

## ALPHA-GLYCOSYL ISOQUERCITRIN A BIOAVAILABLE FORM OF QUERCETIN

Quercetin, a flavonol present in various vegetables and herbal medicines, has numerous beneficial biological activities including supporting healthy cell proliferation, cardiovascular and immune function, and anti-oxidative activities.

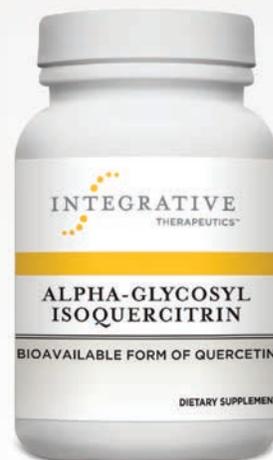
### Superior Bioavailability

Alpha-Glycosyl Isoquercitrin provides the benefits of the flavonoid quercetin with better absorption and superior bioavailability. Isoquercitrin and isoquercetin are naturally-occurring forms of quercetin with a glucoside side chain that enhances bioavailability. As an antioxidant and immune-modulator, Alpha-Glycosyl Isoquercitrin offers the following benefits:

- 3 times more bioavailable than isoquercetin and nearly 18 times more bioavailable than standard quercetin\*
- Enhances cellular antioxidant defenses\*
- Supports cardiovascular health\*
- Helps modulate the body's immune-response mechanisms\*

Because Alpha-Glycosyl Isoquercitrin is actively and rapidly absorbed, it reaches peak plasma levels in 15 minutes.\*

Alpha-Glycosyl Isoquercitrin is also featured in Curcumax™ Pro. In combination with bioavailable turmeric and boswellia, it's a safe and effective formula for improving patient comfort and mobility.\*



wheat free



gluten free



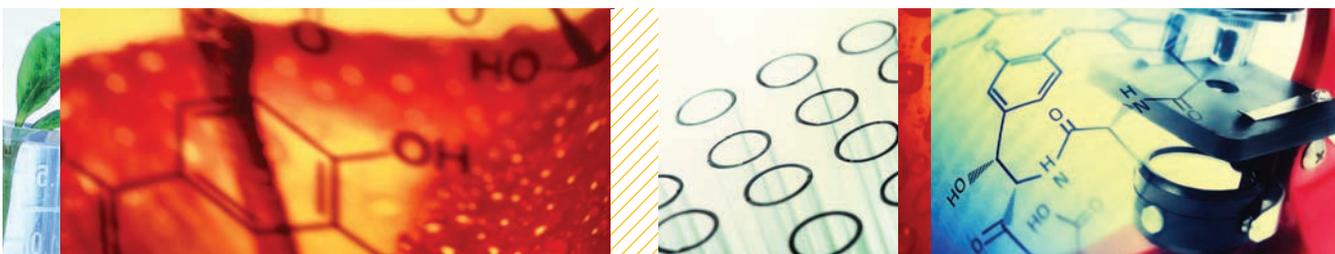
soy free



dairy free



vegetarian





## ALPHA-GLYCOSYL ISOQUERCETRIN

### Quercetin as a Foundational Flavonoid

Quercetin possesses potent antioxidant properties to scavenge free radicals, promote DNA integrity, and support cellular regulation.\* Quercetin has also been studied for its support of healthy glutathione levels.\*

Quercetin is a foundational structure of many flavonoids, including rutin, hesperidin, and isoquercitrin. The quercetin ring structure also occurs as part of larger flavonoid molecules, such as hyperosides in St. Johns wort or flavone glycosides in Ginkgo. Quercetin aglycone is the type of quercetin most typically used in supplements because it is the easiest to produce from rutin. However, this form of quercetin rarely occurs in nature and is not actively absorbed (but rather is passively diffused) at the absorptive surfaces in the small intestine.

Supplemental quercetin (quercetin aglycone) is not *actively* absorbed. Its absorption occurs through the small intestine by the slower, less efficient process of *passive diffusion*.

### Quercetin Glucosides, The Predominant Form

In nature, quercetin occurs predominantly in the glucoside form, usually with the glucoside chain at the 3' or 4' position. Apples and onions are among the richest dietary sources of quercetin glucosides, notably the quercetin-3-monoglucosides, isoquercitrin, and isoquercetin.

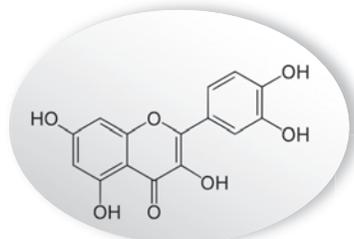
Isoquercitrin and isoquercetin are terms that are sometimes used interchangeably, even by specialists, because the two molecules are very similar in structure. The difference between them is that isoquercitrin has a glucofuranose ring structure, whereas isoquercetin has a glucopyranose ring structure. Functionally, the two molecules are nearly indistinguishable. Quercetin glucosides are also more quickly absorbed, at approximately double the rate of quercetin, and up to ten times more quickly than rutin.\*

### Quercetin Absorption

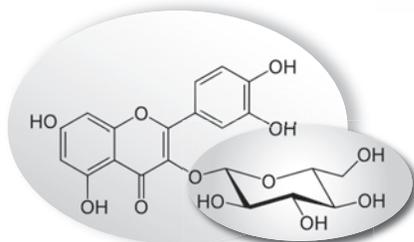
Quercetin glucosides, such as isoquercitrin and isoquercetin, have been shown to be much more bioavailable and more quickly absorbed than quercetin aglycone or quercetin glycosides, such as rutin (quercetin rutinoside).<sup>1-5</sup> These quercetin glucosides have been shown to be more highly bioavailable than the smaller quercetin aglycone or the larger quercetin glycosides such as rutin (quercetin rutinoside).<sup>1</sup>

The glucose moiety of isoquercitrin and isoquercetin speeds the molecules' uptake and transformation into quercetin.

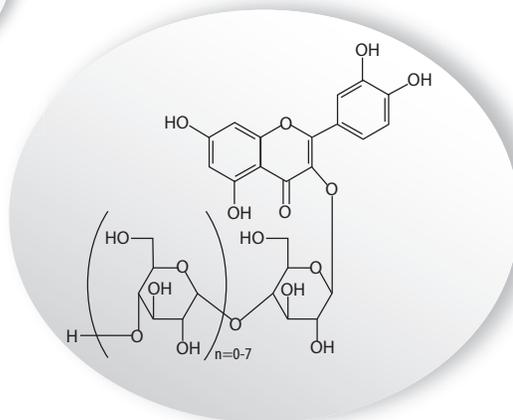
Enzymes and active transport mechanisms in the cells lining the small intestine (enterocytes) interact with the glucose moiety of the isoquercitrin and isoquercetin molecules, speeding their uptake and transformation



**Quercetin**



**Quercetin-3-O-β-Glucoside**  
(isoquercetin/isoquercitrin, Q3G)



**Alpha-Glycosyl Isoquercitrin**

into quercetin.<sup>1,2</sup> Without this glucose moiety, absorption of quercetin through the small intestine is by the slower, less efficient process of passive diffusion.<sup>1,5</sup> Isoquercitrin and isoquercetin therefore provide quercetin, with all its benefits, in a more bioavailable form.<sup>3-7</sup>

The bioavailability of isoquercitrin can be further enhanced through an enzymatic process.

### Superior Bioavailability of Alpha-Glycosyl Isoquercitrin

Alpha-Glycosyl Isoquercitrin (also known as enzymatically-modified isoquercitrin) is a proprietary mixture of quercetin monoglucoside and its alpha-oligoglucosides, consisting mainly of isoquercitrin and its alpha-glucosyl derivatives with 1-7 of additional linear glucose moieties. Animal research has found that Alpha-Glycosyl Isoquercitrin has far greater bioavailability than quercetin aglycone and even higher than quercetin glucosides.<sup>8,9</sup>

Oral bioavailability of quercetins is influenced by their water solubility. Quercetin aglycone is relatively insoluble in water, limiting its usefulness as a dietary supplement. Isoquercitrin and isoquercetin are somewhat more soluble. Researchers have found that water solubility of flavonoids can be further enhanced by enzymatic modification. This has been demonstrated, for example, with the flavonoid hesperidin.<sup>10,11</sup>

Bioavailability of quercetins is influenced by their water solubility. Alpha-Glycosyl Isoquercitrin is more soluble than isoquercitrin, isoquercetin, and quercetin aglycone.

Glycosyl conjugates of isoquercitrin have also been achieved via enzyme-based processes. These have been found to be far more soluble than either quercetin aglycone or quercetin glucosides, and are thus more readily hydrolyzed by intestinal epithelial enzymes, such as lactase-phlorizin hydrolase and mucosal maltase-glucoamylase.<sup>12</sup>

The bioavailability of quercetin, isoquercetin, and alpha-glycosyl Isoquercitrin was compared directly in an animal model. Bioavailability was found to be 2% for quercetin, 12% for isoquercetin, and 35% for alpha-glycosyl isoquercitrin.<sup>8</sup>

	Bioavailability	Factor
Quercetin	2%	1X
Isoquercetin	12%	6X
Alpha-Glycosyl Isoquercitrin	35%	17.5X

REFERENCE: *Biol Pharm Bull* 2009; 32(12) 2034-40.

Researchers have also examined the bioavailability of alpha-glycosyl isoquercitrin in humans.<sup>9</sup> The plasma level of quercetin metabolites was instantly increased by oral intake of alpha-glycosyl isoquercitrin and its absorption efficiency was significantly higher than that of isoquercitrin and rutin.

### Beneficial Effects of Quercetin

Because alpha-glycosyl isoquercitrin is transformed to quercetin in the body, it provides all the health benefits of quercetin in a more bioavailable form.\* Quercetin has been shown to prevent the production of free radicals, including reactive oxygen species (ROS) and reactive nitrogen species.\*<sup>13</sup> Research has shown that quercetin exhibits a broad range of support for the body's vascular responses to immune and exogenous stimuli.\*<sup>14,15</sup> Quercetin also helps the body maintain adequate glutathione levels during oxidative stress;<sup>16</sup> supports a healthy immune response;<sup>17</sup> inhibits xanthine oxidase activity and lipid peroxidation;<sup>18,19</sup> supports healthy cellular regulation, DNA integrity, and normal cell apoptosis;<sup>20</sup> and supports cardiovascular health.\*<sup>21</sup>

### Alpha-Glycosyl Isoquercitrin Clinical Studies

Flavonoids are known to exert stabilizing effects on mast cells and thus support immune function. Researchers investigated the effects of alpha-glycosyl isoquercitrin on immune response in two similarly designed double-blind studies.<sup>22,23</sup> In both studies, subjects took 100 mg alpha-glycosyl isoquercitrin or a placebo for 8 weeks. Subjective measures, activity (ADL) scores and the usage of drugs were recorded daily. Quality of life (QOL) scores were obtained every 4 weeks. In both studies, intake of alpha-glycosyl isoquercitrin proved to be effective for support of ocular comfort.\* Nasal airflow was unchanged.

### Supplement Facts

Serving Size 1 capsule

Amount per 1 capsule	%DV**
Alpha-Glycosyl Isoquercitrin	33 mg **

\*\*Daily Value not established.

**Other ingredients:** cellulose, vegetable capsule (modified cellulose), modified cellulose gum, and silicon dioxide.

**Recommendations:** Take 1 capsule one to three times daily, or as recommended by your healthcare professional.

If pregnant, or nursing, or taking prescription drugs, consult your healthcare professional prior to use.

**Contains no:** Sugar, salt, yeast, wheat, gluten, soy, dairy products, artificial coloring, artificial flavoring, preservatives, or ingredients of animal origin. This product contains natural ingredients; color variations are normal.

Integrative Therapeutics™	Natural Partners	Emerson Ecologics
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Preclinical studies have also found significant hepatocellular health benefit of alpha-glycosyl isoquercitrin in experimental animals, pointing the way towards future areas of human clinical research.\*<sup>24-27</sup>

Alpha-glycosyl isoquercitrin is Generally Recognized as Safe (GRAS).

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\*THIS STATEMENT HAS NOT BEEN EVALUATED BY THE FOOD AND DRUG ADMINISTRATION. THIS PRODUCT IS NOT INTENDED TO DIAGNOSE, TREAT, CURE, OR PREVENT ANY DISEASE.