

SUMMARY EVIDENCE TABLES

Tea and Cancer Prevention



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All cancers combined

Author & Date	Country	Study Type	Methods	Key Results		Main Conclusion	Comments
				Tea	Findings		
Blot et al. (1996) ¹ <i>Also see Blot et al. (1997)²</i>	USA	Narrative descriptive	Literature search and examination of epidemiological references were used to identify articles	Black	<ul style="list-style-type: none"> 3 cohort studies were identified 2 (from the US) showed no relationship present, except for a slightly decreased risk among the heaviest tea drinkers (women) in one of the studies The third study (from the UK) showed that cancer mortality rates significantly increased with tea intake (RR=1.8), but authors did not adjust for certain important factors 	<ul style="list-style-type: none"> It is likely that the effect may not be the same for each type of cancer in humans (i.e. best to use data on separate cancer sites, not for all cancers combined) 	<ul style="list-style-type: none"> Authors found that most epidemiological studies were initiated for purposes other than tea intake, hence the level of detail available on tea use was often minimal No CI reported, only OR
Kohlmeier et al. (1997) ³	USA	Narrative descriptive	Not described	N/S	<ul style="list-style-type: none"> 2 cohort studies referenced In 1 study, a positive association was found between tea intake and total cancer mortality, but no adjustment was made for other risk factors. In the other study (variables were adjusted for), no relationship was apparent (adjusted RR = 0.98) 	<ul style="list-style-type: none"> On the basis of these two studies, little can be said about the impact of tea on total cancer risk 	<ul style="list-style-type: none"> It is more appropriate to consider studies on specific cancers, as if there is an effect, it is likely to not be the same for each specific cancer
Higdon & Frei (2003) ⁴	USA	Narrative descriptive	Not described	Black	<ul style="list-style-type: none"> 3 cohorts identified 2 found no significant association 1 (from UK) found a positive association with heavy tea consumption (≥ 7 cups/day) 	<ul style="list-style-type: none"> Little evidence of a protective effect of black tea consumption on total cancer risk 	
			Green	<ul style="list-style-type: none"> 1 cohort (from Japan) found a significant inverse association between total cancer risk and green tea consumption in women (not men) that drank ≥ 10 cups/day 			

Oral and pharyngeal cancer

Author & Date	Country	Study Type	Methods	Key Results		Main Conclusion	Comments
				Tea	Findings		
Katiyar & Mukhtar (1996) ⁵ <i>Also see Katiyar & Mukhtar (1996)⁶ & Yang & Wang (1993)⁷</i>	USA	Narrative descriptive	Not described	N/S	<ul style="list-style-type: none"> No relationship between tea consumption and nasopharyngeal cancer seen in 3 case-control studies 	<ul style="list-style-type: none"> For nasopharyngeal cancer and tea intake, the evidence shows that no association is likely 	

Blot et al. (1996) ⁸ <i>Also see Blot et al. (1997)⁹</i>	USA	Narrative descriptive	Literature search and examination of epidemiological references were used to identify articles	Black	<ul style="list-style-type: none"> 8 case-control studies were identified None reported a significant association between oral or pharyngeal cancer and tea intake, although the majority noted somewhat lower risks among tea drinkers 	<ul style="list-style-type: none"> Data is weakly consistent with the possibility that black tea intake may reduce the risk of these cancers (which are primarily induced by tobacco and alcohol intake), but the evidence is not sufficient to draw any causal inferences 	<ul style="list-style-type: none"> Authors found that most epidemiological studies were initiated for purposes other than tea intake, hence the level of detail available on tea use was often minimal No CI reported, only OR
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Oesophageal cancer

Author & Date	Country	Study Type	Methods	Key Results		Main Conclusion	Comments
				Tea	Findings		
Katiyar & Mukhtar (1996) ⁵ <i>Also see Katiyar & Mukhtar (1996)⁶ & Yang & Wang (1993)¹⁰</i>	USA	Narrative descriptive	Not described	N/S	<ul style="list-style-type: none"> Epidemiological studies in China reveal that most of the areas with higher oesophageal cancer mortality rates are in the northern provinces where tea is not produced and is infrequently consumed. Lower risk seen in 1 cohort (oropharyngeal cancer in postmenopausal women from Iowa, where daily consumption of tea was found to be associated with over 50% lower risk) and 1 case-control study (oesophageal cancer re green tea) - these findings are consistent with laboratory animal studies No relationship for oesophageal cancer seen in 1 ecological study, 4 case-controls (at normal tea temperature, which = 35-47°C) and 2 case-controls Enhanced risk seen in 3 ecological studies and 5 case-control studies (with high tea temperature, which = 55-67°C) 	<ul style="list-style-type: none"> On the basis of available epidemiological studies and recent observations made in laboratory animals, the authors believe that tea consumption is likely to have preventative effects in reducing cancer risk and suggest that more case-control studies be undertaken For oesophageal cancer specifically, the evidence appears to show that perhaps no association is likely, and that the temperature of the tea makes a difference to cancer risk 	
Blot et al. (1996) ¹¹ <i>Also see Blot et al. (1997)¹²</i>	USA	Narrative descriptive	Literature search and examination of epidemiological references were used to identify articles	Green	<ul style="list-style-type: none"> 14 studies were identified on tea - 4 on green 2 studies from Asia showed that drinking green tea at non-burning temperatures was associated with a lower risk of oesophageal cancer - this effect was significant for 1 study, where (after adjustment) the risk was reduced by 50% among drinkers of >2 cups of green tea per day (OR 0.5 for highest consumption category). This effect was even greater in women. 3 studies show that burning hot green tea is associated with an increased risk of oesophageal cancer (OR 3.6; 4.2; 2.5) 	<ul style="list-style-type: none"> The evidence appears to show that the risk is increased for burning hot tea consumption, no matter what type of tea, and the risk is decreased if drunk at non-burning temperatures 	<ul style="list-style-type: none"> Authors found that most epidemiological studies were initiated for purposes other than tea intake, hence the level of detail available on tea use was often minimal No CI reported, only OR
				Black	<ul style="list-style-type: none"> 14 studies were identified on tea - 10 on black 3 studies showed that burning hot black tea is associated with an increased risk of oesophageal cancer (OR 3.2; 2.8; 1.9) 		

Bushman (1998) ¹³	USA	Narrative descriptive	Not described	N/S	<ul style="list-style-type: none"> • 6 case-controls referenced: • 1 from China showed an inverse association of green tea drinking on risk of oesophageal cancer among women. In men, the OR was consistent with an inverse association but was not statistically significant. • 1 from Singapore showed an inverse relationship for tea (type not stated) • 1 from Hong Kong found no association for tea (type not stated). • Another from China showed increased risk with increased tea strength (type not stated). • The majority of case-control studies indicate a consistent strong association between food and beverage temperature and oesophageal cancer. The hotter the tea or beverage, the greater the risk. 	<ul style="list-style-type: none"> • Results of green tea and oesophageal studies are mixed, with positive and negative findings • The majority of case-control studies indicate a consistent strong association between food and beverage temperature and oesophageal cancer. 	
Trevisanato & Kim (2000) ¹⁴	Canada	Narrative descriptive	Not described	Both	<ul style="list-style-type: none"> • A higher incidence of cancer of the oesophagus was previously linked to tea consumption. Recent studies, however, do not confirm this finding. • A large Japanese study on both green and black tea showed that tea drinking does not increase the development of oesophageal cancer. • It now appears that the development of oesophageal cancer is related to the high temperature at which the drink is consumed rather than the nature of the drink. A number of case-control studies found no relationship between tea consumption at normal temperatures (37-45°C) and oesophageal cancer, but ingestion of very hot tea (55-67°C) increased by 2 to 3 fold. This may be due to enhanced cell proliferation in response to cell death from scalding of the oesophageal mucosa. 	<ul style="list-style-type: none"> • Tea consumption was previously linked to a higher incidence of oesophageal cancer, however recent studies do not confirm this • It appears that the development of oesophageal cancer is related to the high temperature at which the drink is consumed rather than the nature of the drink 	
McKay & Blumberg (2002) ¹⁵	USA	Narrative descriptive	Not described	Green		<ul style="list-style-type: none"> • Some studies have associated green tea consumption with an increased risk of oesophageal cancer but this effect appears due to the scalding beverage temperatures common to these specific cohorts 	

Higdon & Frei (2003) ⁴	USA	Narrative descriptive	Not described	Both	<ul style="list-style-type: none"> In case-control studies, consumption of tea at scalding hot temperatures has been positively associated with oesophageal cancers (likely due to thermal irritation of the oesophagus), but when consumption of very hot tea is excluded from the analyses, most case-control studies find no significant association between tea consumption and oesophageal cancer 3 studies have observed positive associations between the consumption of tea (2 - black, 1 - green) that was not scalding hot and oesophageal cancer risk 2 of the largest case-control studies found inverse relationships between tea consumption and oesophageal cancer (1 - green, 1 - N/S) 	<ul style="list-style-type: none"> Although consumption of tea at very high temperatures may increase the risk of oesophageal cancer, most studies do not find an association between the consumption of tea that is not scalding hot and oesophageal cancer when analyses are adjusted for other risk factors 	<ul style="list-style-type: none"> One of the studies that found a positive association did not adjust for smoking
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Stomach cancer

Author & Date	Country	Study Type	Methods	Key Results		Main Conclusion	Comments
				Tea	Findings		
Katiyar & Mukhtar (1996) ⁵ <i>Also see Katiyar & Mukhtar (1996)⁶ & Yang & Wang (1993)¹⁶</i>	USA	Narrative descriptive	Not described	N/S	Of the 13 studies identified: <ul style="list-style-type: none"> 7 case-control studies indicated that there is no statistically significant association between tea consumption and stomach cancer risk. These were conducted in USA (2), Japan, Greece, Italy, Spain and Turkey. 4 studies indicated that tea intake may prevent stomach cancer - an ecological study from Japan found the cancer death rate (especially that from stomach) in a tea producing area was lower than the national average. A case-control study from Japan and a cohort study from USA showed there was an inverse relationship between tea consumption (green tea specifically in the Japanese study) and stomach cancer. A case-control study from Sweden found that tea had a statistically significant preventative effect when consumed during adolescence. 2 studies indicated that there may be a positive association between tea consumption and stomach cancer - A cohort study from the UK found a positive association for black tea, while a case-control study from Taiwan suggest that green tea is a risk factor. 	<ul style="list-style-type: none"> On the basis of available epidemiological studies and recent observations made in laboratory animals, the authors believe that tea consumption is likely to have preventative effects in reducing cancer risk and suggest that more case-controlled studies be undertaken For stomach cancer specifically, the results appear to be mixed, however most studies indicate there is no significant relationship 	

Blot et al. (1996) ¹⁷ Also see Blot et al. (1997) ¹⁸	USA	Narrative descriptive	Literature search and examination of epidemiological references were used to identify articles	Green	<ul style="list-style-type: none"> • 17 case-control studies were identified – 8 have results on green tea • 3 found significantly reduced risks and 3 found non-significantly reduced risks of stomach cancer among green tea drinkers • 1 found a significant increase of stomach cancer among green tea drinkers, but this was a hospital based case-control study and green tea was rarely used among controls • 1 found a slightly increased risk for those in the mid intake category, but this was not significant 	<ul style="list-style-type: none"> • Mixed results seen for both types of tea 	<ul style="list-style-type: none"> • Authors found that most epidemiological studies were initiated for purposes other than tea intake, hence the level of detail available on tea use was often minimal • No CI reported, only OR
				Black	<ul style="list-style-type: none"> • 4 cohort studies were identified on black tea • 2 found no evidence of an association, 1 found black tea consumption significantly associated with an increased risk of stomach cancer (partly due to confounding factors), and one found it was non-significantly associated with a decreased risk • 17 case-control studies are identified – 12 have results on black tea • Most studies (5) found no evidence of an association • 2 found significantly reduced risks and 2 found non-significantly reduced risks of stomach cancer among black tea drinkers, • 3 found an increased risk, but this was not significant 		
Kohlmeier et al. (1997) ³	USA	Narrative descriptive	Not described	N/S	<ul style="list-style-type: none"> • 3 cohorts and 12 case-control studies referenced • Only 1 cohort study showed a positive association between tea drinking and stomach cancer with a clear dose-response relationship. However inadequate controlling for SES may have influenced this result. • 1 case-control study reported a positive association between tea drinking and stomach cancer, but after adjustment for other risk factors the association was no longer statistically significant. • 6 case-controls and 2 cohorts showed no association. Several critical comments can be made with these studies too – 4 studies used a crude categorization of tea consumption (2 categories), which reduces the chance of finding a meaningful result. In populations with low tea consumption, it may be possible that the range of consumption may be too small for detection of a relationship between stomach cancer and tea drinking. Many studies also present results without adjustment for other risk factors (except age). • 5 case-controls showed a protective effect of tea consumption on the risk of stomach cancer. In these studies, green tea was examined in 2 and black tea in 1. Tea type was not specified in the other 2. 	<ul style="list-style-type: none"> • Epidemiological studies give no conclusive evidence of a protective effect of tea on stomach cancer. • No evidence could be obtained that green tea is more protective than black tea. 	<ul style="list-style-type: none"> • The wide range of tea consumption may be part of the explanation of the varied results, as well as non-adjustment for possible confounding factors. • Authors suggest perhaps if there is a beneficial effect from tea, it is likely to have a significant effect only with high intakes in high-risk populations.

Bushman (1998) ¹³	USA	Narrative descriptive	Not described	Green	<ul style="list-style-type: none"> Overall, of 10 studies examining the association between green tea and stomach cancer, 6 suggest an inverse and 3 report a positive association. The most comprehensive of these studies supports an inverse association between green tea and stomach cancer. Findings were positive in 2 case-controls and 1 cohort study. No association was seen in 1 case-control study. 1 ecological and 4 case-control studies reported an inverse association with stomach cancer, with increased consumption associated with decreased risk. An additional study found a positive association with intermediate consumption, yet a decreased risk in stomach cancer was noted among those with high green tea consumption. In one of the most thorough green tea and stomach cancer case-control studies, the risk was decreased and further decreased with an increasing number of new batches of green tea consumed daily. Among green tea drinkers, the risk did not depend on the age when habitual tea drinking started. Drinking hot tea was associated with an increased risk of stomach cancer, whereas drinking warm or cold tea was associated with a decreased risk compared to non-drinkers. 	<ul style="list-style-type: none"> Research findings for green tea and stomach cancer are mixed In 1 study, the risk was decreased and further decreased with an increasing number of new batches of green tea consumed daily. Also drinking hot tea was associated with an increased risk of stomach cancer, whereas drinking warm or cold tea was associated with a decreased risk compared to non-drinkers.
Trevisanato & Kim (2000) ¹⁹	Canada	Narrative descriptive	Not described	N/S	<ul style="list-style-type: none"> Some studies suggest an inverse relationship between tea consumption and stomach cancer, whereas others show either no correlation or a positive correlation. Owing to methodologic limitations, no definite conclusion can be reached. 	<ul style="list-style-type: none"> The effects of tea on gastric malignancy appear to be conflicting
McKay & Blumberg (2002) ²⁰	USA	Narrative descriptive	Not described	Green	<ul style="list-style-type: none"> Several studies conducted in Japan and China have shown a protective effect of green tea on stomach cancer, with the greatest effect among those with the highest levels of consumption (a high intake is 7-10 or more cups/day) Another prospective study has shown no protective effect, but the highest intake category for this trial was 5 or more cups/day, which is much less than that used for other trials, and other risk factors (such as smoking) may have confounded the results 	<ul style="list-style-type: none"> Several studies from Japan and China have shown a protective effect of green tea on stomach cancer
				Black	<ul style="list-style-type: none"> A weak inverse association between black tea intake and stomach cancer has been observed in a cohort in the Netherlands A significant reduction in risk was found in a case-control study among Polish women who drank tea daily, although this relationship was absent in men 	<ul style="list-style-type: none"> The evidence for black tea is not very clear

Higdon & Frei (2003) ⁴	USA	Narrative descriptive	Not described	Both	<ul style="list-style-type: none"> • 4 out of 5 cohorts did not observe a significant association between tea consumption and gastric cancer risk (2 - green tea) • 1 cohort study (from the UK) found a positive association between black tea consumption and gastric cancer risk, however it did not adjust for smoking • Out of 18 case-controls, 7 found significant inverse associations between tea consumption and gastric cancer risk (4 – green, 3 – black), while 11 found no significant associations 	<ul style="list-style-type: none"> • Most cohort and case-control studies did not observe a significant association between tea consumption and gastric cancer risk, however some case-controls suggest that tea consumption may be protective 	<ul style="list-style-type: none"> •
Unknown (2003) ²¹	Unknown	Narrative descriptive	Not described		<ul style="list-style-type: none"> • 2 recent cohorts from Japan concluded heavy consumers of green tea have the same risk of developing gastric cancer and dying from it than those who drink less than 1 cup/day. • Case-control studies have generally supported the notion that tea consumption reduces the risk of gastric cancer. At least 7 studies have been conducted to date, and 6 of these have reported either a significant inverse relationship or a non-significant inverse trend between tea consumption and gastric cancer development. • Most studies showing a benefit from tea consumption come from Asia, where green tea is favoured. Studies of Europeans who drink black tea less frequently show benefits. 	<ul style="list-style-type: none"> • Recent cohort studies show tea consumption has no relationship with gastric cancer risk, however these findings are in stark contrast to laboratory studies and most previous epidemiological research • Any benefit from tea is likely to come from brewed green tea, which contains a higher concentration of antioxidants than black tea • The benefits of tea consumption (where they have been reported) often are only evident in the heaviest tea consumers - those who drink 10 or more cups/day 	<ul style="list-style-type: none"> • It is possible that for Japanese populations, a high intake of sodium and nitrosamines (from salted, pickled and smoked foods) may be linked to increased risk of stomach cancer i.e. these factors may have influenced results

Borrelli et al. (2004) ²²	Italy	Systematic literature review	Medline, Embase, Amed, CISCOP, Phytobase and Cochrane Library were searched, along with cancer and tea based websites, and bibliographies retrieved. Green tea supplement manufacturers were asked to contribute published and unpublished studies. Only epidemiological studies indicating tea type and cancer site were included (any language). Studies that did not report participant numbers or level of tea consumption were excluded. Meta-analytical approach was inappropriate due to heterogeneity of data.	Green	<ul style="list-style-type: none"> • 10 case-control studies were identified from China and Japan. • For the case-control studies, 5 showed there was an significant inverse association between green tea consumption and gastric cancer risk (for one of these this was only observed in comparison with general population controls, not hospital based ones), 3 showed that frequent consumption of green tea was associated with a decreased risk of gastric cancer (two of these did not reach statistical significance and the other observed a dose-response trend as well as an increased risk among drinkers of green tea at boiling hot temperatures), and 2 showed no association with gastric cancer risk. • For the cohort studies, 4 found no association between green tea consumption and stomach cancer risk, 1 showed that frequent consumption of green tea was associated with a decreased risk of gastric cancer (did not reach statistical significance) and 1 reported a non-significant trend for increased risk. 	<ul style="list-style-type: none"> • No clear evidence to support the suggestion that green tea plays a role in the prevention of stomach cancer, however the evidence from case-control studies is stronger than that from cohort studies. 	<ul style="list-style-type: none"> • Discrepancy in results may be due to differences in the amount and temperature of green tea consumed. • High intake category usually different, but can reach >10 cups/day.
Hoshiyama et al. (2005) ²³	Japan	Narrative descriptive	Not described.	Green	<ul style="list-style-type: none"> • 8 case-control studies identified. 5 showed risk reduction with a statistically significant difference; 2 showed risk reduction without a statistically significant difference; 1 showed the opposite effect. • 6 prospective studies identified. None showed risk reduction with a statistically significant difference. 4 showed no relation. The last one of these is the first study to control for <i>H. pylori</i> infection, but it found no inverse association between green tea consumption and the risk of stomach cancer. 	<ul style="list-style-type: none"> • Results from case-control studies indicate that green tea can reduce the risk of stomach cancer. • Prospective studies indicate no inverse association is present between green tea and stomach cancer risk. 	<ul style="list-style-type: none"> • Such conflicting results are often seen in epidemiology studies. Case-control studies may have problems with the reliability of the information as the information about past history is collected after the cancer is diagnosed.

Colorectal cancer

Author & Date	Country	Study Type	Methods	Key Results		Main Conclusion	Comments
				Tea	Findings		
Rosenberg (1990) ²⁴	USA	Narrative descriptive	Not described	N/S	<ul style="list-style-type: none"> 3 studies identified – results not clearly described Appears as though 1 trial suggests a small, statistically non-significant positive association with colorectal cancer The other 2 appear to show there was a positive association between tea consumption and rectal cancer risk 	<ul style="list-style-type: none"> Very sparse evidence - seems to show perhaps a positive association between tea consumption and rectal cancer risk, but more data is needed 	<ul style="list-style-type: none"> Validity of some studies can't be assessed because insufficient details were given on method Interpretation of some results problematic because the measure of consumption was not quantified or the distribution of cases and controls according to consumption not presented
Katiyar & Mukhtar (1996) ⁵ Also see Katiyar & Mukhtar (1996) ⁶ & Yang & Wang (1993) ²⁵	USA	Narrative descriptive	Not described	N/S	<ul style="list-style-type: none"> 6 studies showed there was no correlation between tea intake and colorectal cancer (1 cohort and 5 case-controls) 3 case-control studies indicated that black tea consumption decreased the risk of rectal cancer 3 studies showed a positive association between tea consumption and colorectal cancer (1 cohort, 1 case-control, 1 ecological) 	<ul style="list-style-type: none"> Mixed results were seen, however most studies showed there was no association between tea intake and colorectal cancer 	
Blot et al. (1996) ²⁶ Also see Blot et al. (1997) ²⁷	USA	Narrative descriptive	Literature search and examination of epidemiological references were used to identify articles	Green	<ul style="list-style-type: none"> 4 case-control studies identified Results were very mixed for colon cancer - it was not associated with green tea in 1, associated with a reduced risk in 2 (only 1 of these significant) and associated with a non significantly increased risk in 1 Rectal cancer results are just as mixed with 2 studies associated with a decreased risk (only 1 of these significant) and 2 associated with a non significant increased risk 	<ul style="list-style-type: none"> Mixed results seen - most studies showed no association with tea drinking, but a small benefit may be possible 	<ul style="list-style-type: none"> Authors found that most epidemiological studies were initiated for purposes other than tea intake, hence the level of detail available on tea use was often minimal No CI reported, only OR

				Black	<ul style="list-style-type: none"> • 4 cohort studies identified • Colon cancer mostly associated with a reduced risk (3 studies), but only 1 of these was significant. The other study showed no association • Rectal cancer was associated with an increased risk in 2 (1 significant) and decreased risk in 2 (0 significant) • 9 case-control studies identified • For colon cancer, most (5) showed the risk is increased, but not significantly. 1 trial showed a significantly higher risk associated with black tea intake and colon cancer, 2 showed no association and 1 showed a non-significant decreased risk • For rectal cancer, most (5) showed the risk is decreased, but not significantly. 1 trial showed a significantly decreased risk associated with black tea intake and rectal cancer, while 3 showed an increased risk (2 significantly) 		
Kohlmeier et al. (1997) ³	USA	Narrative descriptive	Not described	Both	<ul style="list-style-type: none"> • The hypothesis of a protective effect of tea on risk of colon cancer is substantiated by animal experiments. • Few epidemiologic studies have addressed the question of an association between tea consumption and colon cancer. • 9 studies are identified: 5 case-control, 1 cross-sectional, 3 cohorts • Green tea: The scant information does suggest a protective effect of green tea on the development of colon cancer that needs to be confirmed in large epidemiologic studies in populations with variation in their green tea consumption levels. Meta-analyses of these studies would strengthen this finding. • Black tea: The story regarding black tea is less clear. Some epidemiologic evidence does indicate a risk of colon or rectal cancer associated with regular use, whereas some studies have found no association. 	<ul style="list-style-type: none"> • For green tea, the information does suggest a protective effect on the development of colon cancer. • For black tea, the story is less clear. Some studies do indicate there is a risk of colon or rectal cancer associated with regular use, whereas some studies have found no association. 	
Bushman (1998) ¹³	USA	Narrative descriptive	Not described	Both	<ul style="list-style-type: none"> • Several studies have been done on tea drinking and colorectal cancer, with little or inconclusive evidence of an association. However many of these included black tea. • When narrowing the research to green tea, there may be an inverse effect. • Among 5 studies reporting on the association of green tea and colon cancer (one focused on polyps), 3 found an inverse association and 1 found a positive association. For rectal cancer, only 1 of 4 studies reported a statistically significant inverse association, and increased risks were seen in 2 studies. 	<ul style="list-style-type: none"> • There is little or inconclusive evidence of an association between tea drinking and colorectal cancer. However many of these studies are on black tea. • When narrowing the research to green tea, there may be an inverse effect for colon cancer. 	
Trevisanato & Kim (2000) ²⁸	Canada	Narrative descriptive	Not described	N/S	<ul style="list-style-type: none"> • A case-control study from Sweden observed a protective effect of tea with consumption of 2 or more cups per day. The incidence was reduced 4% in the colon, 44% in the rectum and 21% in the colorectum compared with non-tea drinkers. However, low tea consumption (<2 cups/day) offered no protective effect on the development of colorectal cancer compared with non-tea drinkers. 	<ul style="list-style-type: none"> • Tea consumption is inversely related to the development of colorectal cancer 	

McKay & Blumberg (2002) ²⁹	USA	Narrative descriptive	Not described	Green	<ul style="list-style-type: none"> Several studies conducted in Japan and China have shown a protective effect of green tea on colorectal cancer 	<ul style="list-style-type: none"> Several studies from Japan and China have shown a protective effect of green tea on colorectal cancer 	<ul style="list-style-type: none"> Effects of tea drinking on some forms of cancer, including colorectal cancer, may be seriously confounded by social class and lifestyle factors
				Black	<ul style="list-style-type: none"> Black tea has shown little or no effect on colon cancer incidence in studies from the Netherlands and Sweden, and a positive effect in a Finnish cohort from the Alpha-Tocopherol and Beta-Carotene trial (compared to those that did not drink tea, those who consumed one cup or more/day doubled their risk of colon cancer - tea had no impact on rectal cancer) 	<ul style="list-style-type: none"> The evidence for black tea is mixed 	
Higdon & Frei (2003) ⁴	USA	Narrative descriptive	Not described	Black	<ul style="list-style-type: none"> 5 cohort studies were identified: <ul style="list-style-type: none"> 1 found a positive association between black tea intake and colon cancer risk 1 found a positive association between black tea intake and rectal cancer risk 3 did not observe significant associations between black tea consumption and the risk of colon and/or rectal cancer 9 case-control studies were identified: <ul style="list-style-type: none"> 3 found positive associations between black tea consumption and colon cancer risk 1 found an inverse association between black tea consumption and rectal cancer risk 	<ul style="list-style-type: none"> Mixed results seen for black tea 	
				Green	<ul style="list-style-type: none"> Zero cohort studies were identified. 4 case-control studies were identified: <ul style="list-style-type: none"> 1 found green tea consumption to be inversely related to colon cancer risk 1 found green tea consumption to be inversely related to rectal cancer risk 	<ul style="list-style-type: none"> No prospective studies available Some case-control studies show a protective effect of green tea on colorectal cancer risk 	

Arab & Il'yasova (2003) ³⁰	USA	Narrative descriptive	Literature search conducted using Medline. Ecological studies were excluded along with some case-control studies for specific reasons.	Both	<ul style="list-style-type: none"> • 30 publications assessed from 12 countries across Asia, Europe and the Americas <u>Colon Cancer:</u> <ul style="list-style-type: none"> • 7 cohorts and 12 case-controls identified • Only 2 showed a consistent dose-response negative relationship between tea consumption and colon cancer • No consistent effect noted overall <u>Rectal Cancer:</u> <ul style="list-style-type: none"> • 6 studies seemed to indicate a reduced risk with regular tea consumption • However there were a number of studies that showed higher risk among tea drinkers in both case-control and cohort populations and among high consuming populations <u>Colorectal cancer (combined results):</u> <ul style="list-style-type: none"> • 11 studies identified – seemed to be those with weaker designs and less control for potential confounders 	<ul style="list-style-type: none"> • Studies do not provide consistent evidence to support the evidence from animal studies and other research that suggests tea is a potent chemopreventative agent • A negative association is stronger in studies of rectal cancer than colon cancer 	<ul style="list-style-type: none"> • Most studies on green tea were conducted in China or Japan, while black tea and cancer risk was assessed by European countries, in the Americas and in Japan • Largest consumption categories for green tea usually much higher than that for black • Tea consumption in countries that traditionally consume coffee may reflect non coffee consumption and the effect attributed to tea may be due to the absence of coffee or reasons dictating that choice • Few studies addressed all the important confounding factors, and as some confounders have not been consistently considered, comparison across studies is difficult • Until the mid 1990's most studies were not specifically designed to investigate the association between tea and cancer risk and therefore used a single question to assess consumption – more recent trials have used more detailed assessment tools (this may explain differences in results)
Tavani & La Vecchia (2004) ³¹	Italy	Narrative descriptive	Not described	N/S	<ul style="list-style-type: none"> • 7 cohort studies and 12 case-control studies were reviewed • Most cohort and case-control studies found no consistent association between tea intake and either colon or rectal cancer 	<ul style="list-style-type: none"> • No overall association between tea and either colon or rectal cancer risk seen 	

Borrelli et al. (2004) ³²	Italy	Systematic literature review	Medline, Embase, Amed, CISCOP, Phytobase and Cochrane Library were searched, along with cancer and tea based websites, and bibliographies retrieved. Green tea supplement manufacturers were asked to contribute published and unpublished studies. Only epidemiological studies indicating tea type and cancer site were included (any language). Studies that did not report participant numbers or level of tea consumption were excluded. Meta-analytical approach was inappropriate due to heterogeneity of data.	Green	<ul style="list-style-type: none"> • 4 case-control studies and 2 cohort studies were identified from China and Japan. • For case-control studies and green tea consumption, 1 showed a reduced risk for colon cancer but an increased risk for rectal cancer, 1 showed an inverse association for rectal cancer (men) and for colon and rectal cancer (women), and 2 showed no association with colon or rectal cancer risk. • For the cohort studies, 1 found no association between green tea consumption and colon or rectal cancer risk and the other showed that frequent consumption of green tea was associated with a decreased risk of colorectal cancer (did not reach statistical significance) 	<ul style="list-style-type: none"> • No clear evidence to support the suggestion that green tea plays a role in the prevention of colorectal cancer. 	
Marques-Vidal et al. (2006) ³³	Portugal	Systematic literature review	Systematic review of all published prospective studies that assessed foodstuffs with colorectal cancer risk. Studies collected by Medline search.	N/S	<ul style="list-style-type: none"> • 8 prospective studies described on tea intake and colorectal cancer risk • For women, no significant effect was found in 3 studies (but another study not included in table reported that catechins namely from tea were inversely related to rectal (not colon) cancer) • For men, a significant inverse relationship was found in 1 study, but another (in men of Japanese ancestry) found no effect on colon cancer and an increased risk on rectal cancer. However opposite effects (increased risk on colon cancer and no effect on rectal cancer) was found in a Finnish study. • The three other papers didn't show any relationship between colorectal cancer risk and black or green tea 	<ul style="list-style-type: none"> • The available data doesn't indicate a relationship between tea consumption and colorectal cancer risk 	

Sun et al. (2006) ³⁴	USA	Meta-analysis	Medline, Embase, Cancerlit & Biosis Previews databases were searched (restrictions were English language and papers published from Jan 1966 - July 2005). Articles satisfying the exposure, outcome and study design criteria were pulled. Reference lists of retrieved papers were also screened. Included studies had to have information on the number of colorectal cancer cases & controls studied and/or an OR/RR for highest versus lowest level of tea intake. Results were pooled and heterogeneity examined. Publication bias was also assessed.	Green	<p><u>Colorectal cancer:</u></p> <ul style="list-style-type: none"> • 8 studies were included in the meta-analysis (4 cohorts and 4 case-controls). 6 were conducted in Japan, while the other 2 were done in China. • Results showed a reduced risk of colorectal cancer with high green tea consumption (pooled OR = 0.82; 95% CI = 0.69-0.98) • There was significant heterogeneity across the studies (i.e. results were not consistent with one another). Analysis revealed study design is a major contributor to the observed heterogeneity, followed by year of publication. • When studies were stratified by design, results were consistent within the cohort studies and within the case-control studies, but were divergent across the two designs. • The inverse association between green tea intake and colorectal cancer risk was observed only in case-control studies (pooled OR for case-controls = 0.74, 95% CI = 0.63-0.86; pooled OR for cohorts = 0.97, 95% CI = 0.82-1.16) • When the authors stratified the studies by country, a stronger finding was noted among the 2 studies conducted in China (pooled OR = 0.65, 95% CI = 0.45-0.93) than Japan (pooled OR = 0.93, 95% CI = 0.80-1.07) • Results among women were highly divergent, while results among men were consistent • Overall results for women show a non-significant reduction in colorectal cancer risk with high intake of green tea (pooled OR = 0.52, 95% CI = 0.25-1.05). No such effect was noted in men (pooled OR = 0.89, 95% CI = 0.73-1.08). <i>P</i> for gender difference = 0.16. • For those studies that did not adjust for any dietary factors (n=5) pooled OR = 0.76, 95% CI = 0.60-0.98, while for those studies that did adjust for any dietary factors (n=5) pooled OR = 0.92, 95% CI = 0.74-1.13. <p><u>Colon cancer:</u></p> <ul style="list-style-type: none"> • 6 studies included in analysis (3 cohorts & 3 case-controls) • For colon cancer, a high green tea intake was associated with a moderate reduction in risk (pooled OR = 0.86, 95% CI = 0.73-1.00). This was mainly based on results from case-control studies (pooled OR = 0.74, 95% CI = 0.60-0.93), not cohorts (pooled OR = 0.99, 95% CI = 0.79-1.24) <p><u>Rectal cancer:</u></p> <ul style="list-style-type: none"> • 6 studies included in analysis (3 cohorts & 3 case-controls) • Results in rectal cancer were highly divergent and there was no indication of any association with green tea intake. For all studies, pooled OR = 0.99, 95% CI = 0.71-1.37. Results from case-control studies (pooled OR = 0.98, 95% CI = 0.61-1.60) and cohorts (pooled OR = 0.99, 95% CI = 0.57-1.73) were similar. 	<ul style="list-style-type: none"> • There is insufficient information from the few epidemiological studies to provide a definitive assessment on the relationship between green tea intake and colorectal cancer risk • Pooled results from all studies showed a reduced risk of colorectal cancer with high green tea consumption, but this was observed only in case-control studies, and was limited to the colon sub-site (not rectal) • Results for women show a non-significant reduction in colorectal cancer risk with high intake of green tea, but this was not seen for men. • Studies conducted in China showed a stronger inverse association than studies conducted in Japan • There was some suggestion of publication bias in the reporting of results on green tea and colorectal cancer risk (based on visualisation of the Begg's funnel plot), however formal testing (using Eggers's method) did not support this notion. 	<ul style="list-style-type: none"> • Most studies did not adjust for potential dietary confounders. • The relative lack of unexposed subjects in Japan (only a small number do not consume green tea on a daily basis) could be one reason for the weaker associations in Japanese.
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				Black	<p><u>Colorectal cancer:</u></p> <ul style="list-style-type: none"> • 20 studies were included in the meta-analysis (7 cohorts and 13 case-controls). 17 were conducted in Western populations, while the other 3 were done in Japan. • Results showed no association between colorectal cancer and black tea consumption (pooled OR = 0.99; 95% CI = 0.87-1.13). • This was also the case when each study type was analysed (pooled OR for case-controls = 0.98, 95% CI = 0.84-1.15; pooled OR for cohorts = 1.02, 95% CI = 0.78-1.34) • There was significant heterogeneity across the studies (i.e. results were not consistent with one another). This was also the case across study type (cohorts and case-controls). • Analysis revealed that study population (Western versus Japanese) contributed significantly to heterogeneity. For Japanese studies, the pooled OR (1.62, 95% CI = 1.22-2.14) was significantly higher than the pooled OR for Western populations (OR = 0.93, 95% CI = 0.82-1.06). • Study design and year of publication did not contribute to the observed heterogeneity across studies. • For Western populations, pooled ORs were similar between studies that did adjust for coffee intake and those that did not. • For Western populations, overall results for women indicated a statistically significant protective effect of black tea on colorectal cancer risk (pooled OR = 0.82, 95% CI = 0.70-0.95). No such association was seen in men (pooled OR = 1.15, 95% CI = 0.89-1.50). <i>P</i> for gender difference = 0.03. <p><u>Colon cancer:</u></p> <ul style="list-style-type: none"> • 12 studies included in analysis (6 cohorts & 6 case-controls) • Results showed no association between colon cancer and black tea consumption (pooled OR = 1.02; 95% CI = 0.88-1.18). For case-control studies, the pooled OR = 1.13, 95% CI = 1.02-1.24. For cohorts, the pooled OR = 0.93, 95% CI = 0.67-1.30. <p><u>Rectal cancer:</u></p> <ul style="list-style-type: none"> • 10 studies included in analysis (5 cohorts & 5 case-controls) • Results showed no association between rectal cancer and black tea consumption (pooled OR = 0.91; 95% CI = 0.73-1.12). For case-control studies, the pooled OR = 0.86, 95% CI = 0.62-1.19. For cohorts, the pooled OR = 0.96, 95% CI = 0.74-1.24. 	<ul style="list-style-type: none"> • There is insufficient information from the few epidemiological studies to provide a definitive assessment on the relationship between black tea intake and colorectal cancer risk • Results showed no association between <u>colorectal</u> cancer and black tea consumption. • There is no evidence that results on colon cancer differ from those on rectal cancer. • The risk was higher in Japanese rather than Western populations • In Western populations, results for women indicated a statistically significant protective effect of black tea on colorectal cancer risk, but no such association was seen in men • No indication of publication bias in the reporting of results on black tea and colorectal cancer risk 	<ul style="list-style-type: none"> • Black tea intake is rare in Japan – therefore a meaningful interpretation of any association for black tea and colorectal cancer may not be possible in this population
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Prostate cancer

Author & Date	Country	Study Type	Methods	Key Results		Main Conclusion	Comments
				Tea	Findings		
Trevisanato & Kim (2000) ³⁵	Canada	Narrative descriptive	Not described	N/S	<ul style="list-style-type: none"> One of the few published studies was a case-control from Canada, which found a low daily consumption of tea significantly reduced the incidence of prostate cancer compared with non-drinkers, whereas a medium to high daily consumption of tea further reduced the incidence of prostate cancer. 	<ul style="list-style-type: none"> The risk for prostate cancer appears to be inversely related to tea consumption 	
Chhabra & Yang (2001) ³⁶	USA	Narrative descriptive	Not described	N/S	<ul style="list-style-type: none"> 7 studies were identified (3 cohorts, 4 case-controls) One cohort using men of Japanese ancestry did find a significant protective effect of black tea intake (more than one cup/day) on prostate cancer risk (RR = 0.6) A more recent case-control study from Canada also demonstrated a decreased risk with tea intake of more than 500g (~2 cups)/day (OR 0.7; CI 0.5-0.99) However other studies found no association (it is suggested that these (or some of these) populations were comprised of predominantly black tea drinkers and that green tea may have a greater chemopreventative potential) 	<ul style="list-style-type: none"> Experimental studies show that tea components can inhibit prostate cancer cell growth Few epidemiologic studies have been conducted on the association between prostate cancer and tea drinking Data does appear to suggest that perhaps green tea has a greater chemopreventative potential than black tea, because of its composition (these studies are not presented though) 	<ul style="list-style-type: none"> Future studies should incorporate differences in tea type and drinking habits
Gupta & Mukhtar (2002) ³⁷	USA	Narrative descriptive	Not described	Green	<ul style="list-style-type: none"> Most reports on Asians who predominantly drink green tea have shown positive cancer preventative effects At least 2 epidemiologic studies have shown that persons who regularly consume tea have a lower prostate cancer incidence It has been observed that Japanese and Chinese populations, which are regular green tea drinkers, have one of the lowest incidence rates of prostate cancer in the world. In contrast, the high-fat diet typical of Western countries is associated with high incidence rates and with a higher risk for prostate cancer. Migratory studies have further confirmed this observation. 	<ul style="list-style-type: none"> Evidence seems to support the link between green tea and the prevention of prostate cancer 	

McKay & Blumberg (2002) ³⁸	USA	Narrative descriptive	Not described	N/S	<ul style="list-style-type: none"> • A case-control study from Canada found that prostate cancer risk is reduced by 30% with a tea intake of >500ml/day • However a retrospective cohort study found no association between tea intake and prostate cancer risk • These observations are most relevant to black tea 	<ul style="list-style-type: none"> • Evidence from the 2 studies presented is mixed 	
Saleem et al. (2003) ³⁹	USA	Narrative descriptive	Not described	Both	<ul style="list-style-type: none"> • As yet, no detailed case-control study has been conducted to assess the effect of consumption of green tea on human prostate cancer. All published data seeking an association between tea consumption and the risk of prostate cancer considered undefined tea preparations, mostly black tea. • At least 2 epidemiological studies have shown that people who regularly consume tea have a lower incidence of prostate cancer. One of these was conducted in Hawaii (cohort) and found a weak but significant negative association between black tea intake (more than 1 cup/day) and prostate cancer. The other in Canada (case-control) observed a decrease in prostate cancer risk with tea intake of more than 2 cups/day. • Other epidemiological studies conducted in Italy, Utah and Canada didn't find any difference of risk for prostate cancer between tea drinkers and non-drinkers. However most of these studies include populations that were predominantly black tea drinkers. It should be noted that most of these studies lacked appropriate controls for comparison in categorization of tea consumption, the type of tea consumed, and the ethnicity of the subjects, which weakens the overall impact of the study. 	<ul style="list-style-type: none"> • Epidemiological studies provide evidence that tea polyphenols may have the potential to lower the risk of prostate cancer in humans – some studies show there is a link while others show no association 	
Higdon & Frei (2003) ⁴	USA	Narrative descriptive	Not described	Black	<ul style="list-style-type: none"> • 3 cohort studies identified: • 1 found a significant inverse association between black tea consumption and prostate cancer risk • 2 found no significant associations • 3 case-control studies identified: • 1 demonstrated an inverse association between black tea consumption and prostate cancer risk • 2 found no significant associations 	<ul style="list-style-type: none"> • Limited studies available show mixed results, with most indicating no association is present but a small number suggesting an inverse association is present • Epidemiological studies on green tea consumption and prostate cancer risk are lacking 	

Lee et al. (2006) ⁴⁰	Australia	Narrative descriptive	PubMed, CINAHL and ProQuest databases searched for articles, without any restriction on publication date. Corresponding reference lists were also searched for relevant articles.	Both	<ul style="list-style-type: none"> • 5 cohort studies identified: • 1 from Japan demonstrated a borderline significant increase in prostate cancer risk for green tea consumption, but no association for black tea • 1 observed a weak inverse association • 3 demonstrated little association • 5 case-control studies identified: • 2 show the risk of prostate cancer is decreased with green tea intake (1 did not attain statistical significance), while another shows tea was linked with a slight reduction in risk (type of tea not specified). • 1 reported an increased risk • 1 reported there was no association 	<ul style="list-style-type: none"> • Evidence from in vitro and animal model studies indicates that tea is associated with a decreased risk or progression of prostate cancer • Epidemiological studies have generated less consistent results • Most cohort studies show there is no association between tea intake and prostate cancer risk • Most case-control studies show that prostate cancer risk may be slightly decreased from drinking tea (especially green) 	
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Breast cancer

Author & Date	Country	Study Type	Methods	Key Results		Main Conclusion	Comments
				Tea	Findings		
Katiyar & Mukhtar (1996) ⁵ <i>Also see Katiyar & Mukhtar (1996)⁶ & Yang & Wang (1993)⁴¹</i>	USA	Narrative descriptive	Not described	N/S	<ul style="list-style-type: none"> • 5 case-control studies showed no relationship between tea consumption and breast cancer risk • 1 ecological study shows the risk is increased and another shows the risk is decreased 	<ul style="list-style-type: none"> • Mixed results were seen, however the majority of studies showed that there was no relationship between tea consumption and breast cancer risk 	
Lubin et al. (1990) ⁴²	USA	Narrative descriptive	Not described			<ul style="list-style-type: none"> • Although coffee and tea have been studied extensively as possible risk factors for breast cancer, they do not appear to contribute to an increased risk • Only one correlation study has found a link with breast cancer and tea 	

Blot et al. (1996) ⁴³ <i>Also see Blot et al. (1997)⁴⁴</i>	USA	Narrative descriptive	Literature search and examination of epidemiological references were used to identify articles	Black	<ul style="list-style-type: none"> • 3 cohort studies identified • 1 reported a significantly decreased risk associated with black tea consumption (OR 0.7 for mid category), while 2 suggest the risk is increased (not significantly) • 5 case-control studies identified • 2 showed no association present, and 3 showed a decreased risk for breast cancer with increasing black tea intake (1 significant result) 	<ul style="list-style-type: none"> • Few studies available, most show no significant association present 	<ul style="list-style-type: none"> • Authors found that most epidemiological studies were initiated for purposes other than tea intake, hence the level of detail available on tea use was often minimal • No CI reported, only OR
McKay & Blumberg (2002) ⁴⁵	USA	Narrative descriptive	Not described	N/S		<ul style="list-style-type: none"> • Breast cancer incidence seems unrelated to tea consumption in recent studies conducted in US, Netherlands and Italy 	
Higdon & Frei (2003) ⁴	USA	Narrative descriptive	Not described	Black	<ul style="list-style-type: none"> • 2 cohort studies were identified • Neither found a significant association between black tea consumption and breast cancer risk • An inverse association between black tea consumption and breast cancer risk in the Nurses Health Study was reported in an abstract in 1992, but the full report has not been published • 5 case-control studies were identified • 1 found an inverse association while the other 4 found no significant associations between black tea consumption and breast cancer risk • A recent case-control study of breast cancer in men observed a positive association with tea consumption 	<ul style="list-style-type: none"> • Some mixed results were seen, however most studies found there was no significant association between black tea intake and breast cancer risk 	
				Green	<ul style="list-style-type: none"> • 2 recent studies in Japanese women observed green tea to be inversely associated with breast cancer <i>recurrence</i> 	<ul style="list-style-type: none"> • Studies on green tea and breast cancer incidence are lacking 	

Seely et al. (2005) ⁴⁶	Canada	Meta-analysis and systematic literature review	Medline, AMED, AltHealthWatch, CancerLit, CHKI, CinAhl, EMBASE and Cochrane Library searched, along with reference sections of relevant articles. Also searched National Research Register for unpublished trials and contacted authors of relevant studies. Included observational or randomized trial designs, published in all languages. Two authors extracted data and appraised the studies. Kappa scores and pooled measures of association calculated. Also tested for homogeneity and publication bias.	Green	<ul style="list-style-type: none"> • 7 studies included for analysis (3 cohorts and 2 case-controls on risk of breast cancer occurrence; 2 cohorts on risk of breast cancer recurrence) • Pooled RR for cohort studies on breast cancer incidence and green tea consumption: 0.89 (95% CI: 0.71-1.1). All three did not show a dose-response trend. • Pooled OR for case-control studies on breast cancer incidence and green tea consumption: 0.44 (95% CI: 0.14-1.31). Both studies did show a positive dose-response trend. • Pooled RR for breast cancer recurrence in cohort studies is 0.75 (CI: 0.47-1.19). Only 1 study showed a dose-response trend, and this was only for stage II disease. 	<ul style="list-style-type: none"> • Pooled analysis does not definitely support the use of green tea in primary prevention of breast cancer, however the case-control studies show a trend toward risk reduction. • The optimal effect was achieved at the highest dose in all cases except one. Nearly all the studies indicated greatest risk reduction at consumption levels equal to or more than 5 cups/day. Authors postulate that any protective effect is most likely to result from green tea at consumption levels greater than or equal to 5 cups/day. • For breast cancer recurrence, magnitude of protective effect is larger in stage I and II cancer in comparison to stage III and IV, with a difference that is statistically significant. • Women recovering from breast cancer who are receiving conventional treatment should consume green tea with caution, as interactions between these factors have not been fully defined. 	<ul style="list-style-type: none"> • No RCTs available to date (i.e. only observational studies) • All studies included in analysis had study populations that were Japanese &/or Chinese. • Results should be interpreted with caution considering the small number of observational studies available. • Some studies did not account for important confounding factors • If there is a protective effect, it is difficult to determine the optimal dose of green tea, as methods of preparation differ person-to-person and study-to-study. Variables in preparation include but are not limited to brewing time and temperature, amount of tea leaves used, cup size, re-using of leaves, quality of tea and freshness of leaf.
Sun et al. (2006) ⁴⁷	USA	Meta-analysis	Medline database searched for observational studies in English. Reference lists of retrieved papers were also screened. Included studies had to have information on the number of breast cancer cases studied and an OR/RR for highest versus lowest level of	Green	<ul style="list-style-type: none"> • 4 studies included – 3 cohorts from Japan and 1 case-control study from USA. • Pooled OR (highest versus lowest exposure level) for cohort studies 0.85 (95% CI: 0.66-1.09) • Pooled OR (highest versus lowest exposure level) for all studies (3 cohorts and 1 case-control) 0.78 (CI: 0.61-0.98) • Risk reduction was stronger among Asian women in Los Angeles, than among native Japanese in Japan • No significant heterogeneity among study results (P= 0.11) and no indication of publication bias 	<ul style="list-style-type: none"> • Pooled result for <u>cohort studies</u> showed there was no association between green tea and breast cancer risk • Pooled result for <u>all studies</u> showed a reduced risk of breast cancer with green tea consumption 	<ul style="list-style-type: none"> • Number of published studies on this topic is too small for results to be conclusive

			tea intake. Results were pooled and heterogeneity examined. Publication bias was also assessed.	Black	<ul style="list-style-type: none"> 13 studies included – 5 cohorts from Europe, USA and Japan and 8 case-controls from Europe, USA and Middle East. Pooled OR (highest versus lowest exposure level) for cohort studies 1.15 (95% CI: 1.02-1.31) Pooled OR (highest versus lowest exposure level) for case-control studies 0.91 (95% CI: 0.84-0.98). A stronger association was seen for hospital based rather than population based case-controls. Pooled OR (highest versus lowest exposure level) for all studies 0.98 (95% CI: 0.88-1.09) Statistically significant difference in the pooled result for cohort and case-control studies. Statistically significant heterogeneity in results across all studies. However, results across studies of the same design were homogenous. No indication of publication bias. 	<ul style="list-style-type: none"> Pooled result for <u>cohort studies</u> showed a modest increase, while that from <u>case-control studies</u> showed a modest decrease in risk of breast cancer associated with high black tea intake Pooled result for <u>all studies</u> showed there was no association between black tea and breast cancer risk 	
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Female reproductive cancer (including ovarian and uterine)

Author & Date	Country	Study Type	Methods	Key Results		Main Conclusion	Comments
				Tea	Findings		
Leviton (1990) ⁴⁸	USA	Narrative descriptive	Not described		<ul style="list-style-type: none"> There is a virtual lack of association between coffee and tea consumption and the risk of ovarian malignancies 	<ul style="list-style-type: none"> It appears as though tea consumption does not increase the risk of ovarian cancer 	
Katiyar & Mukhtar (1996) ⁵ <i>Also see Katiyar & Mukhtar (1996)⁶ & Yang & Wang (1993)⁴⁹</i>	USA	Narrative descriptive	Not described	N/S	<ul style="list-style-type: none"> 2 ecological studies report the possible negative association between tea consumption and cancer of the uterus 	<ul style="list-style-type: none"> 2 studies suggest negative association between tea consumption and cancer of the uterus More studies are required to draw a final conclusion 	

Lee et al. (2005) ⁵⁰	Australia	Narrative descriptive	PubMed, CINAHL and ProQuest databases searched for articles, without any restriction on publication date. Corresponding reference lists were also searched for relevant articles.		<ul style="list-style-type: none"> • 1 case-control study shows that green tea can protect against ovarian cancer • 7 other studies (1 cohort and 6 case-controls) did not report any significant association between tea intake and ovarian cancer risk 	<ul style="list-style-type: none"> • There is much evidence from in vitro and animal studies suggesting that components in tea are associated with a decreased risk or progression of ovarian cancer • Epidemiologic studies have generated inconsistent results • Most studies show that tea intake is not linked with ovarian cancer risk 	
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Pancreatic cancer

Author & Date	Country	Study Type	Methods	Key Results		Main Conclusion	Comments
				Tea	Findings		
Katiyar & Mukhtar (1996) ⁵ <i>Also see Katiyar & Mukhtar (1996)⁶ & Yang & Wang (1993)⁵¹</i>	USA	Narrative descriptive	Not described	N/S	<ul style="list-style-type: none"> • 10 studies found no association between pancreatic cancer and tea intake (3 cohorts, 7 case-controls) • 1 case-control study observed a positive association between tea intake and pancreatic cancer 	<ul style="list-style-type: none"> • Most studies indicate there is no association between tea intake and pancreatic cancer 	
Blot et al. (1996) ⁵² <i>Also see Blot et al. (1997)⁵³</i>	USA	Narrative descriptive	Literature search and examination of epidemiological references were used to identify articles	Black	<ul style="list-style-type: none"> • 6 cohort studies identified • 4 showed an association between black tea intake and a reduced risk of pancreatic cancer (2 significant) • 10 case-control studies identified • Mixed results were seen, with 1 showing a significantly increased risk with black tea consumption, 2 showing a significantly decreased risk with black tea consumption, and many (3) showing a non-significantly decreased risk or (3) not showing any association present • The 3 largest case-control studies show the risk is reduced with black tea consumption, but only one of these was statistically significant 	<ul style="list-style-type: none"> • An association may be present, but more evidence is required 	<ul style="list-style-type: none"> • Authors found that most epidemiological studies were initiated for purposes other than tea intake, hence the level of detail available on tea use was often minimal • No CI reported, only OR

Bushman (1998) ¹³	USA	Narrative descriptive	Not described	Green	<ul style="list-style-type: none"> • Out of 3 case-control studies, 2 found inverse associations. One of these found the risk of cancer was significantly decreased in women with regular green tea consumption and among men/women with increased amount and duration of green tea intake. The other reported a significant inverse association of pancreatic cancer with green tea intake. • The third study found an increased risk with high green tea consumption (≥ 5 cups/day). 	<ul style="list-style-type: none"> • Results are mixed for pancreatic cancer and green tea 	
Trevisanato & Kim (2000) ⁵⁴	Canada	Narrative descriptive	Not described	N/S	<ul style="list-style-type: none"> • A clear inverse correlation was shown by a Chinese study where regular drinkers of tea experienced lower incidence of cancer compared to non-drinkers. This study was limited however by an incomplete correction of confounding factors, including occupational risk factors. • Another case-control study from Poland reported a significant reduction in risk of pancreatic cancer with increasing lifetime consumption of tea. 	<ul style="list-style-type: none"> • Tea consumption is correlated to a lower incidence of pancreatic cancer in humans 	
Higdon & Frei (2003) ⁴	USA	Narrative descriptive	Not described	Black	<ul style="list-style-type: none"> • 7 cohort studies identified • 2 found a significant inverse association between black tea consumption and pancreatic cancer risk • 5 found no significant association – 1 of these was a pooled analysis of data from 2 large US studies • 12 case-control studies identified • 7 did not observe significant associations between black tea consumption and pancreatic cancer risk • 3 found a positive association • 1 found an inverse association 	<ul style="list-style-type: none"> • Most cohort studies showed no significant association between intake of black tea and pancreatic cancer risk • Results from case-control studies are mixed, however some that found positive associations did not adjust for risk factors such as smoking 	<ul style="list-style-type: none"> • At least 2 of the case-control studies that found positive associations between black tea intake and pancreatic cancer did not adjust for other risk factors such as smoking
				Green	<ul style="list-style-type: none"> • 2 case-control studies found an inverse association with pancreatic cancer risk • 1 found a positive association 	<ul style="list-style-type: none"> • Results for green tea are mixed 	

Liver cancer

Author & Date	Country	Study Type	Methods	Key Results		Main Conclusion	Comments
				Tea	Findings		
Katiyar & Mukhtar (1996) ⁵ <i>Also see Katiyar & Mukhtar (1996)⁶ & Yang & Wang (1993)⁵⁵</i>	USA	Narrative descriptive	Not described	N/S	<ul style="list-style-type: none"> 3 studies showed no relationship between tea intake and liver cancer (1 ecological, 1 cohort, 1 case-control) 1 ecological study observed a negative association between green tea consumption and liver cancer in Japan 	<ul style="list-style-type: none"> The majority of studies showed that there was no relationship between tea consumption and liver cancer risk 	

Lung cancer

Author & Date	Country	Study Type	Methods	Key Results		Main Conclusion	Comments
				Tea	Findings		
Katiyar & Mukhtar (1996) ⁵ <i>Also see Katiyar & Mukhtar (1996)⁶ & Yang & Wang (1993)⁵⁶</i>	USA	Narrative descriptive	Not described	N/S	<ul style="list-style-type: none"> 3 studies report an enhanced risk of lung cancer from tea intake (1 ecological, 1 cohort, 1 case-control) 1 ecological study reports a lower risk of lung cancer from tea intake 	<ul style="list-style-type: none"> Results are mixed. Most studies show there is positive association between tea intake and lung cancer risk. 	
Blot et al. (1996) ⁵⁷ <i>Also see Blot et al. (1997)⁵⁸</i>	USA	Narrative descriptive	Literature search and examination of epidemiological references were used to identify articles	Black	<ul style="list-style-type: none"> 4 cohort studies identified 3 show no association is likely (1 of these 3 has a slightly increased risk), while 1 shows a significantly increased risk associated with black tea consumption (OR 2.3 in highest group) - but this may be linked to confounding present 3 case-control studies identified All show the risk increases slightly with higher consumption (but not significantly) 	<ul style="list-style-type: none"> Data available is scanty 	<ul style="list-style-type: none"> Authors found that most epidemiological studies were initiated for purposes other than tea intake, hence the level of detail available on tea use was often minimal No CI reported, only OR

				Green	<ul style="list-style-type: none"> • 1 case-control identified • Shows the risk increases with higher consumption (OR 2.7 for mid group) 		
Kohlmeier et al. (1997) ³	USA	Narrative descriptive	Not described	Both	<ul style="list-style-type: none"> • Tea was found to inhibit tumorigenesis in animal experimental studies. • 3 cohort studies and 1 case-control study evaluated. • 3 of the 4 studies showed black tea intake was not associated with lung cancer risk. • 1 showed "tea" (non-specific type) and 1 showed green tea increased the risk, however these studies do have methodological flaws. 	<ul style="list-style-type: none"> • On the basis of only 4 epidemiological studies, it is difficult to come to a conclusion on the effect of tea on lung cancer 	<ul style="list-style-type: none"> • As in all epidemiological studies on lung cancer, the possible confounding effect by smoking is a serious problem in some of these studies
Bushman (1998) ¹³	USA	Narrative descriptive	Not described	Both	<ul style="list-style-type: none"> • Limited studies have been done on lung cancer • 2 studies are referenced: • The first from Japan reported that Okinawan tea (similar to green but partially fermented) was associated with decreased lung cancer risk (mainly squamous cell carcinoma), especially in women. However researchers did not determine how much green tea they drank, therefore it is not known if results are from one or both teas. • The other study from Hong Kong discovered a statistically significant increased lung cancer risk among green tea drinkers. Black tea also increased risk. However results were stated as tentative, as only a small number of cases and controls drank green tea regularly. The authors also stated that they did not collect data on tea drunk throughout the day and thus were unable to perform a dose-response analysis. 	<ul style="list-style-type: none"> • Results were mixed from the 2 studies referenced, but both had issues with their data collection 	
McKay & Blumberg (2002) ⁵⁹	USA	Narrative descriptive	Not described	Black		<ul style="list-style-type: none"> • Earlier studies show no chemopreventive action by black tea on lung cancer, however a more recent study has shown the risk is reduced with 2 or more cups of tea/day 	
Higdon & Frei (2003) ⁴	USA	Narrative descriptive	Not described	Black	<ul style="list-style-type: none"> • 4 cohort studies were identified • 3 found no significant relationship between black tea consumption and lung cancer risk • 1 found a positive association (from UK) but these results are likely to be related to a positive association between cigarette smoking and heavy tea consumption • Catechin intake, 87% of which came from black tea, was not significantly associated with lung cancer risk in a cohort of Danish men • 3 out of 4 case-control studies identified found no significant associations between black tea consumption and lung cancer risk 	<ul style="list-style-type: none"> • Cohort and case-control studies suggest no association present for black tea 	

				Green	<ul style="list-style-type: none"> • Zero cohort studies were identified • 2 out of 3 case-control studies identified found no significant associations between green tea consumption and lung cancer risk 	<ul style="list-style-type: none"> • No prospective studies identified • Limited case-control studies available 	
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Kidney cancer

Author & Date	Country	Study Type	Methods	Key Results		Main Conclusion	Comments
				Tea	Findings		
Katiyar & Mukhtar (1996) ⁵ <i>Also see Katiyar & Mukhtar (1996)⁶ & Yang & Wang (1993)⁶⁰</i>	USA	Narrative descriptive	Not described	N/S	<ul style="list-style-type: none"> • 5 case-control studies showed no relationship between green tea consumption and kidney cancer risk • 1 cohort study found daily tea consumption reduced the risk of kidney cancers in postmenopausal women • 1 cohort study found a positive correlation between tea consumption and kidney cancer 	<ul style="list-style-type: none"> • Mixed results were seen, however the majority of studies showed that there was no relationship between tea consumption and kidney cancer risk 	
Blot et al. (1996) ⁶¹ <i>Also see Blot et al. (1997)⁶²</i>	USA	Narrative descriptive	Literature search and examination of epidemiological references were used to identify articles	Black	<ul style="list-style-type: none"> • 2 cohort studies identified • 1 showed risk is significantly increased in males, while the other the risk is non-significantly reduced in females • 12 case-control studies identified • 4 showed no association present for both males and females • 1 study showed a significantly decreased risk for females • 2 studies showed a significantly increased risk for females, with one OR 18.8 for the highest group! 	<ul style="list-style-type: none"> • An increased risk of kidney cancer with increasing black tea intake have been noted, but other studies have failed to confirm this 	<ul style="list-style-type: none"> • Authors found that most epidemiological studies were initiated for purposes other than tea intake, hence the level of detail available on tea use was often minimal • No CI reported, only OR
Tavani et al. (1997) ⁶³	Italy	Narrative descriptive	Not described	N/S	<ul style="list-style-type: none"> • In most studies, tea consumption was not associated with renal-cell carcinoma 	<ul style="list-style-type: none"> • Tea was not associated with renal-cell carcinoma in most studies 	
McKay & Blumberg (2002) ⁶⁴	USA	Narrative descriptive	Not described	N/S	<ul style="list-style-type: none"> • An American case-control study indicated that for an intake of more than 5 cups of tea/day there was no association with risk of kidney cancer 	<ul style="list-style-type: none"> • There was no association between tea intake and kidney cancer in one study 	

Bladder cancer

Author & Date	Country	Study Type	Methods	Key Results		Main Conclusion	Comments
				Tea	Findings		
Katiyar & Mukhtar (1996) ⁵ <i>Also see Katiyar & Mukhtar (1996)⁶ & Yang & Wang (1993)⁶⁵</i>	USA	Narrative descriptive	Not described	N/S	<ul style="list-style-type: none"> 16 case-control studies, 2 cohort studies and 1 ecological study showed no relationship between tea consumption and cancers of the bladder and urinary tract 	<ul style="list-style-type: none"> All studies showed that there was no relationship between tea consumption and cancers of the bladder and urinary tract 	
Blot et al. (1996) ⁶⁶ <i>Also see Blot et al. (1997)⁶⁷</i>	USA	Narrative descriptive	Literature search and examination of epidemiological references were used to identify articles	Black	<ul style="list-style-type: none"> 3 cohort studies identified 1 showed risk was increased, 2 showed risk was decreased and all were non-significant 16 case-control studies identified 1 showed black tea significantly associated with increased risk of bladder cancer (OR 1.5 for highest group) All other studies did not have significant results, but 7 showed a decreased risk, 4 showed an increased risk and 4 showed no association present 	<ul style="list-style-type: none"> Tea intake appears to have little, if any association with bladder cancer 	<ul style="list-style-type: none"> Authors found that most epidemiological studies were initiated for purposes other than tea intake, hence the level of detail available on tea use was often minimal No CI reported, only OR
Bushman (1998) ¹³	USA	Narrative descriptive	Not described	Green	<ul style="list-style-type: none"> The number of studies on green tea and bladder cancer is limited In 1 case-control study from Japan, green tea was associated with decreased bladder cancer risk in women, but not in men. 	<ul style="list-style-type: none"> Green tea appears to protect females against bladder cancer in 1 study 	
Trevisanato & Kim (2000) ⁶⁸	Canada	Narrative descriptive	Not described	N/S	<ul style="list-style-type: none"> The protection conferred by tea on urinary bladder cancer appears to be more pronounced in females than in males. Although the data are scarce, published studies report a 50% reduction in the incidence of bladder cancer in female but not in male tea drinkers compared with non-tea drinkers. 	<ul style="list-style-type: none"> Tea appears to protect females against bladder cancer 	

Zeegers et al. (2001) ⁶⁹	The Netherlands	Meta-analysis and systematic literature review	Medline, Cancerlit and current contents searched for follow-up and case control studies of all languages published until February 2000. Citation tracking also performed. Articles were included in the analysis if they provided sufficient information to estimate a summary OR. Study quality and publication bias assessed. Between study variance estimated.	N/S	<ul style="list-style-type: none"> • 20 articles provided sufficient information to estimate a summary association of tea consumption • Adjusted (age, smoking, sex) summary OR for urinary tract cancer: <p>Current versus non-drinker</p> <p>Men: 1.08 (95% CI 0.94-1.24) – 7 studies Women: 0.99 (95% CI 0.81-1.20) – 6 studies Men + women: 1.01 (95% CI 0.92-1.10) – 7 studies</p> <p>Ever versus non-drinker</p> <p>Men: 1.02 (95% CI 0.84-1.25) – 4 studies Women: 1.00 (95% CI 0.27-3.73) – 3 studies Men + women: 1.09 (95% CI 0.54-2.17) – 3 studies</p>	<ul style="list-style-type: none"> • Tea consumption seems not to be related to an increased risk of <u>urinary tract cancer</u> 	<ul style="list-style-type: none"> • Limitation = only follow-up studies and case-controls included • Only compared current drinker versus non-drinker and ever drinker versus non-drinker (summary OR can not be quantified by amount or type of tea)
McKay & Blumberg (2002) ⁷⁰	USA	Narrative descriptive	Not described	Green plus N/S	<ul style="list-style-type: none"> • A case-control study in Japan indicated a protective effect of green tea on bladder cancer, particularly among women • An American case-control study indicated an intake of more than 5 cups of tea/day is associated with a 30% reduced risk, but there was no evidence of a dose-response relationship • Another case-control study (from Taiwan) suggested an increased risk of bladder cancer with tea consumption, but none of the results were significant 	<ul style="list-style-type: none"> • Study results suggest that if an association is present, it is not clear 	
Higdon & Frei (2003) ⁴	USA	Narrative descriptive	Not described	Both	<ul style="list-style-type: none"> • 5 out of 6 cohort studies didn't observe a significant association between bladder cancer and tea consumption (1 of these followed green tea drinkers) • Recently, an inverse association between black tea consumption and bladder cancer risk was observed in the Netherlands Cohort Study • 15 out of 20 case-control studies found no significant association between tea consumption and bladder cancer risk • 3 case-controls identified a positive association between black tea and bladder cancer risk • 1 case-control from France found an inverse association for black tea in women who smoked cigarettes, but not in non-smoking women or men 	<ul style="list-style-type: none"> • The majority of studies only evaluated black tea consumption • Studies did not find significant associations between black or green tea consumption and bladder cancer 	

Thyroid cancer

Author & Date	Country	Study Type	Methods	Key Results		Main Conclusion	Comments
				Tea	Findings		
Mack et al. (2003) ⁷¹	USA	Meta-analysis	Method has been described elsewhere. Studies identified were published between 1980-1997. Variables were restructured to provide a common format for the pooled analysis (for tea intake this was cups per month). Heterogeneity was also tested.	N/S	<ul style="list-style-type: none"> 14 case-control studies identified on thyroid cancer from USA, Asia and Europe. Only 9 provided data on tea intake. Pooled OR for all 9 studies 1.0 (95% CI: 0.8-1.2). There was heterogeneity among studies (P = 0.08). Pooled OR for males (>8 cups tea/month) 1.2 (CI: 0.7-1.9), P for trend = 1.0. Pooled OR for females (>8 cups tea/month) 0.9 (CI: 0.7-1.2), P for trend = 0.55. No association was apparent in a histology-specific analysis. For high tea consumption, an increased risk was suggested for studies from southern Europe and a reduced risk from US studies. When a test for regional heterogeneity was conducted (data not shown), there was marginal significance (P = 0.07). 	<ul style="list-style-type: none"> No association seen for thyroid cancer risk and tea consumption. This finding was consistent in both gender-specific and histology-specific analyses. Regional differences in risk may exist – this may be due to variations in preparation 	

Skin cancer

Author & Date	Country	Study Type	Methods	Key Results		Main Conclusion	Comments
				Tea	Findings		
Trevisanato & Kim (2000) ⁷²	Canada	Narrative descriptive	Not described	Both	<ul style="list-style-type: none"> There is a lack of human studies examining the relationship between tea drinking and skin cancer The best studies involve work conducted in mice 	<ul style="list-style-type: none"> There is a lack of human studies examining tea and skin cancer 	
McKay & Blumberg (2002) ⁷³	USA	Narrative descriptive	Not described	N/S	<ul style="list-style-type: none"> References several studies that investigated the topical application of tea components to prevent skin cancer One case-control study reported that showed an inverse association between tea consumption and the occurrence of squamous cell carcinoma of the skin in a population of US adults 	<ul style="list-style-type: none"> Animal and human studies show a consistent, protective effect of tea polyphenols against chemical and ultraviolet light induced skin cancer 	
Higdon & Frei (2003) ⁴	USA	Narrative descriptive	Not described		<ul style="list-style-type: none"> A recent population based case-control study found a significant inverse relationship between tea consumption frequency and the risk of squamous cell carcinoma of the skin only after adjusting for brewing time 	<ul style="list-style-type: none"> 1 case-control study showed tea to be protective, but only after adjusting for tea brewing time 	

Abbreviations used in tables

CI	Confidence interval
N/S	Not specified
OR	Odds ratio
RR	Relative risk

Further information

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