

Plasma/Serum Lycopene and Disease Risk

Lung Cancer Critical Findings

Disease type	First Author	Study Title and Complete Citation	Date	Abstract	Study Type	G.Tom +, N, -	P.Tom +, N, -	F.Tom +, N, -	Lyco +, N, -	Other +, N, -
Cancer: lung	Comstock GW	<p>The risk of developing lung cancer associated with antioxidants in the blood: ascorbic acid, carotenoids, alpha-tocopherol, selenium, and total peroxy radical absorbing capacity.</p> <p>Comstock GW, Alberg AJ, Huang HY, Wu K, Burke AE, Hoffman SC, Norkus EP, Gross M, Cutler RG, Morris JS, Spate VL, Helzlsouer KJ.</p> <p>Cancer Epidemiol Biomarkers Prev. 1997 Nov;6(11):907-16.</p>	1997	<p>Lung cancer cases diagnosed during the period 1975 through 1993 and matched controls were identified in the rosters of Washington County, Maryland residents who had donated blood for a serum bank in 1974 or 1989. Plasma from participants in the 1989 project was assayed for ascorbic acid; serum or plasma was assayed for participants in either project for alpha- and beta-carotene, cryptoxanthin, lutein/zeaxanthin, lycopene, alpha-tocopherol, selenium, and peroxy radical absorption capacity. Among the total group of 258 cases and 515 controls, serum/plasma concentrations were significantly lower among cases than controls for cryptoxanthin, beta-carotene, and lutein/zeaxanthin with case-control differences of -25.5, -17.1, and -10.1%, respectively. Modest nonsignificant case-control differences in a protective direction were noted for alpha-carotene and ascorbic acid. There were only trivial differences for lycopene, alpha-tocopherol, selenium, and peroxy radical absorption capacity. Findings are reported for males and females and for persons who had never smoked cigarettes, former smokers, and current smokers at baseline. These results and those from previous studies suggest that beta-carotene is a marker for some protective factor(s) against lung cancer; that cryptoxanthin, alpha-carotene, and ascorbic acid need to be investigated further as potentially protective factors or associates of a protective factor; and that lycopene, alpha-tocopherol, selenium, and peroxy radical absorption capacity are unlikely to be associated with lung cancer risk. Until specific preventive factors are identified, the best protection against lung cancer is still the avoidance of airborne carcinogens, especially tobacco smoke; second best is the consumption of a diet rich in fruits and vegetables.</p>	CC nested				N	
Cancer: lung	Yuan JM	<p>Prediagnostic levels of serum beta-cryptoxanthin and</p>	2001	<p>Higher blood levels of beta-carotene have been found to be associated with reduced risk of lung cancer, but large intervention trials have failed to demonstrate reduced lung</p>	CC nested				N	

retinol predict smoking-related lung cancer risk in Shanghai, China.

Yuan JM, Ross RK, Chu XD, Gao YT, Yu MC.

Cancer Epidemiol Biomarkers Prev. 2001 Jul;10(7):767-73.

cancer incidence after prolonged high-dose beta-carotene supplementation. Data on blood levels of specific carotenoids other than beta-carotene in relation to lung cancer are scarce. Little is known about the relationship between prediagnostic serum levels of carotenoids, retinol, and tocopherols, and risk of lung cancer especially in non-Western populations. Between January 1986 and September 1989, 18,244 men ages 45-64 years participated in a prospective study of diet and cancer in Shanghai, China. Information on tobacco smoking and other lifestyle factors was obtained through in-person interviews. A serum sample was collected from each study participant at baseline. During the first 12 years of follow-up, 209 lung cancer cases, excluding those diagnosed within 2 years of enrollment, were identified. For each cancer case, three cancer-free control subjects were randomly selected from the cohort and matched to the index case by age (within 2 years), month and year of blood sample collection, and neighborhood of residence. Serum concentrations of retinol, alpha- and gamma-tocopherols, and specific carotenoids including alpha-carotene, beta-carotene, beta-cryptoxanthin, lycopene, and lutein/zeaxanthin were determined on the 209 cases and 622 matched controls by high-performance liquid chromatography methods. A high prediagnostic serum level of beta-cryptoxanthin was significantly associated with reduced risk of lung cancer; relative to the lowest quartile, the smoking-adjusted relative risks (95% confidence intervals) for the 2nd, 3rd, and 4th quartile categories were 0.72 (0.41-1.26), 0.42 (0.21-0.84), and 0.45 (0.22-0.92), respectively (P for trend = 0.02). Increased serum levels of other specific carotenoids including alpha-carotene, beta-carotene, lycopene, and lutein/zeaxanthin were related to reduced risk of lung cancer although the inverse associations were no longer statistically significant after adjustment for smoking. A statistically significant 37% reduction in risk of lung cancer was noted in smokers with above versus below median level of total carotenoids. Serum retinol levels showed a threshold effect on lung cancer risk. Compared with the lowest quartile (<40 microg/dl), the smoking-adjusted relative risk (95% confidence interval) was 0.60 (0.39-0.92) for men in the 2nd-4th quartiles of retinol values combined; no additional decrease in risk was observed between individuals from the 2nd to 4th quartiles. There were no associations between prediagnostic serum levels of alpha- and gamma- tocopherols and lung cancer (all Ps for trend

				> or =0.4). The present data indicate that higher prediagnostic serum levels of total carotenoids and beta-cryptoxanthin were associated with lower smoking-related lung cancer risk in middle-aged and older men in Shanghai, China. Low level of serum retinol (with a threshold effect) is associated with increased lung cancer risk in this oriental population.						
Cancer: lung	Ito Y	<p>Serum carotenoids and mortality from lung cancer: a case-control study nested in the Japan Collaborative Cohort (JACC) study.</p> <p>Ito Y, Wakai K, Suzuki K, Tamakoshi A, Seki N, Ando M, Nishino Y, Kondo T, Watanabe Y, Ozasa K, Ohno Y; JACC Study Group.</p> <p>Cancer Sci. 2003 Jan;94(1):57-63.</p>	2003	<p>To investigate whether high serum levels of carotenoids, tocopherols, and folic acid decrease risk of lung cancer in Japanese, we conducted a case-control study nested in the Japan Collaborative Cohort (JACC) Study. A total of 39,140 subjects provided serum samples at baseline between 1988 and 1990. We identified 147 cases (113 males and 34 females) of death from lung cancer during an 8-year follow-up. Of the subjects who survived to the end of this follow-up, 311 controls (237 males and 74 females) were selected, matched to each case of lung cancer death for gender, age and participating institution. We measured serum levels of antioxidants in cases of lung cancer death and controls. Odds ratios (ORs) for lung cancer death were estimated using conditional logistic models. The risk of lung cancer death for the highest quartile of serum alpha-carotene, beta-carotene, lycopene, beta-cryptoxanthin, and canthaxanthin was significantly or marginally significantly lower than for the lowest quartile: the ORs, adjusted for smoking and other covariates, were 0.35 (95% confidence interval (CI), 0.14-0.88), 0.21 (0.08-0.58), 0.46 (0.21-1.04), 0.44 (0.17-1.16) and 0.37 (0.15-0.91), respectively. The ORs for the highest serum levels of zeaxanthin/lutein and folic acid tended to be low, but the differences were not statistically significant. Serum total cholesterol was also inversely related to risk of lung cancer death: the OR for the highest vs. the lowest quartile was 0.39 (95% CI, 0.19-0.79). Higher serum levels of carotenoids such as alpha- and beta-carotenes may play a role in preventing death from lung cancer among Japanese.</p>	CC nested				N	
Cancer: lung	Comstock GW	<p>The risk of developing lung cancer associated with antioxidants in the blood: ascorbic acids, carotenoids,</p>	2008	<p>Lung cancer cases diagnosed during the period 1975 through 1993 and matched controls were identified in the rosters of Washington County, Maryland residents who had donated blood for a serum bank in 1974 or 1989. Plasma from participants in the 1989 project was assayed for ascorbic acid; serum or plasma was assayed for</p>	CC				N	

		<p>alpha-tocopherol, selenium, and total peroxy radical absorbing capacity.</p> <p>Comstock GW, Alberg AJ, Huang HY, Wu K, Burke AE, Hoffman SC, Norkus EP, Gross M, Cutler RG, Morris JS, Spate VL, Helzlsouer KJ.</p> <p>Am J Epidemiol. 2008 Oct 1;168(7):831-40.</p>		<p>participants in either project for alpha- and beta-carotene, cryptoxanthin, lutein/zeaxanthin, lycopene, alpha-tocopherol, selenium, and peroxy radical absorption capacity. Among the total group of 258 cases and 515 controls, serum/plasma concentrations were significantly lower among cases than controls for cryptoxanthin, beta-carotene, and lutein/zeaxanthin with case-control differences of -25.5, -17.1, and -10.1%, respectively. Modest nonsignificant case-control differences in a protective direction were noted for alpha-carotene and ascorbic acid. There were only trivial differences for lycopene, alpha-tocopherol, selenium, and peroxy radical absorption capacity. Findings are reported for males and females and for persons who had never smoked cigarettes, former smokers, and current smokers at baseline. These results and those from previous studies suggest that beta-carotene is a marker for some protective factor(s) against lung cancer; that cryptoxanthin, alpha-carotene, and ascorbic acid need to be investigated further as potentially protective factors or associates of a protective factor; and that lycopene, alpha-tocopherol, selenium, and peroxy radical absorption capacity are unlikely to be associated with lung cancer risk. Until specific preventive factors are identified, the best protection against lung cancer is still the avoidance of airborne carcinogens, especially tobacco smoke; second best is the consumption of a diet rich in fruits and vegetables.</p>						
Cancer: lung	Klarod K	<p>Serum antioxidant levels and nutritional status in early and advanced stage lung cancer patients.</p> <p>Klarod K, Hongsprabhas P, Khampitak T, Wirasorn K, Kiertiburanakul S, Tangrassameeprasert R, Daduang J, Yongvanit P, Boonsiri P.</p> <p>Nutrition. 2011 Apr 27. [Epub ahead of print]</p>	2011	<p>OBJECTIVE: Malnutrition frequently occurs in lung cancer patients. We aimed to determine nutritional status and antioxidant and mineral levels in Thai patients with lung cancer. METHODS: A prospective study with matched case-control was conducted. Nutritional status was assessed by body mass index (BMI) and subjective global assessment (SGA). Eastern Cooperative Oncology Group (ECOG) performance status was used to assess the performance. The serum antioxidant and mineral levels were determined. RESULTS: Forty-nine patients with a mean age of 58.8 (range, 35-82) who were first diagnosed with lung cancer were enrolled. They were compared with 60 healthy controls, and levels of retinol, α-tocopherol, β-carotene, lycopene, β-cryptoxanthin, selenium, and zinc were lower ($P < 0.05$). However, peroxidase activity was higher ($P = 0.002$) in patients. Selenium levels were higher in early stage compared to advanced stage patients ($P =$</p>	CC				(-)	Low lyco in cases

			<p>0.041). Overweight patients had higher selenium levels (0.04 mg/L) than normal BMI patients ($\beta = 0.04$, $P = 0.035$). Patients with SGA class C had lower selenium levels (0.03 mg/L) than those with class A ($\beta = -0.03$, $P = 0.035$). The poorer ECOG performance patients had significantly lower β-carotene ($\beta = -0.192$, $P = 0.003$) and selenium ($\beta = -0.031$, $P = 0.011$) levels compared with those with good ECOG performance status. CONCLUSIONS: Significantly lower levels of antioxidants and selenium were found in lung cancer patients compared to healthy controls. Levels of some antioxidants and minerals differed among categories of BMI, SGA categories, or ECOG performance status. These findings may be helpful for further studies, such as the effect of nutritional supplementation on clinical outcomes.</p>						
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