Calcium D-Glucarate

*β-Glucuronidase Inhibition for Detoxification Support**

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Calcium D-Glucarate is calcium bound to D-glucaric acid, which is a natural compound produced in small amounts by the human body that is abundantly found in various plant foods, such as broccoli, cabbage, kale, apples, oranges, and grapefruit. Research shows that D-glucaric acid derivatives, such as calcium D-glucarate, help support the body's natural elimination of toxins and excess steroid hormones.* Oral supplementation of calcium D-glucarate provides the body with an efficient, slow-released source of its active metabolite, D-glucaro-1, 4-lactone, an inhibitor of beta (β)-glucuronidase.

Benefits*

- Supports detoxification
- Promotes healthy estrogen metabolism

Ingredient Highlights

- 1.2 grams of calcium D-glucarate per serving to promote normal detoxification*
- 150 mg of calcium per serving

Supplement Facts

Serving Size 2 capsules
Servings Per Container 30

Amount Per Serving		% Daily Value
Calcium (from Calcium D-Glucarate USP 1.2 g)	150 mg	12%

Other Ingredients: Microcrystalline cellulose, cellulose (capsule), vegetable stearate. CDG060-6

Calcium D-Glucarate is a calcium salt combining calcium and D-glucaric acid.[1] Calcium D-glucarate is metabolized into D-glucaric acid, which is further broken down into three compounds, with the most active being D-glucaro-1,4-lactone.[1,2] This metabolite is a specific β-glucuronidase inhibitor that increases the detoxification of potential carcinogens.[3,4] β-glucuronidase is an enzyme that can deconjugate potential toxins and allow them to be reabsorbed back into the body instead of being excreted.[5]

As a β-glucuronidase inhibitor, supplementation with calcium D-glucarate reduces β-glucuronidase activity to support the elimination of the toxins through glucuronidation instead.*[1] This promotes normal detoxification and optimal health.* In a mouse study, it was found that supplementing with calcium D-glucarate led to a 70% inhibition of mammary tumor development and inhibited β-glucuronidase. It lowered endogenous levels of estradiol, which likely played a role in the reduction of tumorigenesis.[6] Calcium D-glucarate may also support antioxidant status and promote a healthy inflammatory response.*[2,7,8]

Glucuronidation

Glucuronidation is one of the metabolic pathways for phase II detoxification. Glucuronic acid attaches to a compound requiring detoxification and elimination, such as a xenobiotic or a hormone, along with the help of uridine 5'-diphospho-glucuronosyltransferase.[9] With the conjugation of glucuronic acid and the compound, glucuronidation creates less reactive conjugates, known as glucuronides, that can be readily eliminated by the body through urinary, intestinal, or biliary excretion. Glucuronidation is the main detoxification pathway for many medicines and other xenobiotics, pollutants, and endogenously produced compounds, such as estrogens and androgens, mineralocorticoids, glucocorticoids, fatty acid derivatives, retinoids, and bile acids.[9,10] The glucuronide conjugates must remain intact for excretion.

Beta-Glucuronidase

Beta-glucuronidase impedes glucuronidation activity by breaking apart the glucuronides that reduce the body's ability to safely eliminate potentially toxic compounds, which may impact health.[5] As the conjugated glucuronides go through the gastrointestinal tract, they may undergo metabolism from beta-glucuronidase produced by the gut microflora. This splits the compound back into glucuronic acid and the potentially damaging molecule, which allows for reabsorption and recirculation.[10,11] Although some recycling of endogenous compounds that undergo glucuronidation may be an important aspect of homeostasis, excess activity may allow too many potentially damaging compounds to be reabsorbed.[12] Both the rate of conjugation with D-glucuronic acid and the rate of de-glucuronidation by β-glucuronidase impact the elimination of potential toxins.[9]

In addition to endogenous β-glucuronidase, certain species of gut bacteria (primarily *Escherichia coli*) produce β-glucuronidase. Therefore, the gut microbiome makeup may have a significant impact on the recycling of potential toxins.[3] In an in vitro study, β-glucuronidase from human gut microbes reactivated two estrogen glucuronidase back into estrone and estradiol. This suggests that β-glucuronidase may participate in the estrobolome and its impact on estrogen levels in the body that may affect the risk of estrogen-associated health conditions, including cancers.[5,13] This may also be a bi-directional relationship. In one study, D-glucaro-1,4-lactone supported a reduction in β-glucuronidase and improved the gut microbiome makeup, reducing the levels of *E. coli*.[3]

Beta-Glucuronidase Levels and Health

Elevated levels of β-glucuronidase activity are associated with a higher risk of cancers, especially hormone-dependent cancers such as breast cancer.[1,6,14] These elevated levels are also associated with periodontal disease, including those patients with type 2 diabetes and bacterial infections.[15] Research is also testing the viability of β-glucuronidase as a biomarker for certain conditions such as periodontal disease, cancers, and bacterial infections.[14,15]

Inhibiting β-glucuronidase supports increased glucuronidation to promote detoxification and excretion of potentially toxic compounds and metabolites, including estrogen and its potentially toxic metabolites.[1,6,7] Reduction of β-glucuronidase activity may also support increased excretion of bile acids and glucuronidation of cholesterol to promote cholesterol excretion and healthy cholesterol levels.[3] In animal studies, it was found that inhibiting β-glucuronidase protects against gastrointestinal damage from nonsteroidal anti-inflammatory drugs (NSAIDs) through the prevention of glucuronide cleavage that releases potentially damaging NSAID aglycone and instead supports excretion in the bile.[16,17] This potential protective action of glucarate does not alter the systemic drug exposure of the NSAIDs.

Recommended Use: Take 2 capsules per day with meals or as directed by your health-care practitioner.

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

https://www.designsforhealth.com/api/library-assets/literature-reference---calcium-d-glucarate-tech-sheet-references

Dosing recommendations are given for typical use based on an average 150 pound healthy adult. Healthcare 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.

To contact Designs for Health, please call us at (860) 623-6314, or visit us on the web at www.designsforhealth.com.