

Silymarin (milk thistle extract) as a therapeutic agent in gastrointestinal cancer

Silymarin contains a group of closely-related flavonolignan compounds including silibinin, and is extracted from *Silybum marianum* species, also called milk thistle. Silymarin has been shown to protect the liver in both experimental models and clinical studies. The chemopreventive activity of silymarin has shown some efficacy against cancer both in vitro and in vivo. Silymarin can modulate apoptosis in vitro and survival in vivo, by interfering with the expression of cell cycle regulators and apoptosis-associated proteins. In addition to its anti-metastatic activity, silymarin has also been reported to exhibit anti-inflammatory activity. The chemoprotective effects of silymarin and silibinin (its major constituent) suggest they could be applied to reduce the side effects and increase the anti-cancer effects of chemotherapy and radiotherapy in various cancer types, especially in gastrointestinal cancers. This review examines the recent studies and summarizes the mechanistic pathways and down-stream targets of silymarin in the therapy of gastrointestinal cancer.