

Diet: Phytochemicals – an army on your plate.

Over recent years more and more emphasis has been placed on the way we live our lives, including what we eat, in the battle against disease. For example, with regard to cancer, epidemiologists have demonstrated that it is a largely avoidable disease. They have estimated that more than two-thirds of cancer might be prevented through changes in lifestyle (Oliveria *et al.* (1997)) with nearly one third of the incidences of cancer being attributable to diet alone (Dresbach and Rossi). At the same time, researchers have found that for most cancer sites, people who have a low fruit and vegetable intake (at least the lower quarter of the population) experience about twice the risk of cancer compared with those with high intake, even after control for potentially confounding factors (Block *et al.* (1992)).

In the light of such evidence, governments and health organizations across the world have launched campaigns to try and educate the general population with regard to their health risks and things they can do as individuals to ameliorate those risks. If people were to substantially increase their consumption of fruit and vegetables, then major public health benefits could be achieved (Block *et al.* (1992)).

But simply knowing that eating more fruit and vegetables is good for you and can reduce your risk of developing a number of deadly diseases, is not enough. Scientists are now trying to understand why eating a substantial amount of fruit and vegetables has such a protective effect and this where phytochemicals come into play.

What are phytochemicals?

Phytochemicals are chemical compounds that are found only in plants. Indeed, “phyto” comes from the Greek word for plant. Phytochemicals are not nutrients and so are not necessary for sustaining life. They do not provide energy, essential vitamins or minerals but they have health protective benefits and have been shown to protect against and/or treat cancer, heart disease, diabetes and hypertension as well as other diseases. Over 900 different compounds have so far been discovered with new ones continually being identified. It is estimated that there maybe over 100 different phytochemicals in just one serving of vegetables (Dresbach and Rossi).

For a number of years researchers have been aware that phytochemicals have provided plants with protection against diseases but it has only been “more recently that they have been recommended for protection against human disease” (Dresbach and Rossi). Many of the phytochemicals “exert subtle drug-like effects and influence the body’s biochemistry in positive ways”

(Kleiner (1997)), producing their vital health protective effects. Phytochemicals are involved in many processes in

the body including ones that prevent cancer cell replication.

One group of phytochemicals are antioxidants. Antioxidants are found most often in fruits and vegetables as phytochemicals in the plant pigment. They play an incredibly important role in disease prevention as they effectively clean up any free radicals before they are able to cause damage. Free radicals (unstable molecules also known as oxidants) are constantly being produced by the body. In order to stabilize themselves, free radicals “steal” electrons from other molecules. By doing this, the free radicals cause damage to cell proteins and genetic material, leaving the cells vulnerable to cancer. Antioxidants may also be useful in the fight against cardiovascular disease as they are known to reduce LDL cholesterol. They can also be found in tea (black, green and oolong) red wine and chocolate.

Where do I find phytochemicals?

Although phytochemicals can be obtained by eating grains and other starchy foods derived from plant sources, the amount of phytochemicals consumed will be quite low. Fruit and vegetables are really “where it’s at”. Furthermore, eating a variety of fruit and vegetables is the real key as no single fruit or vegetable will provide all the nutrients, vitamins and phytochemicals that you need on a daily basis. Also, researchers believe that it may be that a variety phytochemicals has to be ingested because some phytochemicals need to interact with others in order to provide their full beneficial effects. As yet optimal levels have not been extrapolated and, as suggested earlier, there are still probably many more phytochemicals to be discovered and their properties understood.

In order to maximize the amount of phytochemicals that you are eating, you should chose bright and strongly coloured plant foods. The darker the colour then the more nutrients and phytochemicals the food will contain, for it is the colour of the pigment in the food that is “like a micro universe of disease fighting phytochemicals” (Barco (2004)).

Set out below is a table showing what phytochemicals can be found in which foods, and their benefits. This table is not intended to be an exhaustive list – there are, after all, hundreds of phytochemicals and possibly many more still to be discovered.

| Phytochemical | Food Source(s) | Reputed Benefit |
|---|---|---|
| Allyl sulfides | Garlic, onions, shallots, leeks, chives | Lower risk of stomach and colon cancers |
| Sulforaphanes, indoles, isothiocyanates | Broccoli, cabbage, brussel sprouts, cauliflower, kohlrabi, watercress, turnips, Chinese cabbage | Lower risk of breast, stomach, and lung cancers |
| Carotenes | Carrots, dried apricots and peaches, cantaloupe, green leafy vegetables, sweet potatoes, yams | Lower risk of lung and other cancers |
| Lycopene, p-coumaric acid, chlorogenic acid | Tomatoes | Lower risk of prostate and stomach cancer |
| Phytoestrogens | Soy foods, especially tofu, miso, and tempeh | Lower risk of breast and prostate cancers |
| Monoterpenes | Cherries, citrus fruit peel oils, caraway, dill, spearmint, lemongrass | Lower risk of breast, skin, liver, lung, stomach, and pancreas cancers |
| Polyphenols | Green tea | Lower risk of skin, lung, and stomach cancers |
| Alpha-linolenic acid, vitamin E | Vegetable oils | Reduce inflammation (eg, from exercise-related muscle damage) and risk of heart disease |

(Source - Kleiner (1997))

For many the idea of increasing their fruit and vegetable consumption is likely to be daunting, particularly when you consider that the average American only eats one serve of fruit and one serve of vegetables a day (Dresbach and Rossi). In 2002 the Ontario Nutrition and Cancer Prevention Survey found that of the 3,183 people (aged between 18 and 64 years) surveyed, 40% failed to meet Canada's Food Guide recommendations (5 - 10 servings of fruit and vegetables a day), with 46% of men and 36% of women eating fewer than the recommended minimum of 5 servings of fruit and vegetables a day.

Can't I just take a supplement?

Taking a supplement may not be the answer either. It would be impossible to get all of the known phytochemicals simply by taking a supplement and as mentioned above, the overlapping and interactive effect of taking different phytochemicals from different plant sources is essential if you are to obtain the phytochemicals full beneficial effects. "Consumption of supplements containing phytochemicals will only provide selected components in a concentrated form, not the diversity of compounds that occur naturally in foods" (Dresbach and Rossi). Furthermore, it is difficult to see how supplements can provide all the benefits of naturally occurring phytochemicals until research has been completed into the interactions between these phytochemicals.

At the end of the day, the conclusion has to be that increased fruit and vegetable consumption must be encouraged – the benefits of doing so are enormous not only to the individual but also in terms of public health benefits. And the key to gaining the maximum benefit is to eat a wide variety of fruit and vegetables every day – the brighter the better.

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