



Cruising Review

Flavonoid: Publications and Research from SwissMixIt



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Flavonoids, a group of natural substances with variable phenolic structures, are found in fruits, vegetables, grains, bark, roots, stems, flowers, tea and wine. These natural products are well known for their beneficial effects on health and efforts are being made to isolate the ingredients so called flavonoids. Flavonoids are now considered as an indispensable component in a variety of nutraceutical, pharmaceutical, medicinal and cosmetic applications. This is attributed to their anti-oxidative, anti-inflammatory, anti-mutagenic and anti-carcinogenic properties coupled with their capacity to modulate key cellular enzyme function.

PDF Version of the webpage (first pages)

Flavonoid Botanical Information

Flavonoids, a group of natural substances with variable phenolic structures, are found in fruits, vegetables, grains, bark, roots, stems, flowers, tea and wine. These natural products are well known for their beneficial effects on health and efforts are being made to isolate the ingredients so called flavonoids. Flavonoids are now considered as an indispensable component in a variety of nutraceutical, pharmaceutical, medicinal and cosmetic applications. This is attributed to their anti-oxidative, anti-inflammatory, anti-mutagenic and anti-carcinogenic properties coupled with their capacity to modulate key cellular enzyme function. Flavonoids, Biological activity, polyphenols, phytochemicals, proanthocyanidins, functional foods, antioxidants, chemoprevention, apoptosis, inflammation, immune-regulation, tumor associated macrophages, medical foods, oxidative/nitrosative stress, Ca²⁺, ATPases in aging and diseases, natural products, apigenin, dendritic cells, neuroinflammation, chronic inflammation, Coronaviruses, Positive-sense RNA viruses, COVID-19, SARS-CoV, SARS-CoV-2, MERS-CoV

Keywords: Flavonoids, Biological activity, polyphenols, phytochemicals, proanthocyanidins, functional foods, antioxidants, chemoprevention, apoptosis, inflammation, immune-regulation, tumor associated macrophages, medical foods, oxidative/nitrosative stress, Ca²⁺, ATPases in aging and diseases, natural products, apigenin, dendritic cells, neuroinflammation, chronic inflammation, Coronaviruses, Positive-sense RNA viruses, COVID-19, SARS-CoV, SARS-CoV-2, MERS-CoV

Description and Research Abstract: Flavonoids, a group of natural substances with variable phenolic structures, are found in fruits, vegetables, grains, bark, roots, stems, flowers, tea and wine. These natural products are well known for their beneficial effects on health and efforts are being made to isolate the ingredients so called flavonoids. Flavonoids are now considered as an indispensable component in a variety of nutraceutical, pharmaceutical, medicinal and cosmetic applications. This is attributed to their anti-oxidative, anti-inflammatory, anti-mutagenic and anti-carcinogenic properties coupled with their capacity to modulate key cellular enzyme function.

With more than 4000 compounds, flavonoids are the most abundant polyphenols present in plant foods. The major groups of flavonoids of nutritional interest are the flavanols, or catechins (e.g., epigallocatechin 3-gallate from green tea), the flavones (e.g., apigenin from celery), the flavonols (e.g., quercetin, ubiquitous in plant foods, particularly red onion and apple), the flavanones (e.g., naringenin from citrus), the anthocyanidins (e.g., cyanidin from berries), and the isoflavones (e.g., genistein and daidzein from soya beans). Once absorbed, flavonoids are mostly found as conjugates, with recent studies suggesting that tissue β -glucuronidase may release active aglycones from stable circulating glucuronides. Flavonoids are bioactive dietary constituents that may enhance health and help prevent chronic disease. The strongest evidence for chronic disease prevention is in the area of vascular health, where a meta-analysis revealed improvements in flow-mediated dilatation and blood pressure.

Flavonoids are bioactive, polyphenolic, non-nutrients in plants, that are ubiquitous in diets.

Flavonoids, one of the most abundant phytochemicals in a diet rich in fruits and vegetables, have been recognized as possessing anti-proliferative, antioxidant, anti-inflammatory, and estrogenic activities. Numerous cellular and animal-based studies show that flavonoids can function as antioxidants by preventing DNA damage and scavenging reactive oxygen radicals, inhibiting formation of DNA adducts, enhancing DNA repair, interfering with chemical damage by induction of Phase II enzymes, and modifying signaling pathways. Recent evidence also shows their ability to regulate the immune system.

Flavonoids are widely distributed plant secondary metabolites with various metabolic functions. They are ubiquitous in fruits and vegetables that are regularly consumed by humans. These natural compounds are categorized by their chemical structure into 6 major subgroups as follows: chalcones, flavones, flavonols, flavandiols, anthocyanins, and proanthocyanidins or condensed tannins.

Natural compounds with a great diversity of chemical structures may provide an alternative approach for the discovery of new antivirals. In fact, numerous flavonoids were found to have antiviral effects against SARS- and MERS-CoV by mainly inhibiting the enzymes 3-chymotrypsin-like protease (3CLpro) and papain-like protease (PLpro).

Flavonoids are polyphenolic compounds subdivided into 6 groups: isoflavonoids, flavanones, flavanols, flavonols, flavones and anthocyanidins found in a variety of plants. Fruits, vegetables, plant-derived beverages such as green tea, wine and cocoa-based products are the main dietary sources of flavonoids. Flavonoids have been shown to possess a wide variety of anticancer effects: they modulate reactive oxygen species (ROS)-scavenging enzyme activities, participate in arresting the cell cycle, induce apoptosis, autophagy, and suppress cancer cell proliferation and invasiveness. Flavonoids have dual action regarding ROS homeostasis—they act as antioxidants under normal conditions and are potent pro-oxidants in cancer cells triggering the apoptotic pathways and downregulating pro-inflammatory signaling pathways.

Fruits and vegetables, tea, and cocoa are rich natural sources of flavonoids. Epidemiological studies have indicated that consumption of these foods is likely to be associated with a reduced risk of cardiovascular disease.

Flavonoids, natural phenolic compounds, are known as agents with strong antioxidant properties. In many diseases associated with oxidative/nitrosative stress and aging they provide multiple biological health benefits.

Phenolic acids and flavonoids also function as reducing agents, free radical scavengers, and quenchers of singlet oxygen formation. In addition, flavonoids and phenolic acids components play important roles in the control of cancer and other human diseases.

For centuries, flavonoids and their preparations have been used to treat various human illnesses, and their continual use has persevered throughout the ages. This review focuses on the anti-inflammatory actions of flavonoids against chronic illnesses such as cancer, diabetes, cardiovascular diseases, and neuroinflammation with a special focus on apigenin, a relatively less toxic and non-mutagenic flavonoid with remarkable pharmacodynamics.

Flavonoids occur in most plant species, and account for a significant percentage of the chemical constituents of some; e.g. dried green tea leaves contain approximately 30% flavonoids by weight.
