

The Different Ways Quercetin Promotes Wellness

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STORY AT-A-GLANCE

- › Quercetin is a powerful antioxidant that protects against oxidative stress, helping manage conditions like multiple sclerosis by reducing inflammation and promoting neuroprotection
- › Research noted that quercetin has anticancer properties as well, affecting various cancers by promoting apoptosis, inhibiting angiogenesis and suppressing metastasis
- › Quercetin has antiviral capabilities, particularly against coronaviruses, by inhibiting viral replication and entry into cells. It showed promise during the COVID-19 pandemic
- › Supplementing with zinc enhances the antiviral effects of quercetin, which acts as a zinc ionophore. This improves the transportation of zinc ions into cells to inhibit viral replication
- › Natural sources of quercetin include onions (especially peels), berries, apples and various vegetables. Supplements are generally safe, with additional benefits when taken before bed

When it comes to optimizing nutrient intake, most people think of vitamins and minerals. However, there are many other compounds that help boost your health, namely quercetin.

I believe quercetin deserves more attention as the growing body of research shows that it helps optimize your health in different ways, such as fighting cancer and viruses, as well as repairing damage caused by oxidative stress.

Quercetin Boosts Your Antioxidant Profile

According to USA Today, "The primary benefit of quercetin is that it's a powerful antioxidant and thereby protects the body from cell-damaging free radicals."¹ In fact, a 2023 study² noted that quercetin is the most potent antioxidant flavonoid, which helps protect your body against different diseases.

In one meta-analysis,³ for example, quercetin has been found to help in the management of multiple sclerosis (MS) by fighting against oxidative stress. As noted by the researchers, oxidative stress causes neural cell death, as well as impairing mitochondrial function.

Oxidative stress also affects the integrity of the blood-brain barrier, thereby promoting greater entry of leukocytes into the central nervous system. Eventually, this process damages the myelin,⁴ a layer surrounding the nerves that help transmit electrical impulses.⁵ This process worsens the progression of MS over time.

Following this framework, the researchers sought to find out just how effective quercetin is in helping manage MS. Based on their collated research, here's how quercetin protects the central nervous system (CNS):

"Quercetin can reduce oxidative stress, inhibit the demyelination process, promote remyelination potential, improve optic pathway function, reduce glial activation, decrease apoptosis, enhance BBB integrity and reduce inflammatory responses."

The same study also noted that quercetin's antioxidant capabilities also have neuroprotective effects. Examples include "increasing learning and memory, reducing mitochondrial dysfunction, reducing senile plaques and increasing oxidative defense via activating AMP-activated protein kinase (AMPK)."⁶

The Cancer-Fighting Capabilities of Quercetin

According to Dr. Denise Millstine, director of integrative medicine at the Mayo Clinic's Arizona branch, quercetin has anticancer capabilities,⁷ and this statement is supported by published research, too.

In a 2023 study,⁸ researchers noted that quercetin has therapeutic effects on blood, lung and prostate cancers. It works by regulating molecular factors involved in signaling pathways, thereby promoting apoptosis and autophagy in cancer cells.

Furthermore, quercetin has an anti-angiogenesis effect on cancer by reducing the proliferation of tumor-related blood vessels. It has an anti-metastatic effect, too. By suppressing various molecular pathways and angiogenesis, it helps prevent the proliferation of cancer cells that have separated from the primary tumor.⁹

Quercetin has been studied on different animal models and human cancer cell lines. In one review published in 2022,¹⁰ it has been shown to affect leukemia, breast, osteosarcoma and pancreatic cancers. A separate study notes that quercetin targets colon cancer cells as well:¹¹

"Quercetin arrested colon cancer cell growth by modulating expression of aging proteins including Sirtuin-6 and Klotho and also by inhibiting telomerase activity to restrict the telomere length which is evident from qPCR analysis. Quercetin also exhibited DNA damage protection by reducing proteasome 20S levels," the study authors noted.

Viruses Are Quashed by Quercetin

The reputation of quercetin as antiviral agent initially started in the aftermath of the 2003 SARS epidemic. In a report¹² published in the Canadian magazine Maclean's, medical researchers Michel Chrétien and Majambu Mbikay began experimenting with quercetin, discovering that it had "broad spectrum" capabilities that help fight different viruses.

In 2014, during the Ebola outbreak in West Africa, they tested their theory and noted that quercetin did well against the virus "even when administered only minutes before

infection." During the COVID-19 pandemic, Chrétien, Mbikay and other researchers pushed for quercetin as an antiviral intervention.¹³ The question is, how effective is this strategy?

In a study¹⁴ published in *Frontiers in Pharmacology*, researchers conducted an open-label, randomized control trial in Lahore, Pakistan. A total of 108 patients 18 years or older who tested positive for SARS-CoV-2 were selected for the experiment and split into two groups – the test group received 500 mg (milligrams) of quercetin (plus standard care) and the control group received standard care only.

After a week, quercetin was able to reduce viral persistence in the test group by 68% compared to the control group by 24%. This means that they tested negative for the SARS-CoV-2 virus. In conclusion, the researchers noted that quercetin boosted the recovery of the test group from COVID-19.¹⁵

Researchers from a study¹⁶ published 2022 have unlocked the mechanism as to why quercetin is effective in inhibiting SARS-CoV-2. According to their observations, quercetin generally prevents viruses from entering cells by interacting with the hemagglutinin glycoprotein. But in the case of SARS-CoV-2, quercetin inhibits the 3-chymotrypsin-like protease (3CLpro), which is required for the virus to replicate. Another way quercetin blocks viral replication is via inhibiting the Mpro protein.

SARS-CoV-2 is not the only virus that quercetin inhibits. Other strains known to respond to quercetin include other coronaviruses, influenza, human respiratory syncytial virus (RSV) and rhinovirus.¹⁷ If you're prone to colds and flu, consider taking quercetin for a couple of months before cold and flu season hits to boost your immune system.

Zinc Boosts the Antiviral Benefits of Quercetin

While quercetin is impressive in its own right, you can still improve its effectiveness. One strategy is increasing your zinc intake because quercetin acts as a zinc ionophore.¹⁸ This mechanism works by transporting zinc ions through the cellular membranes and into the cell, which helps stop the replication of viruses.

This mechanism was observed in a study¹⁹ published in the British Journal of Nutrition. While the researchers noted that the exact mechanisms are unknown, the following theories have been postulated:

"Antiviral functions of Zn are based on inhibition of physical processes, as virus fixation, infection and coating, as well as the inhibition of viral protease and polymerase enzymatic function. The increase in the intracellular Zn concentrations could interfere with the proteolytic processing of viral polyprotein, influencing its enveloping.

Furthermore, high intracellular Zn concentrations may affect directly the viral protease (picornavirus, encephalomyocarditis and polioviruses), and to alter the tertiary structure of the protein, as in the case of the encephalomyocarditis virus. In addition, Zn inhibits viral and host cellular membrane fusion, preventing viral infection."

Zinc is not just needed for viral protection. It's also involved in other important processes such as cell division and growth and wound healing. According to a study²⁰ published in the Journal of Agricultural and Food Chemistry, zinc also helps with glucose absorption and regulates energy metabolism. If you don't get enough zinc, your sense of taste²¹ and smell²² are affected, too.

Where can you get zinc? Natural sources include grass fed beef and Greek yogurt, mushrooms, cheddar cheese, pastured eggs and broccoli.²³ If you choose to take a supplement, I would be cautious with taking more than 15 mg per day, since you must factor the zinc from the other foods you eat. If you already eat large amounts of animal foods, you may not even need to take a supplement at all.

That said, Chris Masterjohn, Ph.D., noted that the ideal dosage for zinc supplementation is 7 mg to 15 mg four times a day on an empty stomach or with phytate-free food.²⁴ Be mindful of your copper intake as well, as an imbalanced zinc-to-copper ratio can nullify the benefits of zinc on quercetin.

Try These Dietary Sources of Quercetin

The great thing about quercetin is that it's already present in many fruits and vegetables. So, if you're eating a well-rounded diet, you're likely getting it from various sources. But if you want to increase your intake, Millstine notes that cranberries, dark-colored grapes, garlic, capers and apples (with the peel) are good sources.²⁵ Additional sources include:²⁶

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|-----------|--|-----------|
| Coriander | Fennel | Dill |
| Okra | Berries (juniper berries, cranberry, blueberry and mulberry) | Green tea |
| Broccoli | Moringa | Asparagus |
| Onions | | |

From the examples provided above, I want to emphasize the quercetin levels found in onions, especially their peels. According to published research,²⁷ "about 77 times more quercetin is found in onion peel than in the edible section." This makes sense due to antimicrobial properties in quercetin,²⁸ which acts as a protective barrier to protect the rest of the vegetable from soil microbes.²⁹

If the thought of consuming onion skins sounds unappealing to you, there is a workaround this —make a broth from onion peels to extract the quercetin and other antioxidants. In a study³⁰ published in *Foods*, cooking onions increases their beneficial properties, specifically baking, grilling and frying. While all methods are beneficial in boosting the quercetin properties, bioavailability differs:

"After in vitro digestion, the bioaccessibility index for total phenolic compounds ranged between 42.6% and 65.5% in grilled and baked YSO (yellow-skin onions), respectively, and between 39.8% and 80.2% in boiled and baked RSO (red-skinned onions), respectively. Baking contributed to the highest amount of

bioaccessible phenolic compounds for both the onion varieties after in vitro digestion."

Should You Take a Quercetin Supplement?

According to a study³¹ published in *Frontiers in Immunology*, quercetin has an excellent safety profile. Researchers noted that supplementation up to 1 gram (1,000 mg) per day for three months did not create significant side effects. Intravenous quercetin is a different matter, however:

"Intravenous administration of quercetin in a phase I clinical trial for cancer patients resulted in nausea, vomiting, sweating, flushing and dyspnea at doses >10.5 mg/Kg (756 mg per 70 Kg individual). Only higher intravenously administered doses up to 51.3 mg/Kg (around 3,591 mg per individual) were associated with renal toxicity."

Adding to this, consider increasing your vitamin C intake as well, either through foods or through supplements. Like zinc, vitamin C has been shown to increase the effectiveness of quercetin. The same study noted that vitamin C and quercetin "exerts a synergistic antiviral action" due to their overlapping benefits. Moreover, vitamin C helps recycle quercetin, further increasing its efficacy.³² This benefit was also confirmed in other studies.^{33,34}

The dosage is just half of the equation. The other half is when to take quercetin supplements. I believe that taking quercetin (with zinc) before going to bed is the best approach. In addition, remember that your last meal must be taken three to four hours before sleeping. Then, sleep for eight hours.

If you're metabolically flexible, your body will enter a fasted state during sleep and boost NADPH levels. As noted in a study³⁵ published in *Cells*, NADPH is needed for nitric oxide synthesis, which diffuses into your mitochondria to create peroxynitrite. From there, mitophagy occurs to benefit neuronal metabolism, which helps in the management of Parkinson's disease.

The other benefit of taking quercetin at night is to take advantage of its senolytic action to remove senescent cells, which are similar to nonreplicating cancer cells that secrete powerful proinflammatory cytokines that destroy your health. You can optimize quercetin's senolytic properties if you take it while you are fasting.

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