



Polyphenol power

Opportunities abound while challenges remain in exploring the health benefits of polyphenols and their appropriate use.

THERE has been increasing interest in polyphenols and their role in the prevention of chronic degenerative diseases, such as cardiovascular diseases and some types of cancers.

A two-day international symposium on the global scientific development of plant polyphenols was recently organised by the International Life Sciences Institute (ILSI) Southeast Asia Region and the Nutrition Society of Malaysia. I would like to share some highlights with readers who were not able to attend.

Plant polyphenols and health

Polyphenols are a large group of compounds found in many of the foods we eat. They are present in plants such as fruits, vegetables, seeds, legumes and nuts, and products derived from them eg tea, coffee, fruit juices, wines, soya products, and our all-time favourites - cocoa and chocolate.

Based on many epidemiological, clinical, animal, cellular in vitro, and mechanistic studies, there are scientific evidences that suggest polyphenols perform important roles, from providing basic nutrition to reducing the risk of chronic age-related diseases.

In the opening lecture, Professor Gary Williamson of the University of Leeds, United Kingdom, provided an overview on the efforts to continue unravelling the complex links between polyphenols and health. He highlighted the importance of the bioavailability of polyphenols and discussed the absorption and utilisation of these compounds as well as the mechanisms of action.

In a second opening lecture, Professor Kevin Croft of the University of Western Australia discussed the analytical methods and assessment of biological activities of dietary polyphenols and flavonoids. Key methodological elements to be considered include: a) the need to consider flavonoid metabolism as an important factor influencing the biological activity using in vitro studies; b) appropriate assays for assessing antioxidant activity; c) animal models for assessing effects of dietary polyphenols on atherosclerosis; and d) human intervention studies and assays for markers of polyphenol absorption, oxidative stress, inflammation, endothelial function, blood pressure, and lipid metabolism.

Tea polyphenols

Four presentations on tea polyphenols were given by Professor Jonathan Hodgson of the University of Western Australia; Professor Gao Yu Tang of the Cancer Institute, Shanghai Jiaotong University in China; Dr Manoj Joshi, Unilever Research Centre in India; and Dr Keiichi Abe of Cerebos Pacific Limited in Singapore.

Next to water, tea is the most widely consumed beverage in the world. It is estimated 3.5 million tonnes of tea leaves are produced each year worldwide. Tea is brewed from the tree *Camelia sinensis*, and there are three types of tea: green tea (non-fermented), black tea (fermented), and oolong tea (half fermented).

The beneficial effects of tea have been attributed to the presence of high amounts of flavonoids, a group of polyphenols. Tea flavonoids are strong antioxidants, and are the most potent polyphenols in green tea. The process of fermentation, a combination of enzymatic and/or heat reactions, results in the formation of a wide variety of conjugated or polymerised compounds of catechins with



Scientific evidence suggests plant polyphenols, like those found in coffee and tea, perform roles that range from providing nutrition to reducing the risk of chronic diseases.

improved potency or specificity.

Overall, the available data suggest that effects of tea flavonoids on endothelial function, visceral adiposity, and perhaps other markers of cardiovascular disease risk may be at least partially responsible for benefits of drinking tea on cardiovascular disease risk.

Many experimental studies have shown that tea preparations have inhibitory activities against tumour genesis. But epidemiological studies on tea drinking and cancer in human beings are limited, and the results of studies inconsistent. Inconsistency in reported outcomes are partly explained by confounding variables like study design, amounts of tea consumed, dietary restrictions, wash-out phase, composition of the test population, and baseline risk factors. One of the lesser emphasised, but significant, variables has been the tea itself; differences in the composition of the tea are likely to cause variability in efficacy.

Tea has been recognised as one of the products within the Foods for Specified Health Use (FOSHU) system in Japan. Of the nine categories of health claims for FOSHU, "body fat related" is one of the fastest growing categories. One of the key products in this category is tea. A catechin-containing tea is the first beverage to claim reduction of abdominal fat. There are also teas that have been registered for "serum cholesterol", "blood pressure", and "blood glucose" categories of health claims for FOSHU.

Coffee polyphenols

Current understanding and research in the area of coffee and polyphenols were presented by four international speakers, namely Professor Gary Williamson, University of Leeds, United Kingdom; Dr Koh Woon Puay of the National University of Singapore; Dr Thomas Hatzold of Kraft Foods R&D Inc based in Germany; and Dr Elke Gerhard-Rieben in the Nestlé PTC Orbe, Switzerland.

Coffee was discovered in the Arabic region more than a thousand years ago and is now one of the most widely consumed beverages together with water and tea. Most consumers appreciate coffee for its aroma and taste, as well as for the mild stimulating effect resulting from the caffeine it naturally contains.

The main polyphenols in coffee are chlorogenic acids (CGA). These consist of phenolic acids, especially caffeic or ferulic acid, linked

to a quinic acid. The CGA content varies on the type of bean, length of roasting, and brewing method. Coffee is also a very complex drink, containing many other bioactive components such as caffeine, Maillard reaction products, oligosaccharides, N-methylpyridinium, trigonellin, cafestol, kahveol, etc. Data obtained thus far through in vitro and human studies show that coffee phenolic acids are absorbed efficiently, and that many metabolites are found in blood and plasma.

Data obtained from observational studies link coffee consumption to a variety of health benefits. These include, besides the well-known acute effect of caffeine on mental performance, other effects on the brain, eg a lower risk of developing Parkinson's and Alzheimer's Disease. In addition, there is evidence that coffee drinking may attenuate age-related cognitive decline.

Potential positive effects are not limited to the brain. There is evidence that coffee drinkers have a lower risk of developing alcohol-induced liver cirrhosis. In the Singapore Chinese Health Study, subjects reporting consumption of four or more cups of coffee per day were found to have a 30% reduction in risk of diabetes compared to those who reported non-daily consumption.

Communication

The difficulties involved in communicating these potential benefits to consumers were also highlighted. Regulatory bodies restrict such communications more and more. The EU regulatory system, for example, requires pre-market approval for any health claim, including claims relating to a function (eg coffee increases mental alertness; coffee contains

antioxidants) and so-called disease risk reduction claims (eg coffee decreases the risk of developing diabetes).

In the interests of public health, it was felt a reasonable approach should be taken. If the hurdle of scientific substantiation is set too high, then the public will not benefit from the positive effects of certain foods. On the other side, if the hurdle is lower, and some limited claims are allowed, the harm to public health is limited, if not absent, if the claims turn out to be unsubstantiated later on.

There is just so much more to say about polyphenols in other plant foods. I would therefore like to continue sharing in the next installment of NutriScene. I will also highlight some issues related to consumer education of health benefits as well as regulatory developments in relation to health claims.

■ *NutriScene is a fortnightly column by Dr Tee E Siong, who pens his thoughts as a nutritionist with over 30 years of experience in the research and public health arena. For further information, e-mail starhealth@thestar.com.my.*

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