



The Powerful Health Benefits of Apple Flavonoids: Protecting Against DNA Damage and Cancer

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DESCRIPTION

One of the most popular and commonly consumed fruits in the world is the apple. Apples are rich in various nutrients, including vitamins, minerals, fiber, and flavonoids, which make them a highly beneficial food for human health. Flavonoids are a group of natural compounds found in fruits and vegetables, including apples, and are known to possess numerous health-promoting properties. One of the most important properties of flavonoids is their ability to act as antioxidants, which protect the body against free radicals and oxidative stress. In recent years, several studies have investigated the potential of apple flavonoids in suppressing carcinogen-induced Deoxyribonucleic Acid (DNA) damage and reducing the risk of cancer.

Carcinogens are substances that can cause cancer by damaging DNA in cells. DNA damage is one of the primary causes of cancer, and preventing or repairing such damage is crucial in reducing cancer risk. Several studies have shown that apple flavonoids possess strong anti-cancer properties and can help prevent cancer by suppressing DNA damage caused by carcinogens.

Apples are rich in flavonoids, including flavanols, flavonols, and anthocyanins, which are known to possess potent antioxidant properties. Flavonoids are natural compounds that are widely distributed in fruits and vegetables and have been shown to possess numerous health-promoting properties. Several studies have investigated the potential of apple flavonoids in reducing the risk of cancer by suppressing carcinogen-induced DNA damage.

In a study published in the Journal of Agricultural and Food Chemistry, researchers investigated the effect of apple flavonoids on DNA damage induced by a carcinogen called benzo[a]pyrene (BaP). BaP is a potent carcinogen found in cigarette smoke and grilled meats and is known to cause DNA damage. The study found that apple flavonoids were able to suppress BaP-induced DNA damage in human lymphocytes. The researchers concluded that the anti-carcinogenic effect of apple flavonoids may be due

to their ability to scavenge free radicals and protect DNA against oxidative damage.

Another study published in the Journal of Agricultural and Food Chemistry investigated the effect of apple flavonoids on DNA damage induced by another carcinogen called aflatoxin B1 (AFB1). AFB1 is a potent carcinogen found in peanuts, corn, and other grains, and is known to cause DNA damage. The study found that apple flavonoids were able to suppress AFB1-induced DNA damage in human liver cells. The researchers concluded that the anti-carcinogenic effect of apple flavonoids may be due to their ability to inhibit the activity of enzymes that activate AFB1 and convert it into a more toxic form.

The mechanisms by which apple flavonoids suppress carcinogen-induced DNA damage are not fully understood, but several mechanisms have been proposed. One mechanism is their ability to scavenge free radicals and prevent oxidative damage to DNA. Free radicals are highly reactive molecules that can damage cellular components, including DNA, and cause mutations that can lead to cancer. Apple flavonoids act as antioxidants and can neutralize free radicals by donating an electron, thereby preventing oxidative damage to DNA.

Another mechanism is their ability to inhibit the activity of enzymes that activate carcinogens and convert them into more toxic forms. AFB1, for example, is activated by an enzyme called cytochrome P450 and converted into a highly reactive metabolite that can cause DNA damage. Apple flavonoids have been shown to inhibit the activity of cytochrome P450 and prevent the activation of AFB1, thereby reducing its carcinogenic potential.

Apple flavonoids have also been shown to induce phase II detoxification enzymes, which are involved in the elimination of carcinogens and other toxins from the body. Phase II enzymes, such as glutathione S-transferase and NAD (P)H: Quinone Oxidoreductase 1 (NQO1), can conjugate carcinogens with glutathione or other molecules, making them less reactive and easier to eliminate from the body. Apple flavonoids have been shown to increase the expression and activity of these enzymes, thereby enhancing the body's ability to detoxify carcinogens and other toxins.

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