# Silymarin: A Potent Antioxidant, Liver Protector, and Anti-Cancer Agent

Silymarin is a unique flavonoid complex—containing silybin, silydianin, and silychrisin—that is derived from the milk thistle plant. These unique phytochemicals from the milk thistle have been the subject of decades of research into their beneficial properties.

Milk thistle’s common name comes from the white markings on the leaves, its milky white sap, and its traditional use by nursing mothers to increase milk. But it is best known for its use as a liver protectant and decongestant, which can be traced to the Greeks and Pliny the Elder (23-79AD), who wrote that it was excellent for “carrying off bile.” The famous English herbalist Culpepper (1616-1654) used milk thistle to cleanse the liver and spleen, and to treat jaundice and gallstones.[1](https://www.smart-publications.com/articles/silymarin-a-potent-antioxidant-liver-protector-and-anti-cancer-agent#fn-195-1)

In the U.S., the Eclectics—a prominent group of American doctors who practiced during the 20th century—used it for liver problems, and to treat varicose veins, menstrual problems, and kidney disorders. The plant was also cultivated as a food, providing leaves for salad, seeds for a coffee-like drink, and flowers, which were eaten as artichokes are today.1

In 1968, a group of German scientists discovered the active flavonoid complex silymarin, which provides milk thistle’s medicinal benefits.[2](https://www.smart-publications.com/articles/silymarin-a-potent-antioxidant-liver-protector-and-anti-cancer-agent#fn-195-2)

Since then, hundreds of studies have been done on silymarin, and it is approved in the German Commission E Monographs (the most accurate information available on the safety and efficacy of herbs) as a supportive treatment for inflammatory liver conditions such as cirrhosis, hepatitis, and fatty infiltration caused by alcohol and other toxins.[3](https://www.smart-publications.com/articles/silymarin-a-potent-antioxidant-liver-protector-and-anti-cancer-agent#fn-195-3)

Silymarin is used to:

* Regenerate liver cells damaged by alcohol or drugs
* Decongest the liver (A liver decongestant stimulates bile flow through the liver and gallbladder, thus reducing stagnation and preventing gallstone formation and bile-induced liver damage.)
* Increase the survival rate of patients with cirrhosis[4](https://www.smart-publications.com/articles/silymarin-a-potent-antioxidant-liver-protector-and-anti-cancer-agent#fn-195-4)
* Complement the treatment of viral hepatitis[5](https://www.smart-publications.com/articles/silymarin-a-potent-antioxidant-liver-protector-and-anti-cancer-agent#fn-195-5)
* Protect against industrial poisons, such as carbon tetracholoride (a colorless gas that leaks into air, water and soil near manufacturing and waste sites)[6](https://www.smart-publications.com/articles/silymarin-a-potent-antioxidant-liver-protector-and-anti-cancer-agent#fn-195-6)
* Protect the liver against pharmaceuticals that stress the liver, such as acetaminophen and tetracycline[1](https://www.smart-publications.com/articles/silymarin-a-potent-antioxidant-liver-protector-and-anti-cancer-agent#fn-195-1)
* Antidote and prevent poisoning from the death cap mushroom, Amanita phalloides [7](https://www.smart-publications.com/articles/silymarin-a-potent-antioxidant-liver-protector-and-anti-cancer-agent#fn-195-7)[8](https://www.smart-publications.com/articles/silymarin-a-potent-antioxidant-liver-protector-and-anti-cancer-agent#fn-195-8)[9](https://www.smart-publications.com/articles/silymarin-a-potent-antioxidant-liver-protector-and-anti-cancer-agent#fn-195-9)

## **How does silymarin work?**

* As an antioxidant, silymarin scavenges for free radicals that can damage cells exposed to toxins. Silymarin has been said to be at least ten times more potent in antioxidant activity than vitamin E.[10](https://www.smart-publications.com/articles/silymarin-a-potent-antioxidant-liver-protector-and-anti-cancer-agent#fn-195-10)[11](https://www.smart-publications.com/articles/silymarin-a-potent-antioxidant-liver-protector-and-anti-cancer-agent#fn-195-11)[12](https://www.smart-publications.com/articles/silymarin-a-potent-antioxidant-liver-protector-and-anti-cancer-agent#fn-195-12)
* It increases glutathione in the liver by more than 35% in healthy subjects and by more than 50% in rats.[13](https://www.smart-publications.com/articles/silymarin-a-potent-antioxidant-liver-protector-and-anti-cancer-agent#fn-195-13) Glutathione is responsible for detoxifying a wide range of hormones, drugs, and chemicals. High levels of glutathione in the liver increases its capacity for detoxification.
* Silymarin also increases the level of the important antioxidant enzyme superoxide dismutase in cell cultures.[14](https://www.smart-publications.com/articles/silymarin-a-potent-antioxidant-liver-protector-and-anti-cancer-agent#fn-195-14)
* It stimulates protein synthesis in the liver, which results in an increase in the production of new liver cells to replace the damaged ones.[15](https://www.smart-publications.com/articles/silymarin-a-potent-antioxidant-liver-protector-and-anti-cancer-agent#fn-195-15)
* Silymarin inhibits the synthesis of leukotrienes (mediators of inflammation, which can result in psoriasis, among other things).[16](https://www.smart-publications.com/articles/silymarin-a-potent-antioxidant-liver-protector-and-anti-cancer-agent#fn-195-16)

[Thorne Research – Siliphos – Botanical Extract Complex for Antioxidant and Liver Support – 90 Capsules](https://www.amazon.com/gp/product/B001PLKZKI/ref%3Das_li_tl?ie=UTF8&camp=1789&creative=9325&creativeASIN=B001PLKZKI&linkCode=as2&tag=ussmart0c-20&linkId=05c82deca752ed4604db3e3bdaa293d3)

##

1. Presser, Arthur. *Pharmacist’s Guide to Medicinal Herbs*. Smart Publications, Petaluma, CA, 2000.pp 259-260.

[↑](https://www.smart-publications.com/articles/silymarin-a-potent-antioxidant-liver-protector-and-anti-cancer-agent/#fn-ref-195-1)

1. Wagner, H., et al. “The Chemistry of Silymarin (Silybin), the Active Principle of the Fruits of Silybum marianum.” *Arzneim-Forsch Drug Res*. 1968; 18:688-96.

[Abstract](http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?cmd=Retrieve&db=PubMed&list_uids=5755805&dopt=Abstract) [↑](https://www.smart-publications.com/articles/silymarin-a-potent-antioxidant-liver-protector-and-anti-cancer-agent/#fn-ref-195-2)

1. Blumenthal M, Busse W Goldberg A, eds. *The Complete German Commission E Monographs*. 1998; Austin, TX: American Botanical Council; Boston: Integrative Medical Communications.

[↑](https://www.smart-publications.com/articles/silymarin-a-potent-antioxidant-liver-protector-and-anti-cancer-agent/#fn-ref-195-3)

1. Ferenci P, et al. Randomized, controlled trial of silymarin treatment in patients with cirrhosis of the liver. *J Hepatol*1989;9:105-13.

[Abstract](http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?cmd=Retrieve&db=PubMed&list_uids=2671116&dopt=Abstract)[↑](https://www.smart-publications.com/articles/silymarin-a-potent-antioxidant-liver-protector-and-anti-cancer-agent/#fn-ref-195-4)

1. Berenguer J and Carrasco D. Double-blind trial of silymarin versus placebo in the treatment of chronic hepatitis. *Muench Med Wochenschr* 1977; 119, 240-260.

[↑](https://www.smart-publications.com/articles/silymarin-a-potent-antioxidant-liver-protector-and-anti-cancer-agent/#fn-ref-195-5)

1. Wagner H. Plant constituents with antihepatotoxic activity.*Natural Products as Medicinal Agents* (Beal JL and Reinhard E, eds.) 1981; Hippokrates-Verlag, Stuttgart, Germany.

[↑](https://www.smart-publications.com/articles/silymarin-a-potent-antioxidant-liver-protector-and-anti-cancer-agent/#fn-ref-195-6)

1. Faulstich H, et al. Silybin inhibition of amatoxin uptake in the perfused rat liver. *Arzneim-Forsch Drug Res* 1980;30:452-4

[Abstract](http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?cmd=Retrieve&db=PubMed&list_uids=7387753&dopt=Abstract) [↑](https://www.smart-publications.com/articles/silymarin-a-potent-antioxidant-liver-protector-and-anti-cancer-agent/#fn-ref-195-7)

1. Tuchwever B, et al. Prevention of silybin of phalloidin induced acute hepatoxicity. *Toxicol Appl Pharmacol*1979;51:265-75.

[Abstract](http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?cmd=Retrieve&db=PubMed&list_uids=531892&dopt=Abstract)[↑](https://www.smart-publications.com/articles/silymarin-a-potent-antioxidant-liver-protector-and-anti-cancer-agent/#fn-ref-195-8)

1. Catalina MV, Nunez O, Ponferrada A, Menchen L, Matilla A, Clemente G, Banares R. [Liver failure due to mushroom poisoning: clinical course and new treatment perspectives] [Article in Spanish] *Gastroenterol Hepatol*. 2003; Aug-Sep;26(7):417-20.

[Abstract](http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?cmd=Retrieve&db=PubMed&list_uids=12887855&dopt=Abstract)[↑](https://www.smart-publications.com/articles/silymarin-a-potent-antioxidant-liver-protector-and-anti-cancer-agent/#fn-ref-195-9)

1. Awang D. Milk thistle. *Can Pharm J* 1993; 422, 403-404.

[↑](https://www.smart-publications.com/articles/silymarin-a-potent-antioxidant-liver-protector-and-anti-cancer-agent/#fn-ref-195-10)

1. Wagner H. Antihepatotoxic flavonoids. *Plant Flavonoids in Biology and medicine: Biochemical, Pharmacological, and Structure-Activity Relationships*. 1986; Alan R. Liss, New York, pp. 545-558.

[↑](https://www.smart-publications.com/articles/silymarin-a-potent-antioxidant-liver-protector-and-anti-cancer-agent/#fn-ref-195-11)

1. Adzet T. Polyphenolic compounds with biological and pharmacological activity. *Herbs Spices Med Plants* 1986;1,167-184.

[↑](https://www.smart-publications.com/articles/silymarin-a-potent-antioxidant-liver-protector-and-anti-cancer-agent/#fn-ref-195-12)

1. Valenzuela A, et al. Selectivity of silymarin on the increase of the glutathione content in different tissues of the rat. *Planta Medica*1989; 55, 420-422.

[Abstract](http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?cmd=Retrieve&db=PubMed&list_uids=2813578&dopt=Abstract) [↑](https://www.smart-publications.com/articles/silymarin-a-potent-antioxidant-liver-protector-and-anti-cancer-agent/#fn-ref-195-13)

1. Muzes G, et al. Effect of the bioflavonoid silymarin on the in vitro activity and expression of super oxide dismutase (SOD) enzyme. 1991; *Acta Physiol Hungarica* 78, 3-9.

[Abstract](http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?cmd=Retrieve&db=PubMed&list_uids=1763650&dopt=Abstract) [↑](https://www.smart-publications.com/articles/silymarin-a-potent-antioxidant-liver-protector-and-anti-cancer-agent/#fn-ref-195-14)

1. Fiebrich G and Koch H. Silymarin, an inhibitor of lipoxygenase.*Experientia* 1979; 35,148-150.

[↑](https://www.smart-publications.com/articles/silymarin-a-potent-antioxidant-liver-protector-and-anti-cancer-agent/#fn-ref-195-15)

1. Nassuato G, Iemmolo RM, Strazzabosco M, et al. Effect of silibinin on biliary lipidcomposition: experimental and clinical study. *J Hepatol* 1991; 12: 290-5.

[↑](https://www.smart-publications.com/articles/silymarin-a-potent-antioxidant-liver-protector-and-anti-cancer-agent/#fn-ref-195-16)

1. Singh RP, Agarwal R, Prostate cancer prevention by silibinin,*Curr Cancer Drug Targets*. 2004 Feb;4(1):1-11).

[Abstract](http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?cmd=Retrieve&db=pubmed&dopt=Abstract&list_uids=14965263)[↑](https://www.smart-publications.com/articles/silymarin-a-potent-antioxidant-liver-protector-and-anti-cancer-agent/#fn-ref-195-17)

1. Zi X, Agarwal R. Silibinin decreases prostate-specific antigen with cell growth inhibition via G1 arrest, leading to differentiation of prostate carcinoma cells: implications for prostate cancer intervention. *Proc Natl Acad Sci USA* 1999; 96: 7490-7495.

[Abstract](http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?cmd=Retrieve&db=PubMed&list_uids=10377442&dopt=Abstract) [↑](https://www.smart-publications.com/articles/silymarin-a-potent-antioxidant-liver-protector-and-anti-cancer-agent/#fn-ref-195-18)

1. Yang SH, Lin JK, Chen WS, Chiu JH.Anti-angiogenic effect of silymarin on colon cancer LoVo cell line. *J Surg Res*. 2003; Jul;113(1):133-8.

[Abstract](http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?cmd=Retrieve&db=PubMed&list_uids=12943822&dopt=Abstract) [↑](https://www.smart-publications.com/articles/silymarin-a-potent-antioxidant-liver-protector-and-anti-cancer-agent/#fn-ref-195-19)

1. Gallo D, Giacomelli S, Ferlini C, Raspaglio G, Apollonio P, Prislei S, Riva A, Morazzoni P, Bombardelli E, Scambia G. Antitumour activity of the silybin-phosphatidylcholine complex, IdB 1016, against human ovarian cancer. *Eur J Cancer*. 2003; Nov;39(16):2403-10.

[Abstract](http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?cmd=Retrieve&db=PubMed&list_uids=14556934&dopt=Abstract) [↑](https://www.smart-publications.com/articles/silymarin-a-potent-antioxidant-liver-protector-and-anti-cancer-agent/#fn-ref-195-20)

1. Singh RP, Agarwal R, Flavonoid antioxidant silymarin and skin cancer, *Antioxid Redox Signal*. 2002 Aug;4(4):655-63.

[Abstract](http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?cmd=Retrieve&db=pubmed&dopt=Abstract&list_uids=12230878) [↑](https://www.smart-publications.com/articles/silymarin-a-potent-antioxidant-liver-protector-and-anti-cancer-agent/#fn-ref-195-21)

1. Sharma G, Singh RP, Chan DC, Agarwal R, Silibinin induces growth inhibition and apoptotic cell death in human lung carcinoma cells, *Anticancer Res*. 2003 May-Jun;23(3B):2649-55.

[Abstract](http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?cmd=Retrieve&db=pubmed&dopt=Abstract&list_uids=12894553) [↑](https://www.smart-publications.com/articles/silymarin-a-potent-antioxidant-liver-protector-and-anti-cancer-agent/#fn-ref-195-22)

1. Zi X, Feyes DK, Agarwal R, Anticarcinogenic effect of a flavonoid antioxidant, silymarin, in human breast cancer cells MDA-MB 468: induction of G1 arrest through an increase in Cip1/p21 concomitant with a decrease in kinase activity of cyclin-dependent kinases and associated cyclins, *Clin Cancer Res*. 1998 Apr;4(4):1055-64.

[Abstract](http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?cmd=Retrieve&db=pubmed&dopt=Abstract&list_uids=9563902) [↑](https://www.smart-publications.com/articles/silymarin-a-potent-antioxidant-liver-protector-and-anti-cancer-agent/#fn-ref-195-23)

1. Bhatia N, Zhao J, Wolf DM, Agarwal R, Inhibition of human carcinoma cell growth and DNA synthesis by silibinin, an active constituent of milk thistle: comparison with silymarin, *Cancer Lett*. 1999 Dec 1;147(1-2):77-84.

[Abstract](http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?cmd=Retrieve&db=pubmed&dopt=Abstract&list_uids=10660092) [↑](https://www.smart-publications.com/articles/silymarin-a-potent-antioxidant-liver-protector-and-anti-cancer-agent/#fn-ref-195-24)

1. Scambia G, De Vincenzo R, Ranelletti FO, et al, Antiproliferative effect of silybin on gynaecological malignancies: synergism with cisplatin and doxorubicin, *Eur J Cancer*. 1996 May;32A(5):877-82.

[Abstract](http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?cmd=Retrieve&db=pubmed&dopt=Abstract&list_uids=9081370) [↑](https://www.smart-publications.com/articles/silymarin-a-potent-antioxidant-liver-protector-and-anti-cancer-agent/#fn-ref-195-25)

1. Dhanalakshmi S, Agarwal P, Glode LM, Agarwal R, Silibinin sensitizes human prostate carcinoma DU145 cells to cisplatin- and carboplatin-induced growth inhibition and apoptotic death, *Int J Cancer*. 2003 Sep 20;106(5):699-705.

[Abstract](http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?cmd=Retrieve&db=pubmed&dopt=Abstract&list_uids=12866029) [↑](https://www.smart-publications.com/articles/silymarin-a-potent-antioxidant-liver-protector-and-anti-cancer-agent/#fn-ref-195-26)

1. Morazzoni P, Montalbetti A, Malandrino S, Pifferi G, Comparative pharmacokinetics of silipide and silymarin in rats,*Eur J Drug Metab Pharmacokinet*. 1993 Jul-Sep;18(3):289-97.

[Abstract](http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?cmd=Retrieve&db=pubmed&dopt=Abstract&list_uids=8149949) [↑](https://www.smart-publications.com/articles/silymarin-a-potent-antioxidant-liver-protector-and-anti-cancer-agent/#fn-ref-195-27)

1. Schandalik R, Gatti G, Perucca E, Pharmacokinetics of silybin in bile following administration of silipide and silymarin in cholecystectomy patients, *Arzneimittelforschung*. 1992 Jul;42(7):964-8.

[Abstract](http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?cmd=Retrieve&db=pubmed&dopt=Abstract&list_uids=1329780) [↑](https://www.smart-publications.com/articles/silymarin-a-potent-antioxidant-liver-protector-and-anti-cancer-agent/#fn-ref-195-28)

1. Comoglio A, Tomasi A, Malandrino S, Poli G, Albano E., Scavenging effect of silipide, a new silybin-phospholipid complex, on ethanol-derived free radicals, *Biochem Pharmacol*. 1995 Oct 12;50(8):1313-6.

[Abstract](http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?cmd=Retrieve&db=pubmed&dopt=Abstract&list_uids=7488251) [↑](https://www.smart-publications.com/articles/silymarin-a-potent-antioxidant-liver-protector-and-anti-cancer-agent/#fn-ref-195-29)

1. Duke, James. A. *The Green Pharmacy*. Rodale Press. 1977.

[↑](https://www.smart-publications.com/articles/silymarin-a-potent-antioxidant-liver-protector-and-anti-cancer-agent/#fn-ref-195-30)

1. Mokhtari MJ, Motamed N, Shokrgozar MA. Evaluation of silibinin on the viability, migration and adhesion of the human prostate adenocarcinoma (PC-3) cell line. Cell Biol Int. 2008 Aug;32(8):888-92. Epub 2008 Apr 8.

[Abstract](http://www.ncbi.nlm.nih.gov/pubmed/18538589?ordinalpos=5&itool=EntrezSystem2.PEntrez.Pubmed.Pubmed_ResultsPanel.Pubmed_DefaultReportPanel.Pubmed_RVDocSum) [↑](https://www.smart-publications.com/articles/silymarin-a-potent-antioxidant-liver-protector-and-anti-cancer-agent/#fn-ref-195-31)

1. Tyagi A, Sharma Y, Agarwal C, Agarwal R. Silibinin impairs constitutively active TGFalpha-EGFR autocrine loop in advanced human prostate carcinoma cells. Pharm Res. 2008 Sep;25(9):2143-50. Epub 2008 Feb 6.

[Abstract](http://www.ncbi.nlm.nih.gov/pubmed/18253818?ordinalpos=9&itool=EntrezSystem2.PEntrez.Pubmed.Pubmed_ResultsPanel.Pubmed_DefaultReportPanel.Pubmed_RVDocSum) [↑](https://www.smart-publications.com/articles/silymarin-a-potent-antioxidant-liver-protector-and-anti-cancer-agent/#fn-ref-195-32)