

BroccoProtect™

A synergistic broccoli blend enhanced with myrosinase to optimize bioavailability



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BroccoProtect™ is an optimized blend of broccoli seed extract and broccoli sprout concentrate, providing preformed sulforaphane (SFN), sulforaphane glucosinolate (SGS) and a proportional amount of myrosinase enzyme for maximal conversion of SGS to SFN. It is designed to help support detoxification, antioxidant capacity and cellular health, as well as offer cardiovascular and neuronal protection.*

BroccoProtect™ features:

- **Broccoli Seed Extract** – standardized to provide 3 mg SFN and 7.5 mg SFN potential from 23 mg of SGS per serving. The broccoli seeds are grown in North America and processed with supercritical fluid extraction, leaving no solvent residue in the finished product
- **Broccoli Sprout Concentrate** – a good source of myrosinase enzyme, included to maximize bioavailability of SGS by approximately 10 times compared to other SGS formulas without myrosinase. (Myrosinase converts SGS to SFN during transport through the gastrointestinal tract.)
- **Delayed Release Capsule** – ensures that the reaction between SGS and myrosinase occurs in the alkaline environment of the intestines, maximizing SGS conversion to SFN and avoiding conversion to nitriles, which is favored in acidic environments³⁷

Health benefits of sulforaphane (SFN), a derivative of sulforaphane glucosinolate*

- **Supports detoxification:** SFN upregulates phase II P450 enzymes, facilitating detoxification.^{1,30-32,38} It is important for phase II detoxification to keep up with the rate of phase I reactions because intermediates produced by phase I may be more harmful than their original forms.
- **Promotes healthy cellular function:** SFN upregulates antioxidant defenses in normal cells but may increase oxidative stress in abnormal cells.¹⁹ It has been shown to mitigate cancer cell proliferation and migration in several types of cancer, through multiple mechanisms.^{6,7,10,11,13,14,19,20,21,24}
- **Supports healthy hormone levels:** SFN facilitates transformation and elimination of estrogen metabolites via stimulation of the enzymes glutathione S-transferase and quinone reductase, which convert estrogen quinones into safer metabolites.¹
- **Supports normal immune function:** SFN was shown in an animal model to upregulate Th1 response, partially mitigating age-related decline in innate immune activity.⁴
- **Exhibits protective effects against vascular damage characteristic of diabetes and cardiovascular disease:** Animal and cell culture studies suggest SFN may reduce oxidation of LDL, decrease formation of advanced glycation end products (AGEs), and reduce AGE-induced inflammation in endothelial cells and the aorta.^{22,23,25}
- **Supports healthy neurological function:** Animal models indicate SFN penetrates the blood-brain barrier and delivers neuroprotective effects in the CNS, primarily through activation of the Nrf2/ARE pathway, providing anti-inflammatory and antioxidant actions that may protect against the neurodegenerative processes that underlie stroke, traumatic brain injury, Alzheimer's and Parkinson's diseases.³⁶ Additionally, SFN has been shown to inhibit dopamine oxidation, thus prolonging its actions.³⁸
- **Inhibits *H. pylori* viability and pathological effects on gastric mucosa:** SFN has demonstrated antibacterial effects in cellular studies against *H. pylori* strains with resistance to several antibiotics,⁸ and reduced colonization and attenuated gastritis in *H. pylori*-infected mice and humans.³³ When supplemented in animals, SFN inhibited processes leading to gastric tumor formation caused by *H. pylori*-induced DNA damage.⁸

Highlights:

- Delivers a targeted dose of sulforaphane in 2 caps at approx. 100 µM (see Table 1)
- Higher preformed SFN content and SFN potential per serving than any other formulas on the market
- The SGS bioavailability in this formula does not depend on intestinal bacteria's ability to produce myrosinase, which may be variable and even negligible in some individuals^{16,17,30}
- Does not contain significant amounts of goitrogens (affecting thyroid function), unlike a few servings of cruciferous vegetables
- Safe to use in conjunction with blood thinners due to low vitamin K content per capsule (~0.6 mcg K1), unlike the substantial amount in cruciferous vegetables

Supplement Facts

Serving Size 1 capsule

Amount Per Serving	% Daily Value
Broccoli Blend	500 mg *
Broccoli Seed Extract, Broccoli Sprout Concentrate (<i>Brassica oleracea italica</i>)[providing 23 mg sulforaphane glucosinolate, 4 enzyme units of myrosinase, and 3 mg sulforaphane]	

*Daily Value not established.

Other Ingredients: Cellulose (delayed release capsule), microcrystalline cellulose, calcium ascorbate, silicon dioxide, vegetable stearate.



Purpose of SGS supplements and their sulforaphane potential

The consumption of raw cruciferous vegetables in the US has been estimated at two servings/week,⁴² with an average US intake of glucosinolates at approximately 13 mg/day.^{41,42} Based on epidemiological evidence, this level of intake is not adequate to derive maximal benefits from their active metabolites, isothiocyanates. One example of a well-researched isothiocyanate is sulforaphane. Results from studies that investigated the effects of supplementation with SGS (broccoli extracts) or preformed sulforaphane showed improvement of many aspects of physiology. Sulforaphane supplements that effectively deliver therapeutic levels are not available; formulas containing SGS plus myrosinase can be used instead to support significant sulforaphane formation and absorption in the body.^{16,40}

Myrosinase increases bioavailability of SGS and other glucosinolates from co-ingested cruciferous vegetables

Numerous human, animal and cellular studies show that diets rich in cruciferous vegetables (e.g., broccoli, cabbage, kale, radishes, watercress, mustard greens) promote a wide range of health benefits owing to specific active ingredients such as glucosinolates, which include sulforaphane glucosinolate. These have been recognized as some of the most potent in affecting health outcomes.^{17,24,29} The conversion of glucosinolates to isothiocyanates is catalyzed by myrosinase contained in raw cruciferous plants.¹⁵ Juicing or chopping/chewing of raw cruciferous vegetables brings myrosinase in contact with glucosinolates, enabling their conversion to isothiocyanates,³⁰ a class of compounds which includes sulforaphane. Unfortunately, cooking and other processing of cruciferous plants may inactivate the naturally occurring myrosinase, depending on the temperature applied and its duration.⁴⁰ Thus, the glucosinolate content of processed/cooked foods must be converted to isothiocyanates with the aid of myrosinase produced by intestinal bacteria. This conversion occurs at a much lower rate—1.2%-7.3%—after ingesting cooked foods as compared to 77% after ingesting raw foods.³⁰ Thus, lack of myrosinase may reduce bioavailability of glucosinolates from cooked cruciferous foods by as much as 10-64 times. Supplementation with BroccoProtect™ can provide enough myrosinase for both the SGS in the supplement and also for the glucosinolates contained in the co-ingested cruciferous vegetables (especially if cooked), to support their conversion to sulforaphane and/or isothiocyanates.

The SGS content of one capsule of BroccoProtect™ is 23 mg (52.8 μM) plus 3 mg SFN, the total amount being similar to that provided by approx. 50 g of fresh raw broccoli (1/2 - 3/4 cup),⁴³ while both sources provide myrosinase. Table 1 illustrates the metabolic steps and calculation of the sulforaphane produced ("SFN potential") from ingesting one capsule of BroccoProtect™. Table 2 lists the same facts for a supplement containing the equivalent amount of SGS without myrosinase and shows approximately 10 times lower bioavailability compared to BroccoProtect™. Therapeutic levels of sulforaphane have been reported in the range of 100 μM and above,^{32,37-39} which may be delivered by a minimum of 2 capsules of BroccoProtect™ per day, ideally 12 hours apart, for sustained activity.

Glucosinolates derived from diets high in cruciferous vegetables can add up to beneficial levels of intake, but one would have to consume approximately three cups of raw broccoli or similar amounts of other cruciferous vegetables per day in order to support formation of approximately 100 μM of sulforaphane and/or other isothiocyanates.^{32,37-39} Thus, a more practical approach for deriving a consistent intake of glucosinolates with active myrosinase is to use a combination of sources: a diet rich in cruciferous vegetables along with 1-2 capsules of BroccoProtect™.

Active ingredients	Ingredients metabolism in upper GI	Ingredients metabolism in lower GI	SFN	Total SFN
23 mg SGS plus 4 EU MYR	MYR catalyzes the conversion of SGS to SFN at an approximate rate of 80% (70%-90% ¹⁷)	MYR produced by from GI bacteria is not relied upon, since 4 enzyme units of MYR from BroccoProtect™ maximize the SGS to SFN conversion	approx.* 7.5 mg SFN potential	10.5 mg (60 μM*)
3 mg SFN	SFN is absorbed unchanged	SFN is absorbed unchanged	3 mg SFN*	

Active ingredients	Ingredient metabolism in upper GI	Ingredient metabolism in lower GI	SFN potential
23 mg SGS and no MYR	A portion of SGS is likely absorbed in the blood unchanged, which reduces the total amount available for conversion to SFN in the lower GI	MYR (from GI bacteria) catalyzes SGS to SFN conversion at an approximate rate of 10% (11.5% ¹⁶ , 9.4% ¹⁷)	Approx. 0.9 mg (5.2 μM **)

* 23 mg SGS=52.8 μM SGS. A conversion rate of 80% of 52.8 μM SGS = 42.2 μM SGS, which converts to 42.2 μM SFN = 7.5 mg SFN. 3 mg SFN = 17.7 μM SFN. 17.7 μM SFN + 42.2 μM SFN = approx. 60 μM SFN

**A conversion rate of 10% of 52.8 μM SGS = 5.3 μM SGS, which converts to 5.3 μM SFN = 0.9 mg SFN.

SGS: sulforaphane glucosinolate; MYR: myrosinase; SFN: sulforaphane.

The molecular weight of SGS = 436 μg/μM. molecular weight of SFN = 177.3 μg/μM

Recommended Use:

- As a dietary supplement, take one capsule per day with a meal, or as directed by your health care practitioner.

Synergistic combinations with additional DFH formulations:

- For added phytonutrients from fruit and vegetables: PaleoGreens®, PaleoReds®, EssentiaGreens™
- For hormonal metabolism modulation: DIM-Evail™, FemGuard+Balance™, Prostate Supreme™
- For detoxification support: Amino-D-Tox™, Detox Antiox™, Glutathione Power, S-Acetyl-Glutathione, VegeCleanse™
- For cellular health support: Curcum-Evail®, Resveratrol Supreme, EGCG, Prostect™, Inflammation™, Tocotrienol formulations

For a list of references cited in this document, please visit:

<https://www.designsforhealth.com/techsheet-references/broccoprotect-references.pdf>

Dosing recommendations are given for typical use based on an average 150 pound healthy adult. Health care practitioners are encouraged to use clinical judgement with case-specific dosing based on intended goals, subject body weight, medical history, and concomitant medication and supplement usage.

***These statements have not been evaluated by the Food and Drug Administration. This product is not intended to diagnose, treat, cure or prevent any disease.**

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