

Benefits of Plant Polyphenols in Food

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The inclusion of plant polyphenols in food and beverages may play a role in the battle against oxidative disease.

Oxidative stress is not a new phenomenon, but like much of the stress in the modern environment it can get out of control. Oxidative stress is caused by the generation of free radicals or reactive oxygen or nitrogen species (ROS, RNS)¹. These compounds are missing an electron and fight hard to source one. Free radicals attempt to secure an electron from our lipids/fat, protein and DNA (our genes). These are the fundamental building blocks of life and therefore damage to them is of serious concern. The role of the antioxidant is to return the missing electron. It is also worth considering the role of food in this process.

It has been reported that degenerative disease, such as cardiovascular disease (CVD) and obesity in England during the mid to late 1880s was only at 10 per cent of current rates, yet intake of antioxidant rich foods that could guard against oxidative stress were at levels 10 times the current intake². It could be argued that many other dietary factors could contribute to this statistic, for example changes in total energy intake or the kinds of macronutrients consumed. However, total energy intake does not adequately explain the increase in modern society, as total calorie intake during this time was on average

between 50 and 100 per cent higher than what is currently consumed in England.²

The types of macronutrients consumed does not adequately explain the increase of disease either. In most countries a diet high in saturated fat is associated with a high incidence of cardiovascular disease. However, a study published in *The Lancet*³ reported that in France people have an extremely high intake of saturated fat, yet they do not suffer the rates of coronary heart disease that would be expected from their diet. This phenomenon is known as 'The French Paradox' because it challenges the widespread belief that saturated fat intake is directly linked to cardiovascular disease. One explanation for this paradox is that saturated fat has no relation to the spread of CVD. However, the fact that there is so much evidence globally supporting the link between a diet high in saturated fat and CVD cannot be ignored. The other explanation is that there are components in the typical French diet at a concentration that can help protect against the development of these diseases. It has been hypothesised that the intake of high antioxidant polyphenols in wine may be responsible. For this reason it is important to consider the potential for food to be formulated to have a meaningful impact on disease.

The 2016 Mintel report titled *Food as Medicine*⁴ identified 'antioxidant'

as a top health claim, alongside the ever-present 'slimming' and 'digestive' claims. The importance of supporting these claims with solid and well communicated evidence was later reinforced in a Mintel report published in April 2018 titled *Nutraceuticals Need To Be Defined And Proven Effective*⁵, stating that, "Brands will need to establish their benefits and prove that these products are effective." Effective antioxidants included in food should be made by nature, and proven by science.

However, some critics have questioned whether sufficient evidence backs these claims. Despite this, a large body of research⁶ supports the need for food to help protect our bodies from oxidative stress.

Oxidative stress has the capacity to affect every organ and system in the body. It has been linked with everything from Alzheimer's disease, arteriosclerosis, cancer and heart disease, accelerating ageing, asthma, diabetes and leaky gut syndrome⁸.

High levels of oxidative stress are detected alongside the full spectrum of chronic diseases and disorders that cause deaths and disabilities. New drugs are being developed and released to address these diseases. However, considering the cost, side effects and pain associated with the diseases and their treatment, prevention is better than a cure⁸.

As a result, academia and medical institutions search to find a 'natural'

solution by examining plant extracts which have been used in diets and medicine for thousands of years without fully understanding their mode of action.

A number of different natural compounds are now known to be involved in the mode of action and contribute to key steps in these pathways or cascades. By far the most studied group is polyphenols. This includes both non-flavonoids (such as phenolic acids, hydroxycinnamic acids, stilbenes, hydrolysable tannins) and flavonoids (flavones, flavonols, flavonols/ flavian-3-ols, anthocyanins, iso-flavones)¹⁰.

These bioactive compounds are ubiquitous across the plant kingdom, although their composition differs across species, season and situation⁶. Our intake of these compounds has decreased dramatically following the agricultural revolution due to our intake of plant variety decreasing¹¹. Diets high in fat and refined sugar are also known to increase oxidative stress. The modern diet therefore creates a combined, negative effect by increasing the supply of oxidants from the production of ROS during the metabolism of food, in addition to decreasing the intake of antioxidant rich foods typical of the diet we evolved on.

In the laboratory, antioxidant compounds from plants have been shown to have powerful antioxidant capabilities. Other benefits such as regulation of carbohydrate metabolism have been observed, in addition to anti-inflammatory, anti-microbial and anti-proliferation properties. Therefore, antioxidant compound from plants may have the potential to modulate many diseases.^{6,7,9,10}

Today, scientists are beginning to understand more about how these natural extracts function in the body - right down to the intricate workings of the complex metabolic pathways that interact, cross-talk and drive our cells, organs and bodies to respond efficiently to oxidative stress. This means that food can be formulated to include antioxidants, but the



ingredients used may also help the body make more of its own.^{6,10}

Typically, these foods take the form of fruits or plant extracts from far flung parts of the world. They are therefore expensive and come with detailed back stories of how they have been traditionally used to promote health in ancient civilizations. The challenge for the food industry now is providing food that tastes good, is cost effective and helps consumers have a healthy and balanced diet.

There are myriad ways that polyphenols have been added to food formulations around the world to provide antioxidants to consumers. Beverages are one of the most common formats, with polyphenols derived from berry blends such as the maqui berry nectar sold in Chile, grape extracts included in the Pokka Mixed Red and Kyoho grape drink sold in Malaysia, sugar cane derived polyphenols in the Urc Herbal beverage sold in Vietnam, or the combination of cocoa, sugar cane and mushroom in the TaVie Lingzhi Magic Cocoa instant drink which is sold in Russia. Beyond beverages, inclusions of polyphenols can be seen in the addition of sugar cane derived polyphenols in Bibica Moon Cakes in Vietnam, or in Phyto the chocolate frog made by Daintree Estates in Australia.

Including natural plant polyphenols in foods and beverages is an opportunity to intervene as a first line

of defense against oxidative stress. The natural bioactives included in food can become scavengers themselves, mop up the free radicals and ultimately help the body defend itself.

References

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