



# THE LITTLE BOOK OF TEA

IN ASSOCIATION WITH THE  
TEA ADVISORY PANEL









## Contents:

**p4 : Foreword**

**p6 : Tea and hydration**

**p9 : Evidence for tea benefits**

**p13 : Tea, cardiovascular disease and diabetes**

**p15 : Green or black tea?**

**p16 : Caffeine**



# Foreword by The Tea Advisory Panel (TAP)

Tea is the most consumed drink in the world, after water, but offers many more benefits than just being a refreshing beverage. Studies have linked regular tea drinking – both black and green teas – with benefits for heart health, cancer prevention, oral health and cognitive function. The major active substances in tea are believed to be flavonoids – plant compounds from the polyphenol family – which are also found in different forms in fruits, vegetables, cocoa and red wine. Two other substances – caffeine and L-theanine (an amino acid)– are thought to contribute to tea’s effects on mental performance and mood.

This Little Book brings together reviews of these studies published in recent years by the Tea Advisory Panel (TAP). It also provides additional information about how tea is used in the UK and offers tips for health and wellness.



- Tea has been enjoyed in Europe since the 16th century and probably came to Britain in the mid 1600s.
- Black, green and oolong teas come from the same plant, *Camellia sinensis*, and offer similar health benefits.
- An average cup or mug of tea contains 40-50mg of caffeine. Coffee contains twice as much on average –and in some cases up to 400mg for a large filter coffee !
- It is a myth that tea contains the same compounds that ‘tan’ leather – tannic acid and tannins. Instead, the characteristic hue and taste of black tea are down to its rich flavonoid content.







# Tea and hydration

## Black tea vs. water for hydration

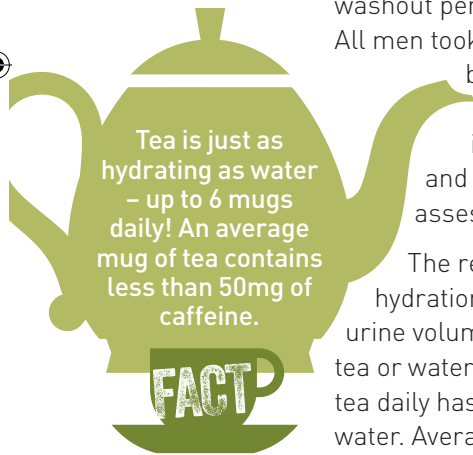
It is a common belief that caffeinated drinks, such as tea, may adversely affect body hydration levels. Consumers are sometimes given advice in magazines to limit consumption of caffeinated drinks, or drink water alongside them. A randomised cross-over trial in adults has investigated whether or not this claim is true in relation to tea drinking.

In a cross-over trial, 21 healthy men were randomised to drink either four or six mugs of regular 'black' tea (containing 168mg or 252mg total caffeine), or similar amounts of boiled water over one day. The tea was made each time in a standardised way. There was a five day washout period between the tea and water conditions.

All men took part in all test conditions and, during these, blood and urine samples were taken at regular intervals to monitor hydration status. It was important to have measures of both blood and urine as this is the gold standard method for assessing hydration.

The results revealed that the various indicators of hydration status, e.g. blood and urine osmolality, total urine volume, blood urea, were no different after drinking tea or water. This suggests that drinking up to 6 mugs of tea daily has similar hydrating properties to drinking plain water. Average tea intakes in the UK are currently 2-3 servings per day which are well within the limits tested in this study.

For more information see: Ruxton CHS & Hart VA (2011) British Journal of Nutrition Vol.66: pg 588-95.



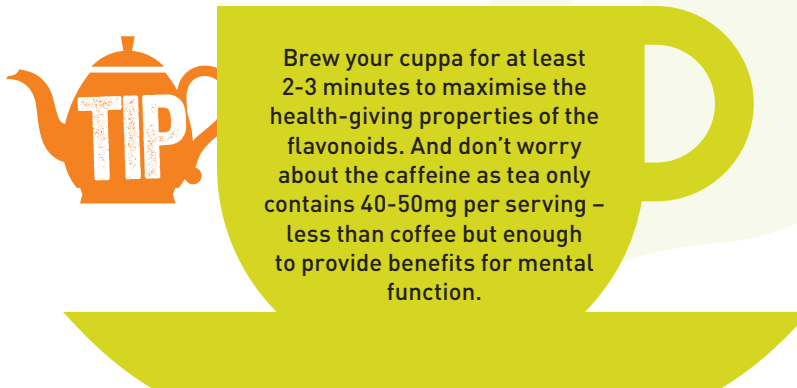
## Health professionals' role in healthy hydration

Water is essential for human health and life. Health professionals, such as nurses, have a key role in helping to promote healthy hydration habits in different groups of patients, as discussed in a new continuing professional development article published in Nursing Standard.

Even mild dehydration can have a negative effect on patients' health and recovery so it is important to detect the early signs of dehydration including lethargy, headache, a dry mouth, and dark urine. The consequences of dehydration include reduced mental function, depressed mood, increased risk of urinary tract infections, constipation, kidney stones and pressure ulcers.

Patients should be encouraged to consume fluids from foods, e.g. dairy products, soups, fruits and vegetables. Depending on age, a healthy fluid intake would be 4-7 servings (glass or mug) per day, according to European Food Safety Authority recommendations. Different population groups have different needs and may require more fluid depending on illness, environment and medication. Water, milk, unsweetened tea; coffee and herbal infusions are healthy options. Contrary to previous patient guidelines, there is now evidence that tea is just as hydrating as water so patients can reach for a cup of tea when they feel thirsty.

For more information see: Ruxton CHS (2012) Nursing Standard Vol. 26: pg 50-56.







## DID YOU KNOW

According to many studies, adding milk doesn't appreciably influence the bioavailability of the flavonoids in tea. Neither would adding sugar if that's your preference.

# Evidence for tea benefits

## Is black tea helpful or harmful?

A systematic review published in the European Journal of Clinical Nutrition collated the evidence published from 60 studies investigating the links between black tea and health.

Drinking 3 or more servings of tea daily was associated with a reduced risk of heart disease, thought to be attributed to the high flavonoid content. One meta-analysis found that regular tea drinking reduced the risk of a heart attack by 11%. Some observational studies have linked tea drinking with a lower risk of cancer – particularly colo-rectal cancer – but other studies have found no effect. However, animal and laboratory studies suggested that tea polyphenols had potent anti-cancer effects so this could indicate some benefit.

There was also evidence suggesting links between black tea consumption, bone mineral density and mental performance, but the number of studies was small. Potential links were also seen for the prevention of dental caries but, again, numbers of studies were too few to generate firm conclusions.

On the whole, regular consumption of black tea – at intakes of 3 or more servings per day – had a positive impact on health. Further studies are needed where quality evidence is lacking, e.g. bone health, cancer prevention.

For more information see: Gardner EJ, Ruxton CHS & Leeds AR (2006) European Journal of Clinical Nutrition Vol.62: pg 3-18.





## Focus on flavonoids

Building on evidence from a previous systematic review (see Gardner et al., 2006) a new article pooled the evidence from 20 observational studies looking at the impact of black tea with the particular focus on flavonoids on health. These were published in 2004-2009.

In line with the previous review, black tea was linked to a reduced risk of heart disease with the protective effects most likely explained by the flavonoids found in tea. Other studies continued to suggest anti-cancer links, although further studies in humans are needed to confirm this since the evidence is reliant on observational studies.

Finally, studies linked tea drinking with improvements in mental function and weight management. While studies are few in number at present, there seems to be an association between high intakes of flavonoids in the diet, including those from tea, and less cognitive decline in older people. In addition, a growing number of studies on green tea suggest benefits for weight management, possibly because certain tea flavonoids can boost energy expenditure and fat burning, or may reduce fat and sugar absorption. More human trials are needed to confirm this effect.

For more information see: Ruxton CHS (2009) Nutrition & Food Science Vol.39: pg 283-94.



Natural plant compounds, called flavonoids, explain the beneficial impact of tea on heart health and cognitive function

**FACT**







## Bioavailability of tea flavonoids

A further review paper brought together the latest evidence on the potential role of black tea in supporting human health.

By examining the findings from 20 studies, the review found an association between black tea consumption (more than 3 servings/day) and reduced risk of myocardial infarction (i.e. heart attack). Intakes within a range of 1 to 8 servings per day seemed to provide benefit and were not associated with any adverse effects.

An important aspect of this paper was a discussion about the bioavailability of tea flavonoids as there is debate on whether adding milk reduces the health effects of tea. Studies using blood markers show that the flavanol monomers and gallates (sub-sets of the flavonoid group) found in black tea are absorbed but their bioavailability is lower than other types of flavonoid polyphenols. However, they are still 'bioactive' as proved by studies showing increased anti-oxidation potential in blood lipids following regular tea consumption.

Both bioavailability and the amounts consumed habitually are important when considering the impact of flavonoids on health. In the UK, 82% of dietary flavonoids come from black tea so the lower bioavailability of some tea flavonoids is compensated by relatively high intakes. Adding milk to tea did not appear to influence bioactivity in the human body in the majority of studies which examined this issue.

For more information see: Ruxton CHS (2008).  
Nutrition Bulletin Vol.33: pg 91-101.





## DID YOU KNOW

Tea is associated with relaxation and this may be due to the presence of an amino acid in tea, called L-theanine, which has specific calming effects on the brain.



# Tea, cardiovascular disease and diabetes

## Black tea may lower diabetes risk

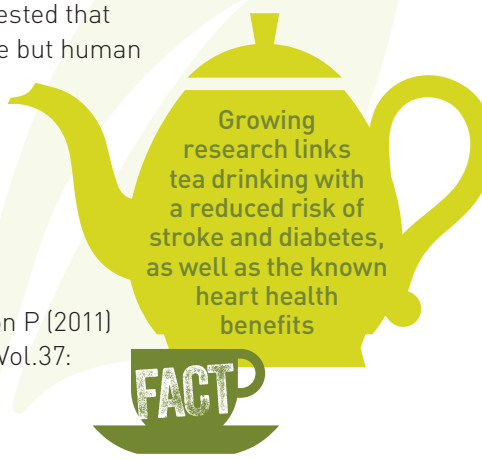
While rates of cardiovascular disease have stabilised in recent years, type 2 diabetes has come to the fore as major health issue. Prevalence rates in the UK have doubled since 1991 and are now 6% in men and 4% in women, with the rapid rise blamed on the obesity epidemic.

Given its high antioxidant content and vascular effects, tea drinking could have beneficial effects beyond the realm of heart health. This was examined in a systematic review which examined associations between regular tea drinking and the risk of cardiovascular disease and diabetes.

Evidence was collated from 40 high quality observational and randomised controlled trials which met strict inclusion criteria. At intakes of 3 or more servings per day, black tea was associated with a reduced risk of heart disease while, for type 2 diabetes risk, benefit was seen at intakes of 1 to 4 servings per day. Observational studies suggested that drinking black tea may reduce the risk of stroke but human intervention studies were lacking.

The evidence that tea may contribute towards the prevention of type 2 diabetes and stroke is promising and now needs to be explored further in human intervention trials in order to identify mechanisms of action.

For more information see: Ruxton CHS & Mason P (2011) British Nutrition Foundation Nutrition Bulletin Vol.37: pg 4-15.



Growing research links tea drinking with a reduced risk of stroke and diabetes, as well as the known heart health benefits

**FACT**





# Green or black tea?

## **Black and green tea offer similar health benefits**

Green tea often hits the headlines for its benefits but not everyone knows that all teas are in fact derived from the same plant, *Camellia sinensis*. Of the tea produced worldwide, 69% is black, 29% green and 2% oolong, so black tea is far more popular and widely available. Perhaps unsurprisingly, given their common origin, black and green teas offer similar health benefits.

While the types of flavonoids found in green and black tea may differ – green is higher in catechins while black contains theaflavins and thearubigins – the overall flavonoid content is fairly similar. Evidence from human studies, which have compared green and black teas, suggests that both forms have the potential to reduce the risk of dental caries, diabetes, heart disease and possibly cancer.

Drinking around four servings of black tea daily, or five to six servings of green tea (due to traditionally smaller cups), may help to protect against these conditions.


For more information see: Ruxton CHS (2011) Network Health Dietitian magazine Issue 66: pg 12-13.



# Caffeine

## Caffeine and mood, cognitive function and performance

Caffeine consumption has been linked with improved physical performance, mental function (alertness) and reduced fatigue yet often receives unfavourable press. A review published in Nutrition Bulletin has studied this in more detail.



Caffeine at intakes up to 400mg daily (equivalent to 8 servings of tea) can benefit mental function and exercise endurance.

**FACT**

The systematic review article pooled findings from 41 double-blind randomised controlled trials meeting strict inclusion criteria. Most studies reported cognitive benefits with low to moderate caffeine intakes (37.5 to 450 mg per day). These benefits included greater alertness and vigilance when performing mental tasks, improved mood and a reduce perception of fatigue. In addition, studies showed that caffeine intakes up to 400mg/day did not lead to dehydration, even in combination with exercise testing. For exercise performance itself, caffeine offers proven ergogenic (i.e. performance-enhancing) effects and was, for a time, banned by the International Olympic Committee . Now that the ban is overturned, athletes use caffeine to boost endurance capability and fat burning (which, in turn, spares glycogen stores).

Overall, evidence showed that caffeine has maximum benefits at intakes of 30 to 400mg per day, equating to about 1 to 8 servings of tea daily, or 1-4 servings of coffee due to its higher caffeine content. No adverse effects, e.g. on sleep quality, were seen at these levels.

For more information see: Ruxton CHS (2008) Nutrition Bulletin Vol.33: pg 15-25.







## Caffeine benefits and risks

Caffeine is considered to be undesirable by some health professionals but this doesn't reflect the evidence. An article in *Nursing Standard*, reviewed published studies on caffeine and health, and considered what advice nurses could give different patient groups.

Studies which reported negative effects of caffeine, e.g. increased anxiety or difficulty sleeping, used high doses (→500mg) in the form of caffeine pills. In contrast, lower amounts of caffeine (up to 400mg/day) tended to promote mental and physical well-being, e.g. increased alertness and endurance, and less fatigue. Natural caffeine sources, such as tea – which contains less than 50mg per cup, are a good source of polyphenols and offer anti-inflammatory and vascular benefits. Regular tea drinking has been associated with reduced heart disease and cancer risk, as well as slower cognitive decline in older adults. For these reasons, some caffeinated drinks can offer health benefits.


A few groups still need to limit overall caffeine intakes. Mums-to-be are advised to consume no more than 200mg/day due to links with lower foetal growth, while people with high blood pressure should keep their caffeine consumption below 250mg/day. There are no UK guidelines for children but, based on Canadian guidance, one or two servings daily of unsweetened tea is considered to be within safe limits.

For more information see: Ruxton CHS (2009) *Nursing Standard* Vol.24: pg 41-48.

### HEALTH TIP

Instead of chewing sugar-free gum after meals, enjoy a cup of tea. The polyphenols in tea have anti-bacterial properties which have been found to kill off the oral bacteria that cause dental decay.





The benefits  
of caffeine, at  
moderate intakes,  
outweigh any risks.  
Tea contains less  
caffeine than other  
sources,  
e.g. coffee.

FACT<sup>P</sup>



**The Tea Advisory Panel:** The Tea Advisory Panel is supported by an unrestricted educational grant from the UK TEA COUNCIL, the trade association for the UK tea industry. The Panel has been created to provide media with impartial information regarding the health benefits of tea. Panel members include nutritionists; dieticians and doctors. For further information please call 0207 7052 8989.



