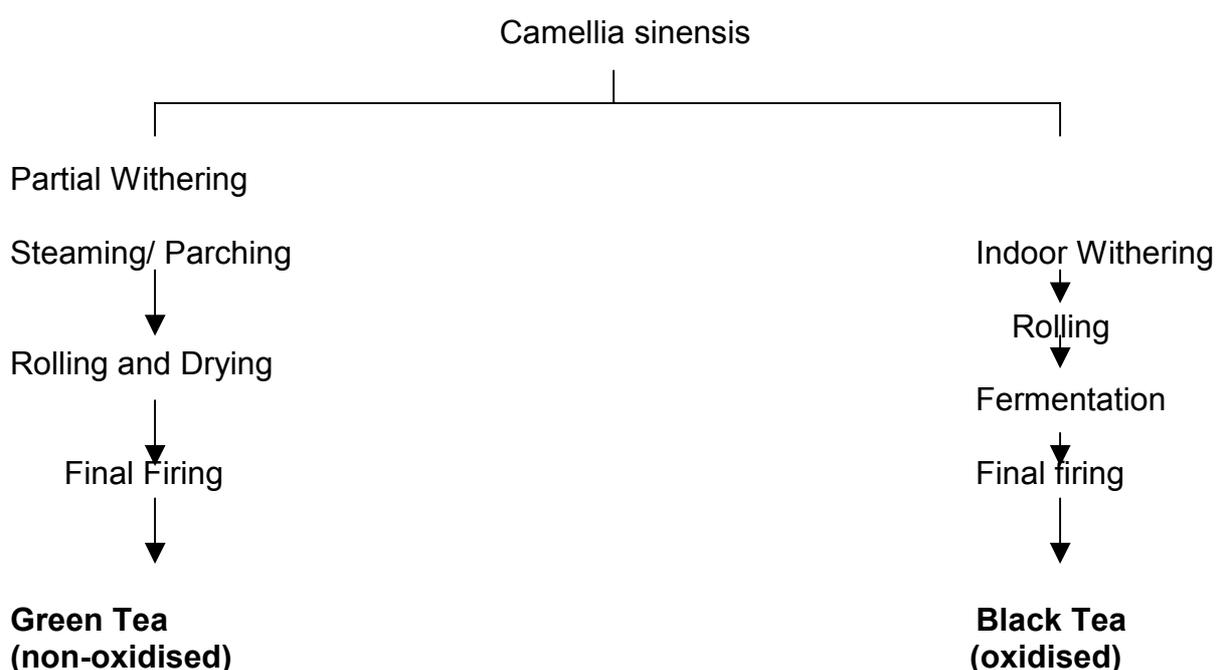


## Black and Green Tea: How do they differ?

### Introduction

Both green tea and black tea come from the leaves of the plant *Camellia sinensis*, however the processing that the leaves undergo to make the final tea is different. The leaves for black tea are fully oxidised while those for green teas are lightly steamed before being dried. Figure 1 outlines the processing of green and black tea in more detail.

Figure 1 – Green and Black Tea Processing



Black teas mostly come from plantations in Africa, India, Sri Lanka and Indonesia while green teas come from countries in the Far East such as China and Japan.

### Flavonoid content of black and green teas

Black and green teas both contain similar amount of flavonoids however they differ in their chemical structure. Green teas contain more of the simple flavonoids called catechins, while the oxidisation that the leaves undergo to make black tea converts these simple flavonoids to the more complex varieties called theaflavins and thearubigins. Table 2 provides average values for the different flavonoids present in green and black tea although they will differ dependent on the variety of leaf, growing environment, manufacturing, particle size of ground tea leaves and infusion preparation.<sup>1,2</sup>

Table 2 – Flavonoids in green and black tea<sup>3</sup>

| Flavonoids | Green Tea<br>(average/ 100g) | Black Tea<br>(average/ 100g) |
|------------|------------------------------|------------------------------|
| Catechins  | 14.2g                        | 4.0g                         |

|                           |             |             |
|---------------------------|-------------|-------------|
| Theaflavins               | -           | 0.94        |
| Flavonol glycosides       | 0.64        | 0.47        |
| Flavone C glycosides      | 0.086       | 0.051       |
| <b>TOTAL POLYPHENOLS*</b> | <b>16.0</b> | <b>15.6</b> |

\* Majority of polyphenols in tea are flavonoids

Oolong tea, is a partially fermented leaf, with a flavonoid profile midway between green and black tea.

### **The health benefits of flavonoids**

Although the oxidisation process modifies the type of flavonoids present, the total level and their overall antioxidant activity, is similar in both teas<sup>4</sup>. Research is now suggesting that antioxidants, such as those found in both green and black tea, may have a protective role to play in certain conditions such as heart disease, stroke and some cancers. Further information about the health benefits of black tea, antioxidants and flavonoids can be found in the Fact Sheets 'Tea and Antioxidants; Tea and Cancer; Tea and Cardiovascular Disease'.

### **The health benefits of green tea**

Green tea specifically has been associated with protection against certain types of cancer<sup>5, 6</sup> including lung<sup>7</sup>, stomach cancer<sup>8-14</sup> and its precancerous condition, gastritis<sup>8, 15</sup>. Moreover, an observational study in Japan found that the regular consumption of green tea (more than 3 cups a day) might be protective against recurrence of breast cancer in the early stages.<sup>16</sup>

The possible protective mechanism of green tea is unclear, although a number of in vitro and animal studies are attempting to explain this, including a study that found that the green tea polyphenol (-) -epigallocatechin (EGC) inhibited the DNA replication in leukaemia cells, resulting in the death of these cells.<sup>17</sup> Other mechanisms by which green tea may be protective is discussed in more detail in the fact sheet 'Tea and Cancer.'

Further work is still required in understanding the protective antioxidant action of black and green teas. In one in vitro study, black tea was found to be more efficient than green tea as a chemopreventor against certain free radicals, oxygen and nitrogen species.<sup>18</sup> However, in another study both green tea and black tea were equally able to protect against Nitric Oxide toxicity.<sup>19</sup>

In addition to its potential anticarcinogenic and antioxidant<sup>20</sup> effects, other studies have shown green tea to have anti-inflammatory, antithrombotic<sup>21</sup>, cholesterol lowering<sup>22-24</sup>, antiviral and antibacterial properties<sup>25-27</sup>.

Although the scientific evidence demonstrating the health benefits of green tea is increasing it is not yet conclusive and provides an interesting area for future research.

### **Green tea and skin protection**

A number of animal studies have shown that topical treatment or oral consumption of green tea polyphenols, inhibit chemical carcinogen or ultraviolet radiation-induced skin tumours in different animal models<sup>28-30</sup>. Treatment of green tea polyphenols to skin

has been shown to have a beneficial effect on the biochemical pathways involved in skin inflammation, cell proliferation and chemical tumour promoters. These results have been confirmed in a human model, where topical application of green tea polyphenols protected against UV light induced DNA damage<sup>31</sup>. Based on results mainly from animal studies, many companies are now supplementing their skin care products with green tea extracts. However, the effects on human skin are still not well understood and further research in this field is required.

### **Green tea extract and weight loss**

Preliminary research published in the American Journal of Clinical Nutrition suggests that an extract from green tea may help with weight loss by speeding up fat oxidation.<sup>32</sup> In this study, researchers conducted a 6 week study of 10 healthy men in their 20's and found that those men who were given a green tea extract used more calories in a day than those who did not. Further research is required before any firm conclusions about green tea and weight loss can be drawn.

### **Caffeine Content of Green Tea and Black Tea**

Black and Green teas are produced from the same plant *Camellia sinensis* so both green and black tea naturally contain caffeine. Further information about caffeine and tea can be found in the Fact Sheet, 'Caffeine: The Facts.'

### **Which to drink?**

The health benefits gained from drinking black and green tea are comparable, both helping towards promoting health and well-being. The decision about which to drink is simply a matter of taste.

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