

Quercetin Emerges as Nature's Powerful Health Ally

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STORY AT-A-GLANCE

- › Quercetin, a flavonoid found in many fruits and vegetables, shows powerful antioxidant properties that help neutralize harmful free radicals in the body, reducing cellular damage and oxidative stress
- › Research indicates quercetin has broad antiviral effects, demonstrating the ability to inhibit the replication and infectivity of various viruses including HIV, hepatitis B, and herpes simplex virus
- › Studies reveal quercetin's capacity to lower blood pressure and reduce cardiovascular risks, with one experiment showing significant reductions in systolic, diastolic, and mean blood pressure in hypertensive rat models
- › Quercetin exhibits anticarcinogenic properties by suppressing cell proliferation and inducing apoptosis in various cancer cell types, suggesting its use as a complementary approach in cancer management
- › Evidence points to quercetin's role in improving insulin sensitivity and glucose metabolism, indicating promise for diabetes management and prevention

Quercetin, a powerful flavonoid found in many fruits and vegetables, is gaining attention for its impressive pharmacological properties. Naturally present in foods such as capers, apples, berries and even tea, this flavonoid acts as a potent antioxidant that helps inhibit reactive oxygen species (ROS), thus playing a key role in neutralizing oxidative stress, preventing cellular damage and maintaining overall health.

But there's more to quercetin than its antioxidant abilities — studies^{1,2} found that it exhibits notable antiviral, blood pressure-lowering and anticancer properties as well. These health advantages illustrate why quercetin is considered a remarkable compound in modern medicine. With its broad-spectrum benefits supported by scientific research, quercetin might be an essential ally in enhancing your overall health.

Quercetin Demonstrates Significant Antioxidant Properties

Quercetin showcases remarkable antioxidant capabilities, crucial for neutralizing oxidative stress and preventing cellular damage. It has five functional hydroxyl groups, which act as potent electron donors, enabling it to neutralize different reactive oxygen species (ROS). By doing so, quercetin helps maintain cellular health and reduces the overall oxidative stress in your body. In a study published in the journal *Molecules*, the researchers explained:

“Oxidative stress can damage mitochondrial DNA, denature intracellular proteins, cause lipid peroxidation, and drive inflammation. Due to the phenolic hydroxyl group and a double bond, quercetin exhibits potential antioxidant activity.”³

This antioxidant mechanism is so vital because oxidative stress plays a significant role in the development of many chronic illnesses. When your ROS levels exceed your body's ability to neutralize them, they cause damage to cells and tissues, accelerating aging and contributing to various diseases.

By neutralizing ROS, quercetin acts as a protective agent, reinforcing your body's defenses against oxidative stress-induced diseases, including heart disease, diabetes and cancer.⁴

“One health problem that oxidative stress is associated with is obesity. Obesity is one of the major health problems in the world, and it leads to increased amounts of fat cells. It is characterized by the overproduction of reactive oxygen stress,” the researchers noted.

Quercetin Exhibits Remarkable Antiviral Properties as Well

The antiviral properties of quercetin add another layer to its pharmacological profile. Studies have shown that quercetin works efficiently against a range of viruses, including human immunodeficiency virus (HIV), hepatitis B and herpes simplex virus.

It achieves this by interfering with viral replication mechanisms and inhibiting enzymes crucial for the viral life cycle, hindering the virus's ability to multiply and spread. In addition, it boosts your immune response, making it harder for the virus to establish a foothold in the body. This dual action makes quercetin a promising natural candidate for antiviral therapies, offering an alternative or complementary approach to traditional antiviral drugs.⁵

It has been shown to inhibit the release of inflammatory cytokines, which could help alleviate infection-related symptoms and suppress excessive inflammatory responses from occurring. Its antioxidant effects also help prevent tissue damage caused by scavenging free radicals, thereby aiding in the recovery process of viral infections.⁶

During the height of the COVID-19 pandemic, quercetin was also considered as an adjunct therapy in the early outpatient treatment of mild SARS-CoV-2 infection, according to studies.^{7,8} In one study conducted on 152 COVID-19 outpatients that were given 1,000 milligrams of quercetin daily for a month, the researchers noted positive outcomes, saying:

*"The results revealed a reduction in frequency and length of hospitalization, in need of noninvasive oxygen therapy, in progression to intensive care units and in number of deaths. The results also confirmed the very high safety profile of quercetin and suggested possible anti-fatigue and pro-appetite properties."*⁹

Quercetin's antiviral advantages are particularly valuable in regions with high prevalence of these viruses, providing a natural, cost-effective solution to augment traditional treatments. Additionally, by incorporating this flavonoid in preventive health strategies, communities could manage viral outbreaks more effectively.

To maximize the benefits of quercetin for viruses, it is best taken with zinc and vitamin C. Quercetin acts as a zinc ionophore, meaning it shuttles zinc through your cellular membrane and into your cells. This is what stops viruses from replicating, which is why it's highly useful during cold and flu season.

Meanwhile, vitamin C boosts your plasma quercetin levels. As noted in a *Frontiers in Immunology* review article:¹⁰

"There is evidence that vitamin C and quercetin co-administration exerts a synergistic antiviral action due to overlapping antiviral and immunomodulatory properties and the capacity of ascorbate to recycle quercetin, increasing its efficacy."

This Flavonoid Plays a Role in Cardiovascular Health, Too

Quercetin's benefits extend to cardiovascular health, and studies have highlighted its ability to reduce blood pressure and combat cardiovascular diseases. This flavonoid lowers both systolic and diastolic blood pressure, mainly due to its ability to act as a vasodilator and its antioxidative action, which reduces oxidative stress in the cardiovascular system.^{11,12}

A review published in *Molecules* also highlighted several molecular mechanisms behind quercetin's cardioprotective actions. According to the researchers:

"One theory is that quercetin causes endothelial nitric oxide synthase (eNOS) to be activated, producing nitric oxide (NO), a vasodilator that relaxes blood vessels and reduces blood pressure. According to several studies, quercetin increases eNOS activity and NO generation."

Another mechanism by which quercetin may exert its antihypertensive effect is the inhibition of angiotensin converting enzyme (ACE). Angiotensin II, a potent vasoconstrictor that raises blood pressure, is created by the ACE enzyme, and quercetin has been shown to inhibit ACE activity, reducing blood pressure."¹³

Furthermore, quercetin inhibits protein kinase C (PKC) a protein involved in vascular contraction. This leads to vasodilation, or the widening of blood vessels, which lowers blood pressure.^{14,15} By reducing oxidative stress within the cardiovascular system, quercetin helps maintain healthy blood vessel function and reduces the overall risk of cardiovascular diseases, making it a noteworthy compound in promoting heart health.

The Molecules review also discussed a study published in the British Journal of Nutrition. The study involved 30 obese and overweight adults with prehypertension and stage 1 hypertension who received 730 milligrams of quercetin supplement daily, for over 12 weeks. The results were notable – there were significant reductions in both systolic and diastolic blood pressure, offering hope for a natural intervention to control hypertension.¹⁶

Quercetin Helps with Diabetes Management

There's also evidence suggesting that quercetin has profound benefits against diabetes, due to its antihyperglycemic effects. Several mechanisms of action play a role in this, particularly its ability to:¹⁷

- Increase insulin sensitivity
- Promote glycogen synthesis
- Improve insulin resistance

Quercetin stimulates the production of pancreatic β -cells, which are responsible for creating insulin. By enhancing insulin secretion, it helps regulate blood sugar levels more effectively.

Quercetin also influences several signaling pathways involved in glucose uptake, making cells more responsive to insulin. This means that it helps stabilize your blood glucose levels, which helps ward off diabetes complications. According to study authors of a 2023 review published in Molecules:

“Quercetin might be a promising candidate that acts in many targets of diabetes, and it can regulate many pathways.

Furthermore, co-crystals comprised of quercetin and antidiabetic agents like metformin and DPP-IV inhibitors have been demonstrated to treat diabetes mellitus (DM) by reducing blood glucose levels and improving glucose tolerance.”¹⁸

Quercetin Has Anticancer Benefits

Quercetin’s ability to fight cancer is another area of interest. This flavonoid interacts with various signaling pathways to suppress cell proliferation and induce apoptosis (programmed cell death) in cancer cells. It works by halting the cell cycle, which then prevents cancer cells from multiplying.

“Quercetin has been found through in vitro experiments to exhibit antitumor activity against prostate, liver, breast, and pancreatic cancer and melanoma. Quercetin’s anticancer effects on hepatocellular carcinoma have been studied not only in vitro but also in vivo.

Although the exact mechanism of action remains elusive, quercetin’s anticancer effect may arise by regulating some enzymatic activities or also by modulating oxidative stress and some cellular pathways,” the study authors said.¹⁹

This anticancer effect is particularly valuable because it offers a less aggressive alternative to traditional cancer treatments like chemotherapy, which often come with astounding health costs and severe side effects. By targeting cancer cells specifically, quercetin helps reduce the need for more invasive treatments and improve the overall quality of life for cancer patients.

As research continues to uncover quercetin’s powerful benefits, incorporating this powerful flavonoid into your health regimen is a wise choice for overall health improvement. The good news is that consuming foods rich in quercetin will allow you to harness this flavonoid’s many health benefits.

The Best Dietary Sources of Quercetin

Quercetin is found in many foods, including citrus fruits, green leafy vegetables, broccoli, apples, onions, green tea, red grapes, dark cherries, and berries such as blueberries and cranberries. Among these, the highest levels are found in apples (especially the skins), onions, broccoli, cherries, berries and green tea.²⁰

For an especially concentrated source, consider onion skins. They have 77 times more quercetin than the flesh.^{21,22} While onion skins are unpalatable, consider sipping on a broth made from onion peels for more potent therapeutic effects. Quercetin is also found in medicinal products such as Ginkgo biloba, St. John's Wort (*Hypericum perforatum*) and elderberry (*Sambucus canadensis*).

If you're using quercetin in supplement form, consider taking it at night (with zinc) before you go to bed and you haven't eaten for at least three to four hours. If you are metabolically flexible, you will enter nutritional ketosis while you sleep.

The other benefit of taking quercetin at night is to take advantage of its senolytic action to remove senescent cells. You can further optimize quercetin's senolytic properties if you take it while you are fasting.

Sources and References

- ^{1, 11, 14, 18, 19} [Molecules 2023, 28\(24\), 8141](#)
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