Tea science

Studies show tea and tea components have promising effects on the mind and body.

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TEA is one of the oldest beverages known to man. It is said to have originated in China and has been cultivated for more than 2,000 years. Next to water, tea is the most widely consumed beverage in the world and its consumption is increasing. It is estimated that 3.5 million tons of tea leaves are produced each year throughout the world.

Extensive research has been undertaken on the beneficial effects of tea consumption, including potential benefits on stroke, coronary heart disease, certain cancers, and weight management. Although some of these effects are far from being conclusive and lack support from human clinical trials, accumulated evidence is certainly promising.

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Annual tea science symposium

The Lipton Institute of Tea has been investigating the scientific basis for traditional beliefs about the health benefits of tea, through its own internal research as well as collaboration with universities around the world. The institute has organised a series of tea science symposiums to provide experts an opportunity to share findings from new studies and discuss their clinical relevance, identify future research opportunities, and foster valuable networks and collaborative partnerships.

I would like to share with readers, particularly scientists who have an interest in tea science, discussions in the third annual tea science symposium organised by the Lipton Institute of Tea held in Bangkok, Thailand, early October last year.

Stroke and cardiovascular health

Stroke (predominantly ischaemic stroke) has an enormous human and economic impact. There is therefore considerable interest in interventions which can reduce the risk of stroke. Animal studies have previously shown that tea and tea components can reduce stroke-related brain damage. There is now considerable evidence for tea protecting against ischaemic stroke in humans.

In her keynote address, Prof Lenore Arab (University of California, Los Angeles, US) presented exciting new data on the cardiovascular benefits of tea, in particular, a new meta-analysis showing that the consumption of black and green tea was associated with a reduced risk of ischaemic stroke worldwide.

The meta-analysis involved nine studies from five countries with almost 195,000 patients who experienced 4,378 strokes. The study found that consuming three cups of green or black tea per day reduced the relative risk of stroke by 21%, regardless of the geographic region.

Prof Arab recognised that further research is required to look into the mechanisms by which tea exerts its protective effect on stroke. Possible mechanisms include an effect on blood clotting, inflammation, endothelial function or perhaps a protective effect on leukoaraiosis (changes in cerebral white matter).

The potential bioactive components in tea include catechins and flavonols, theaflavins and thearubigins. These compounds, collectively known as tea flavonoids, are absorbed into the bloodstream where they may exert vascular effects. Recent research has focused on the interaction between tea flavonoids and the innermost lining of the blood vessels, the endothelium. Improved endothelial function may help to explain the reduced risk of cardiovascular disease and stroke observed among tea drinkers.

Recent research has also focused on the vasodilatory effects of tea flavonoids via a non-invasive technique known as flow mediated dilation (FMD). FMD is gaining acceptance as a predictor of cardiovascular disease risk, with higher FMD values being associated with less risk of future cardiovascular or cerebral events in both symptomatic and asymptomatic subjects.

Several human studies have investigated the effect of green and black tea consumption on endothelial function/FMD, and the majority of these studies have shown a beneficial effect of tea on FMD.

To further investigate the effect of tea consumption on FMD, Dr Sheila Wiseman (Unilever R&D, Netherlands) conducted a meta-analysis via a literature search of available data. In all but one of the eight studies included in the analysis, green or black tea consumption resulted in significant improvements in FMD (a 2 .6% increase with three cups of tea per day), which may contribute to the reduced risk of cardiovascular events and stroke observed among tea drinkers.

The effect of tea on FMD was robust, with effects noted in both healthy and non-healthy subjects, young and old subjects, and in males and females. Further research is required to determine which of the bioactive components of tea has the greatest effect on FMD.

Drinking more than three cups of tea per day is known to be associated with a reduction in the risk of cardiovascular disease. Prof Zhen-Yu Chen (Chinese University of Hong Kong) described potential mechanisms behind the observed cardiovascular benefits of tea catechins and theaflavins.

According to Prof Chen, the cardiovascular protective effects of green and black tea are thought to involve three mechanisms, including an antioxidant or anti-atherosclerotic effect, a cholesterol-lowering effect, and a vasoprotective effect that improves the functioning of the arterial endothelium through nitric oxide pathways.

Cognitive performance, attention, and psychological well-being

Previous studies have shown that tea can improve aspects of attention measured with behavioural tests. Dr Eveline De-Bruin (Unilever R&D, Netherlands) described a new study showing that theanine and caffeine in black tea can improve focus and concentration.

The study involved 24 young adult males who underwent functional magnetic resonance imaging (fMRI) to measure changes in neural activity during a task that required attention. Subjects were scanned after consuming either a test drink (300mg of caffeine and 135mg theanine in a tea base, equivalent to eight cups of tea) or a control drink (tea base but only 20mg caffeine and 6mg theanine, equivalent to half a cup of tea).

Response times following consumption of the test drink were significantly faster in all three components of the test of attention than after the control drink. The test drink also appeared to lead to more efficient functioning of attention networks within the brain. Further research is warranted to see if the effects on attention occur at doses comparable to regular consumption of tea.

Previous research has shown that tea flavonoids have positive effects on cardiovascular disease, stroke, cancer, and the metabolic syndrome (including diabetes and obesity). Caffeine in tea has been shown to improve cognitive performance, attention, psychological well-being, and motivation/alertness. Theanine itself does not appear to improve cognitive performance, but it does result in relaxation and potentiation of the behavioural effects of caffeine.

To determine whether there were positive associations between intakes of tea and tea components and cognitive performance and psychological well-being, Dr Janet Bryan (University of South Australia) examined findings in an existing Australian database of a large cross-sectional survey. The survey involved 1,183 middle-aged South Australians who completed self-reported assessments of their tea consumption, health, cognitive function, memory, and psychological well-being.

The study found that 63% of participants drank both tea and coffee (only 4% drank neither beverage), with women drinking more tea than men. For men, tea flavonoids (except flavonones) were positively associated with self-reported vitality and physical and mental health. For women, tea and tea components were generally negatively associated with psychological outcomes, whereas nutrients not found in tea (e.g. anthocyanidins and folate) were positively associated with psychological outcomes.

There were very few significant associations with cognitive performance measures. Future studies should attempt to identify potential mechanisms by which tea flavonoids exert an effect on cognitive performance.

Positive mood is known to be associated with a number of short- and long-term benefits, including increased creativity and problem solving, broadening of attention, better physical health, and increased longevity.

Defining and measuring mood is open to interpretation, but generally, mood can be considered as a low intensity and enduring affective state with no obvious antecedent cause that influences a range of behaviours and which lasts longer than emotions (which are generally short-lived with obvious causes). Mood is known to fluctuate throughout the day and is often affected by situational factors (e.g. work stress). Individuals employ a variety of strategies to self-manage their mood throughout the day.

Previous studies have shown that ingesting certain foods (including chocolate and tea, generally black tea with no milk or sugar) can influence positive mood through a variety of mechanisms, including hedonic effects which are quite separate from the nutritional effects of foods or drinks.

To determine whether consumption of tea can influence positive mood in non-Western countries, Dr Georgie Russell (Unilever, Netherlands) conducted an exploratory study in Shanghai, China. The study investigated the effect of tea with milk and sugar ("milk tea") in 30 young healthy subjects from Shanghai, China, using assessment tools specifically modified for an Asian population.

The consumption of milk tea led to an improvement in mood and a reduction in self-reported negative mood. Milk tea appeared to be consumed in an attempt to self-manage periods of low mood (e.g. before starting work or after a stressful commute).

Future studies should continue to assess cultural differences in the measurement of mood and seek to better understand the effects of tea on mood.

During the panel discussion session, all participants at the symposium took part in interactive discussions about the key learnings from the symposium and identified areas for further research into the potential benefits of tea consumption.

Following lively discussions, participants agreed that there is now a sizeable body of evidence for a cardiovascular benefit from tea. In addition, preliminary data looks promising with regards to beneficial effects of tea on brain function, cognition, and mood.

Further research is required to understand the mechanisms involved, the active components, and whether there are variations in benefit depending on particular subgroups. An important challenge ahead will be how to translate this growing body of evidence into material suitable for consumers and how to provide scientific support for marketing 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. The information provided is for educational and communication purposes only and it should not be construed as personal medical advice. Information published in this article is not intended to replace, supplant or augment a consultation with a health professional regarding the reader's own medical care. The Star does not give any warranty on accuracy, completeness, functionality, usefulness or other assurances as to the content appearing in this column. The Star disclaims all responsibility for any losses, damage to property or personal injury suffered directly or indirectly from reliance on such information.*