

## CDG Supports Healthy Beta-Glucuronidase Activity\*

- Increased Glucuronidation
- Provides the Patented Form of Supplemental D-Glucaric Acid
- Reduces Beta-Glucuronidase Activity for Increased Glucuronidation of Unwanted Compounds\*

**Calcium D-Glucarate is the supplemental, patented calcium salt form of D-glucaric acid—a substance produced naturally in the body and obtained through consumption of certain fruits and vegetables. Calcium D-glucarate has been extensively studied by researchers at the MD Anderson Cancer Center, and its health benefits are largely attributed to inhibition of beta-glucuronidase; this activity supports the body's ability to detoxify estrogens, xenobiotics, and fat-soluble toxins.\***

### Overview

Inwell's CDG is the patented calcium salt of D-glucaric acid, a substance produced naturally in very small amounts in the body and found in many fruits and vegetables. Researchers at the MD Anderson Cancer Center, who studied the effects and realized the benefits of D-glucaric acid, quickly moved to patent its supplemental form, calcium D-glucarate (CGT). Oral supplementation of CGT has been shown to indirectly inhibit beta-glucuronidase.<sup>[1-3]</sup> This activity ultimately increases glucuronidation (phase II detoxification) and the excretion of toxins and harmful metabolites.\*

### Glucuronidation and Beta-Glucuronidase

During phase II detoxification, unwanted chemicals or compounds are conjugated with glucuronic acid in the liver (glucuronidation) to form glucuronide conjugates that can then be excreted via the urine or bile. Glucuronidation is the pathway used by estrogens and androgens; some steroid hormones; lipid-soluble toxins, such as polycyclic aromatic hydrocarbons; and some nitrosamines, heterocyclic amines, and aromatic amines. This pathway also represents a major means of converting most drugs to water-soluble substances that can be excreted.\*

Beta-glucuronidase, an enzyme produced by intestinal bacteria, cleaves glucuronic acid from the glucuronide conjugates formed during phase II detoxification. This cleaving activity frees the unwanted compounds (e.g., toxins), allowing their reabsorption by the ileal mucosa. When this happens, the body is re-exposed to

- Supports Detoxification and Elimination of Chemicals, Steroid Hormones (Estrogens, Androgens), and Lipid-Soluble Toxins\*

toxins for prolonged periods, which can increase their potential to harm. CGT is converted metabolically to an inhibitor of beta-glucuronidase in the intestine, thereby preventing deconjugation and reabsorption of toxins while increasing their elimination.<sup>[1,3]</sup> Because elevated levels of sex hormones have been linked to unwanted cellular changes, researchers studied the effects of CGT on steady-state hormones and glucuronidation. They found that female rats on a CGT diet had reduced levels of serum estradiol and 17-ketosteroid by 23% and 55%, respectively.<sup>[4]</sup> Furthermore, urinary excretion of 17-ketosteroids in the rats placed on the 10% CGT diet increased by 200% on the second day and then dropped. After one week, excretion had reached a new steady-state level, which was lower by approximately 50% than that of the rats fed the regular chow diet.\*

### Modulating Beta-Glucuronidase Activity

As stated earlier, CGT does not inhibit beta-glucuronidase directly. Taken orally, it dissolves in the stomach and forms D-glucaric acid, from which the potent beta-glucuronidase inhibitor D-glucaro-1,4-lactone is derived.<sup>[5]</sup> Unfortunately, the body rapidly clears D-glucaro-1,4-lactone. However, oral calcium D-glucarate can be considered a sustained release form of the D-glucaro-1,4-lactone.<sup>[4]</sup> Animals given a single dose of oral calcium D-glucarate showed a 50% inhibition of beta-glucuronidase for five hours.<sup>[2]</sup> In vitro and animal studies suggest that the inhibition of beta-glucuronidase protects cells and supports normal cell replication and death (apoptosis).<sup>[3]</sup> These benefits of D-glucaric acid and its salts have been observed in tissues of the colon, prostate, lung, liver, skin, and breast in animal-model studies.<sup>[3,6,7]</sup> These in vitro and animal data are promising, and researchers postulate that controlled human trials will reflect similar results.\*

### Antioxidant Activity

Although the mechanisms of action have not been clearly elucidated, the antioxidant effects of CTG have been demonstrated.<sup>[8-10]</sup> For instance, Olas et al showed that D-glucaro-1,4-lactone was protective against oxidative/nitrative modifications of plasma proteins.\*<sup>[9]</sup>

**\*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.**

## Directions

Take one capsule twice daily, or as directed by your healthcare professional.

Consult your healthcare professional prior to use. Individuals taking medication should discuss potential interactions with their healthcare professional. Do not use if tamper seal is damaged.

## Does Not Contain

Wheat, gluten, yeast, soy, animal and dairy products, fish, shellfish, peanuts, tree nuts, egg, ingredients derived from genetically modified organisms (GMOs), artificial colors, artificial sweeteners, and artificial preservatives.

Supplement Facts		
Serving Size: 1 Capsule		
Servings Per Container: 90		
	Amount Per Serving	%Daily Value
Calcium (as calcium D-glucarate)	60 mg	5%
Calcium D-Glucarate	500 mg	**
** Daily Value not established.		

**Other Ingredients:** Capsule (hypromellose and water), stearic acid, microcrystalline cellulose, magnesium stearate, and silica.

Calcium D-glucarate is licensed from Applied Food Sciences, Inc. and is protected by US patent 7,662,863.

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## References

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