesis and effect on the production of new hepatocytes. "Clinical trials conducted in this respect are very encouraging. The other beneficial application of silibinin is in therapy of the alcoholic liver cirrhosis. The evidence shows that the use of silymarin leads to a significant reduction in liver-related mortality and even reduction in the number of patients with encephalopathy in the course of the disease. Application of silibinin goes beyond liver disease. What is interesting is the fact that this substance of herbal origin occurring in the environment is so strong, favorable, beneficial and multidirectional" (Kostek H, et al. Silibinin and its hepatoprotective action from the perspective of a toxicologist. *Przegl Lek.* 2012;69(8):541-3.)

Blood Sugar: Milk thistle was one of the nutraceuticals determined to “be the most beneficial” when it comes to supporting glucose control (Lee T & Dugoua JJ. Nutritional supplements and their effect on glucose control. *Adv Exp Med Biol.* 2012;771:381-95.)

Nerve Health: Researchers claimed that “Our data demonstrate that milk thistle extract can promote neuronal differentiation and survival, suggesting potential benefits of chemicals in this plant on the nervous system” (Kittur S, et al. Neurotrophic and neuroprotective effects of milk thistle (*Silybum marianum*) on neurons in culture. *J Mol Neurosci.* 2002 Jun;18(3):265-9.)

Cordyceps Sinensis has been used widely in traditional Chinese medicine (TCM) for centuries. WebMD describes cordyceps as a tonic and an adaptogen used to strengthen the immune system, increase energy, and improve liver function (WebMD.com cordyceps overview). Modern applications for cordyceps include muscle/athletic performance (increases production of ATP), brain, heart, lung and mitochondria support, heavy metal detoxification, and improving the integrity of the HPA (Hypothalamus/pituitary) axis, thus calming the nervous system and supporting restful sleep (“this experiment can provide basic evidence that cordycepin may be helpful for sleep-disturbed subjects” - Hu Z, et al. *Cordycepin Increases Nonrapid Eye Movement Sleep via Adenosine Receptors in Rats. Evid Based Complement Alternat Med.* 2013;2013:840134). It possesses antioxidant properties, and is known for its ability to help kidney function (“Cordyceps sinensis may protect against chronic hypoxia injury in diabetic nephropathy” - Yuan M, et al. Effect of Cordyceps sinensis on expressions of HIF-1 α and VEGF in the kidney of rats with diabetic nephropathy. *Zhong Nan Da Xue Xue Bao Yi Xue Ban.* 2013 May;38(5):448-57.)

In a comprehensive two part review series that covered preclinical in vitro and in vivo studies, and open-label and double-blinded clinical trials on the respiratory, renal, hepatic, cardiovascular, immunologic, and nervous systems, and its effects on the immune system, glucose metabolism, and inflammatory conditions (Part I, which appeared in the Fall 1998 issue (4(3):289-303), discussed effects on antisenescence, endocrine and sexual functions, atherosclerosis, hyperlipidemia, and free radicals) the reports were amazingly favorable in all categories (Jia-Shi Ahu et al. The Scientific Rediscovery of a Precious Ancient Chinese Herbal Regimen: Cordyceps sinensis Part II *The J Alt Comp Med* 1998;4(4):429-457.)

A study from *Int Immunopharmacol* states that “many studies have shown that cordyceps sinensis has immunoregulatory activity in many disease models, but the underlying mechanism remains elusive.”

Researchers tried to hypothesize about the underlying mechanisms with an experiment that altered T cell subsets in diabetes-prone mice. They discovered that the onset of diabetes was associated with an imbalance of regulatory T cells (cells that regulate and prevent overreactivity of the immune system) and aggressive T cells known as TH17 cells. When they administered cordyceps sinensis, it “resulted in reduction in the overall incidence of diabetes, and this was due to an increase in the ratio of Treg cells to Th17 in the spleen and pancreatic lymph nodes. Taken together, these data imply that cordyceps sinensis is able to modulate Treg to Th17 cell ratio in vivo...” (Shi B, et al. Immunoregulatory Cordyceps sinensis increases regulatory T cells to Th17 cell ratio and delays diabetes in NOD mice. *Int Immunopharmacol.* 2009 May;9(5):582-6.)

The major known effect of cordyceps is on the liver. In a rat study, researchers found that Cordyceps sinensis could “inhibit liver fibrogenesis derived from chronic liver injury, retard the development of cirrhosis, and **notably ameliorate the liver function**”; the possible mechanism involved inhibiting TGF β (1) expression, thereby preventing the deposition of procollagen I and III (Liu YK, Shen W. Inhibitive effect of cordyceps sinensis on experimental hepatic fibrosis and its possible mechanism. *World J Gastroenterol.* 2003 Mar;9(3):529-33.)

Nerve Health: Cordyceps was able to help when there was some impairment of the central nervous system; it reduced autonomic movements, and was able to increase the effects of sedatives (Jia-Shi Ahu et al. The Scientific Rediscovery of a Precious Ancient Chinese Herbal Regimen: Cordyceps sinensis Part II *The J Alt Comp Med* 1998;4(4):429-457.)

N-Acetyl Cysteine is the main building block of the antioxidant glutathione. Since gastrointestinal absorption of the glutathione molecule is limited, administration of N-acetyl cysteine, as the rate limiting building block, is actually more effective at raising glutathione levels than administering glutathione because the N-acetyl cysteine is carried to the cells where glutathione is made internally.

In fact, when someone suffers from acetaminophen (Tylenol) overdose, their symptoms are due to depletion of glutathione. However, the hospital standard of care is not to administer glutathione (due to poor absorption),

the protocol is to administer N-acetyl cysteine, in order that the N-acetyl cysteine can be carried to the cells to make glutathione (Amathieu R, et al. Severe toxic acute liver failure: Etiology and treatment. *Ann Fr Anesth Reanim.* 2013 May 14.)

In a model of rats prone to liver injury, those given N-acetyl cysteine showed a decrease in congestion, polymorphonuclear leukocytes, mononuclear leukocytes, vacuolar degeneration of hepatocytes, and hepatocellular necrosis. Researchers hypothesized that the antioxidant properties of N-acetyl cysteine were responsible for the favorable effect on liver health (Sahin S, Alatas O. The protective effects of n-acetylcysteine against acute hepatotoxicity. *Indian J Gastroenterol.* 2013 Mar 10.)

N-Acetyl-Cysteine and Nerve Health/Inflammation: N-actyl-cysteine demonstrated an effect on axonal sprouting in rats, leading scientists to speculate that there might be a therapeutic potential in the early treatment of traumatic spinal cord injury (Karalija A et al. Neuroprotective effects of N-acetyl-cysteine and acetyl-L-carnitine after spinal cord injury in adult rats. *PLoS One.* 2012;7(7):e41086.) Other researchers encourage “the use of N-actyl-cysteine for the experimental treatment of inflammatory pain in humans.” (Bernabucci M, et al. N-Acetyl-cysteine causes analgesia by reinforcing the endogenous activation of type-2 metabotropic glutamate receptors. *Mol Pain.* 2012 Oct 23;8:77.)

Green Tea Extract consists of several catechins, which include the well-known epigallocatechin gallate (EGCG). These catechins are rich in polyphenols and act as scavengers of reactive oxygen species (free radicals); their antioxidant activity is believed to function, in part, through modulation of transcriptional factors and enzyme activities. In PubMed, 168 studies pulled up under “green tea extract and liver” alone, attesting to the fact that green tea is a widely researched nutrient (especially in the animal model) for its “antioxidant and anti-inflammatory effects” (Cai Y, et al. *Pathog Dis.* 2013 Feb;67(1):76-83; Hodgson AB et al. *Adv Nutr.* 2013 Mar 1;4(2):129-40.) In animal studies, green tea catechins were found to stimulate liver regeneration and attenuate liver dysfunction (Saito Y, et al. Beneficial effects of green tea catechin on massive hepatectomy model in rats. *J Gastroenterol.* 2013 Mar 30).

Green tea reduces lipid peroxidation and increases the activities of antioxidant enzymes, such as catalase, glutathione peroxidase (GSH-Px) and glutathione reductase (GSH-Rd) in the liver. Reducing oxidative stress and increasing antioxidant enzymes may be mechanisms by which green tea is able to affect the deposition of collagen and fibrotic activity in the liver (Tsai CF, et al. The in vivo antioxidant and antifibrotic properties of green tea (*Camellia sinensis*, Theaceae). *Food Chem.* 2013 Feb 15;136(3-4):1337-44.)

Green Tea and Nerve Health: Exogenously administered nerve growth factor (NGF) repairs injured axons, but it does not cross the blood-brain barrier. Therefore, scientists believe that agents with the ability to affect endogenous NGF would be of great utility for neurological injuries. An interesting study reporting that green tea polyphenols potentiated NGF demonstrated that the polyphenols, not one in particular, all “**synergistically promoted this action**”. This report suggested that the polyphenols of green tea extract in its entirety (not fractionated into a specific catechin) was more effective than fractionated polyphenols (separated into specific catechins such as EGCG) (*J Neurosci Res.* 2010 Dec;88(16):3644-55. Gundimeda U, et al. Green tea polyphenols potentiate the action of nerve growth factor to induce neurogenesis: possible role of reactive oxygen species.)

Dandelion has a reputation for liver support and action as a mild diuretic. Mechanisms may include the effect of dandelion root on fibrotic activity, possibly mediated by “the inactivation of hepatic stellate cells and the enhancement of hepatic regenerative capabilities”, leading scientists to believe that there is enough scientific evidence to substantiate the traditional use of dandelion root in hepatic health (Domitrović R, et al. *Antifibrotic activity of Taraxacum officinale root in carbon tetrachloride-induced liver damage in mice.* *J Ethnopharmacol.* 2010 Aug 9;130(3):569-77.)

It’s believed that excessive oxidative stress contributes to the development of atherosclerosis-linked metabolic syndrome. According to one study, dandelion root can “protect against oxidative stress linked atherosclerosis and decrease the atherogenic index” (Ung-Kyu Choi et al. Hypolipidemic and Antioxidant Effects of Dandelion (*Taraxacum officinale*) Root and Leaf on Cholesterol-Fed Rabbits. *Int J Mol Sci.* 2010 January; 11(1): 67–78.)

Dandelion has shown an effect on immune parameters, including cytokines and interleukins, being cited as improving “fatigue-related indicators and immunological parameters” (Lee BR, et al. Effects of *Taraxacum officinale* on fatigue and immunological parameters in mice. *Molecules.* 2012 Nov 7;17(11):13253-65.)

Dandelion and Nerve Health: In a study reporting beneficial effects of a diet with added dandelion on lead toxicity (on rats) showed that the antioxidant property of dandelion was thought to be responsible for preventing absorption of lead into the brain and related damages (Food Chem Toxicol. 2012 Jul;50(7):2303-10. doi: 10.1016/j.fct.2012.04.003. Gargouri M, et al. Spirulina or dandelion-enriched diet of mothers alleviates lead-induced damages in brain and cerebellum of newborn rats.)

Burdock Root, a perennial herb, has been cultivated for a long time as a popular vegetable. Burdock root improved activity of superoxide dismutase (antioxidant enzyme), lowered MDA (sign of lipid peroxidation) and dramatically reduced lipofuscin (a wear and tear pigment associated with aging) in rats (Liu S, et al. An experimental research into the anti-aging effects of Radix Arctii Lappae. To delve into the anti-aging effects and mechanism of Niubanggen (Radix Arctii Lappae). J Tradit Chin Med. 2005 Dec;25(4):296-9.)

Burdock also suppressed the SGOT and SGPT elevations (liver enzymes) induced by toxic assault and alleviated the severity of liver damage based on histopathological observations in a similar study. Mechanisms of action included reversing the decrease in glutathione and P-450 normally induced by the toxic assault. The antioxidative effect was believed responsible for the beneficial effects on liver cells (Lin CC, et al. Hepatoprotective effects of Arctium lappa on carbon tetrachloride- and acetaminophen-induced liver damage. Am J Chin Med. 2000;28(2):163-73; Lin CC, et al. Anti-inflammatory and radical scavenge effects of Arctium lappa. Am J Chin Med. 1996;24(2):127-37.)

Testimonials/Nutrient Tidbits:

Suggested Dosage: 1 tablet daily or as directed

Size: 60 tablets

Vegetarian: Yes

Contraindications: Some of the herbs in this formula may lower blood sugar levels. This is normally a good thing, but use caution with diabetes, hypoglycemia or drugs affecting blood sugar. This product contains natural blood thinners and should not be combined with blood thinning drugs. Not recommended in pregnancy/lactation.

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