

SOME POSSIBLE EFFECTS OF TEA ON HEALTH

There have been various general surveys of the work on the relationship between tea drinking and health that has taken place in recent years. In an article entitled 'Prophylactic functions of tea polyphenols', at the Health and Tea Convention in Colombo in 1992, Dr Y. Hara, the General Manager of the Food Research Laboratories of Mitsui Norin Company Ltd, summarized some of the findings as follows. He reports that 'Results have proved that tea polyphenols are multi-functionally effective in preventing putrefaction or rancidity of foods, infection of alimentary or respiratory diseases, or development of malignant tumors, among other beneficial properties.' Under 'Tea and Cancer' he provides diagrams and text that shows that 'the growth of the tumors were suppressed in the catechin fed groups [of mice]. In the 1% group, tumor weight was suppressed to 44.2% of the control group.' He concludes: 'Indications are that tea catechins may play very important roles in cancer prevention'. In the next section on 'Tea and Cholesterol', he suggests that tea 'is very effective in reducing cholesterol levels'. In relation to blood pressure, he noted 'significant suppression', as between a control group and tea fed group. He also noted there is likely to be an effect in controlling obesity and diabetes, and reducing blood glucose levels.

One of the most interesting findings comes under 'Tea and Influenza'. He starts by stating that 'Ever since tea started to be widely consumed it came to be known as a good way of treating a variety of complaints, including the flu and colds.' This was tested. 'To determine how much influence tea has on the influenza virus, various experiments were undertaken on cultured canine kidney cells in petri dishes. When the virus solution was spread on the petri dishes, cells were destroyed by the virus in a couple of days to form plaque, whereas when the virus solution was preincubated with tea polyphenols (EGCg from green tea or theaflavin digallate TF3 from black tea) before spreading on the cells, the plaque formation was markedly reduced. ... Results showed that EGCg and TF 3 completely inhibited the virus at concentrations as low as 1ppm. Since an ordinary cup of tea contains about 1,000 ppm of tea polyphenols, the potency of these compounds on the virus is almost incredible.' He continues, after a graph, to state that 'In a separate experiment, it was confirmed that black tea extract solution was 100% effective in inhibiting the proliferation of viruses even at 130 times dilution of normal drinking concentration.' Finally, 'With electron microscopic observation, it was confirmed that the spikes of influenza viruses were totally covered by tea polyphenolic molecules rendering them in [ef] fective.'

Equally interesting are tests carried out in relation to a section headed 'Tea as an Anti-bacterial Agent'. Hara refers to previous research, which shows that tea is effective against bacterial diarrhoea and cholera. He writes 'Tea polyphenols were separated and the anti-bacterial property of each compound against various bacteria was studied. Many varieties of foodborne pathogenic bacteria were found to be susceptible to tea polyphenols, even in a concentration far lower than would be consumed in everyday drinking of tea.' The effects of various catechins and theaflavins on foodborne pathogenic bacteria were tested and the results are shown in two published tables. They include many of the major forms of water-borne bacteria and show that 'the concentration of polyphenols in one cup of tea is twice or three times enough to kill some bacteria.' He shows the effects of tea catechins in preventing dental plaque through an impressive graph. He also shows how tea

polyphenols are effective as an anti-bacterial agent to protect vegetables, to lower blood pressure significantly and even to improve bowel movement.

The same author presented a paper in the following year at 'Teatech 1993', which was published as part of the Proceedings of the International Symposium on Tea Science and Human Health' of the Tea Research Institution, India. In this he analysed the ways in which tea polyphenols worked and some of their components. At the same conference there was a paper on 'Anti-Mutagenic and Anti-Carcinogenic Properties of Tea' by a group of authors which reported on the 'inhibitory effects of tea (extracts, catechins) on chemically induced tumor initiation and promotion in skin, digestive tracts, colon, lung, liver, pancreas and mammary gland in rodents.' Another paper reported on the 'Antiamoebic and Antibacterial Properties of Black Tea' and a further paper suggested that tea inhibited plaque formation on teeth and improved bowel movements, as well as inhibiting various strains of foodborne pathogenic bacteria and six strains of enteric bacteria.

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It is intriguing to compare modern medical research with the more than a thousand years of Chinese, Japanese and European speculations on the effects of tea on health. To condense this, I shall refer to the former as the 'Ancients', and the recent medical writers as the 'Moderns'.

Degenerative diseases of various kinds have been widely analysed. The Ancients believed tea was good for eye sight. The Moderns seem little interested in this. The Moderns on the other hand see several benefits for dental caries and other gum ailments, whereas the Ancients say little or nothing about this. The Ancients believed tea helped with bladder, kidney and other diseases, in particular the kidney stone. The Moderns also see some value here. Both think that tea may be beneficial for the liver. Both thought it beneficial for diseases of the heart and of the head, perhaps through some effect on the blood. The Moderns, in particular, have concentrated on the effects of tea in lowering heart attacks and strokes. Both thought that tea was effective against muscular disorders, including arthritis.

As regards food related diseases, both thought that tea might be useful against vitamin B and vitamin C deficiency diseases, including scurvy. The Ancients spent a great deal of time extolling the virtues of tea as a way of controlling indigestion and intestinal troubles and the Moderns likely have suggested how it may prevent indigestion, inhibit obesity and improve appetite.

The Ancients thought tea helped cured various skin diseases and the Moderns have also suggested that it may help against allergies, including eczema and other skin complaints. Only the Moderns, for obvious reasons, have suggested that tea may help to minimize the effects of atomic radiation. Likewise only the Moderns have suggested that various effects of cigarette smoking, not only on oral and other cancers, but also on the heart and lungs in general, is mitigated by drinking tea. More generally, the Moderns has concentrated in a new way on the possible links between tea drinking and various cancers. Those cancers which it has been suggested are affected by tea drinking are as follows: stomach, colon, oesophagus, lung, liver, pancreas, breast, skin, oral, prostate, digestive tract. The way, in which this may be

effected, through the polyphenol epigallocatechin (EGCg), which inhibits the enzyme that is required for cancer cell growth is just becoming known. Other antioxidants in the tea which may reduce the number of free radicals (destructive molecules that damage DNA) are also being discovered.

Among other miscellaneous virtues, tea was thought by the Ancients to help with menstrual problems and coughs, asthma and ulcers. Recently it has been suggested that tea is useful against colds, asthma and other allergies, and helps alleviate various sores on the body. Tea has often been thought by the Ancients as likely to increase the length of life. The Moderns suggest that the flavinoids in tea have a beneficial effect on health in general and blood in particular and hence may increase longevity.

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The infectious, contagious and other diseases which come from outside the body are widely believed to be affected by tea. A very widespread class are the water-borne bacterial and amoebic diseases. Here both the Ancients and the Moderns have been convinced that tea inhibits common water-borne diseases such as dysentery, typhoid, para-typhoid and cholera. Recent studies have shown precisely which bacteria are destroyed.

An unexpected finding is that the Ancients believed that tea might inhibit or prevent malaria. Modern researchers have not undertaken much research on the connection between malaria and tea. The curious coincidence that two of the most rapid (and hitherto unexplained) disappearances of malaria, in Japan between the fourteenth and sixteenth centuries and in Britain in the second half of the eighteenth century exactly coincided with the spread of tea drinking to the mass of the population, suggests a possible connection. (See Macfarlane, 'Savage Wars', pp.194-204) It is known that various plants around the world are taken as preventives or cures for this disease, for example the Neem tree and the Artemesia plant.¹ These are restricted in their use, however. It would be worth looking to see whether there is some substance in tea which inhibits the spread or seriousness of the attacks of malaria, for if this is so, the fact that many millions of people drink tea every day could be having a very considerable effect.

It is widely known that tea contains substances which kill dangerous bacteria. More startling is the suggestion that certain viruses may also be destroyed. Although a Japanese researcher alludes to the fact that in that country it was widely believed that tea drinking helped protect one against colds, influenza and other viruses of that kind, this does not seem to have been something which attracted much attention until recently. Perhaps we should not be surprised. One of the most serious and ubiquitous and serious of plant viruses are the numerous variants of 'mosaic' virus, which destroy potatoes, tobacco, cocoa and many other plants. Not only is tea not subject to mosaic virus, but it is used as a spray to kill mosaic virus on tobacco. If it is effective against other plant viruses, why not against those that affect humans.

¹ The potentials of artemesia were explored in a Horizon programme of the BBC on 15 October 1998. It is reported on the BBC Web site under the heading 'Health: Can a Chinese herb win the malaria war?' Work on the Neem tree can also be found on the Web by searching for 'neem, tea, malaria'.

Indeed, we now know that this is the case. There is detailed research, particularly by Dr.Hara, to show that tea drinking inhibits influenza and how this occurs. This needs to be tested historically by looking back over past epidemics, in particular that occurring at the end of the First World War, which killed more people than the war itself. Does the mortality rate suggest that those countries which were widespread tea drinkers (e.g. Britain, Japan, China) suffered less mortality than those which did not yet drink tea on a wide scale (e.g. India, where mortality was indeed huge) or much of Continental Europe?

Equally intriguing is the fact 'Tea was used extensively in combating plague in Japan during an epidemic in 1951'.² It is unlikely that the Japanese would have been aware of the earlier connection made in Europe when 'In Germany, a Dr Feltman early prescribed tea as a remedy against pestilence'.³ In view of the absence of plague in Japan throughout all of recorded history, and its disappearance in Europe around the time of the introduction of tea in the second half of the seventeenth century, as well as its virtual disappearance in India after the 1920's, when tea became widely drunk, it would be worth undertaking a little more research in this area, perhaps starting with the Japanese experience. Although endemic on the borders of China, there has apparently never been a pandemic on the scale of the Black Death in that country.

The Ancients believed that tea is beneficial is in relation to mental and physical well being, aiding concentration, improving memory, staving off tiredness. The Moderns have undertaken a considerable amount of research which confirms this effect. Particularly interesting is the finding that memory, concentration, discrimination and other mental processes are improved very considerably by tea, but that it is not merely the caffeine that is doing this, since caffeine in other forms (including coffee) does not have the same effect. There is obviously some synergistic effect here. The Ancients praised tea for increasing optimism and confidence. Again there is much evidence from the Moderns, both laboratory and anecdotal, to support this long held view.

² Geoffrey V. Stagg & David J. Millin, 'The Nutritional and Therapeutic Value of Tea – A Review', *Jnl. Sci. Food and Agriculture*, no.26, 1975, p.1451

³ William H. Ukers, *All About Tea* (New York, 1935), vol. I, 32