

## Tomato/Tomato-based foods and Disease Risk

### Breast 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: breast	Sieri S	Dietary patterns and risk of breast cancer in the ORDET cohort.  Sieri S, Krogh V, Pala V, Muti P, Micheli A, Evangelista A, Tagliabue G, Berrino F.  Cancer Epidemiol Biomarkers Prev. 2004 Apr;13(4):567-72.	2004	The aim of this study was to evaluate the association between dietary patterns and risk of developing breast cancer in an Italian cohort. Women volunteers were recruited from 1987 to 1992 from residents in Varese province, northern Italy, an area covered by a cancer registry. Participants completed a semiquantitative food frequency questionnaire, and anthropometric and other data were collected systematically. Using nutritional data from 8984 women with an average follow up of 9.5 years and 207 incident cases of breast cancer, we conducted an exploratory factor analysis to identify major dietary patterns. Four dietary patterns, which explained 30% of the variance, emerged: salad vegetables (mainly consisting of raw vegetables and olive oil); western (mainly consisting of potatoes, red meat, eggs and butter); canteen (pasta and tomato sauce); and prudent (cooked vegetables, pulses, and fish, with negative loading on wines and spirits). After adjustment for potential confounders, only the salad vegetables pattern was associated with significantly lower (34-35%) breast cancer incidence (RR = 0.66, CI(95%) = 0.47+/-0.95 comparing highest with lowest tertile) with a significant linear trend (P = 0.016). Women with body mass index <25 had an even greater risk reduction in the highest tertile of the salad vegetables pattern (>50% less risk than the lowest tertile, RR = 0.39, CI(95%) = 0.22-0.69) with a significant trend (P = 0.001); whereas women with body mass index > or =25 had no protective effect for the consumption of salad vegetables. These findings suggest that a diet rich in raw vegetables and olive oil protects against breast cancer.	PC		N			Diet pattern
Cancer: breast	Sesso HD	Dietary and plasma lycopene and the risk of breast cancer.  Sesso HD, Buring	2005	Lycopene is potentially effective in the prevention of breast cancer from laboratory and observational studies. Among 39,876 women initially free of cardiovascular disease and cancer, we first conducted a prospective cohort study of dietary lycopene and its food sources. Participants completed a baseline food	PC		N		N	Diet lyco + food sources

		<p>JE, Zhang SM, Norkus EP, Gaziano JM.</p> <p>Cancer Epidemiol Biomarkers Prev. 2005 May;14(5):1074-81.</p>		<p>frequency questionnaire and provided self-reports of breast cancer risk factors. Dietary lycopene levels were divided into quintiles, and lycopene food sources were categorized. During 9.9 years of follow-up, 1,076 breast cancer cases were confirmed by medical record review. In a nested case-control study, we then identified 508 breast cancer cases and 508 controls matched by age, smoking, and follow-up time. Plasma lycopene and other carotenoids were measured. In the prospective cohort study, women with increasing quintiles of dietary lycopene had multivariate relative risks (RR) of breast cancer of 1.00 (ref), 0.95, 1.00, 1.10, and 1.00 (P, linear trend = 0.71). Women consuming &lt;1.5, 1.5 to &lt;4, 4 to &lt;7, 7 to &lt;10, and &gt; or =10 servings/week of tomato-based products had RRs of 1.00 (ref), 1.00, 1.20, 1.18, and 1.16 (P, linear trend = 0.11). No individual lycopene food sources were associated with breast cancer. In the nested case-control study, women in increasing quartiles of plasma lycopene had multivariate RRs of breast cancer of 1.00 (ref), 0.95, 1.15, and 0.93 (P, linear trend = 0.86). The stepwise addition of individual plasma carotenoids did not impact the RRs for plasma lycopene, nor were other carotenoids associated with breast cancer. In conclusion, neither higher dietary nor plasma lycopene levels were associated with a reduced risk of breast cancer in middle-aged and older women.</p>	~~~~~ CC nested				~~~~~ N	~~~~~ Plasma
Cancer: breast	Gallus S	<p>Pizza consumption and the risk of breast, ovarian and prostate cancer.</p> <p>Gallus S, Talamini R, Bosetti C, Negri E, Montella M, Franceschi S, Giacosa A, La Vecchia C.</p> <p>Eur J Cancer Prev. 2006 Feb;15(1):74-6.</p>	2006	<p>Pizza has been favourably related to the risk of prostate cancer in North America. Scanty information, however, is available on sex hormone-related cancer sites. We therefore studied the role of pizza consumption on the risk of breast, ovarian and prostate cancers using data from three hospital-based case-control studies conducted in Italy between 1991 and 2002. These included 2569 women with breast cancer, 1031 with ovarian cancer, 1294 men with prostate cancer, and a total of 4864 controls. Compared with non-pizza eaters, the multivariate odds ratios for eaters were 0.97 (95% confidence interval (CI) 0.86-1.10) for breast, 1.06 (95% CI 0.89-1.26) for ovarian and 1.04 (95% CI 0.88-1.23) for prostate cancer. Corresponding estimates for regular eaters (i.e. &gt; or =1 portion per week) were 0.92 (95% CI 0.78-1.08), 1.00 (95% CI 0.80-1.25) and 1.12 (95% CI 0.88-1.43), respectively. Our results do not show a relevant</p>	CC		N			

				role of pizza on the risk of sex hormone-related cancers. The difference with selected studies from North America suggests that dietary and lifestyle correlates of pizza eating vary between different populations and social groups.						
Cancer: breast	Do MH	Fruits, vegetables, soy foods and breast cancer in pre- and postmenopausal Korean women: a case-control study.  Do MH, Lee SS, Kim JY, Jung PJ, Lee MH.  Int J Vitam Nutr Res. 2007 Mar;77(2):130-41.	2007	We carried out a case-control study to examine the relationship between fruits, vegetables, and soy foods intake with breast cancer risk in Korean women. Incident cases (n = 359) were identified through cancer biopsies and hospital-based controls (n = 708) were selected in the same hospitals. Subjects were asked to indicate usual dietary habits, which were assessed using a semi-quantitative food frequency questionnaire (98 items). Odds ratio (OR) and 95% confidence intervals (95% CI) were calculated by unconditional logistic regression after adjustment for additional confounding factors according to the menopausal status. High grape intake showed an inverse association of breast cancer in postmenopausal women (OR = 0.59, 95% CI = 0.35-0.95; p for trend = 0.05). High tomato intake was associated with reduced breast cancer risk in premenopausal women (OR = 0.59, 95% CI = 0.38-0.89, p for trend = 0.04). In postmenopausal women, green pepper intake showed an inverse association of breast cancer risk (OR = 0.60, 95% CI = 0.43-0.96, p for trend = 0.03). High soybean intake showed an inverse association of breast cancer in postmenopausal women (OR = 0.61, 95% CI = 0.34-0.89, p for trend = 0.02). Our study suggests that high intake of some fruits, vegetables, and soybeans may be associated with a reduced breast cancer risk.	CC	(-)  ↓ risk in pre-meno women				
Cancer: breast	Sant M	Salad vegetables dietary pattern protects against HER-2-positive breast cancer: a prospective Italian study.  Sant M, Allemani C, Sieri S, Krogh V, Menard S, Tagliabue E, Nardini E, Micheli A, Crosignani P,	2007	Studies investigating the relation of diet to breast cancer have produced conflicting results. We hypothesized that dietary factors associated with breast cancer risk might differentially influence the HER-2 status of the cancers that develop, and investigated this hypothesis by analyzing the data of the ORDET prospective study. We analyzed 8,861 volunteer women residents of the Varese Province, Italy, for whom we had full data. By December 31, 2001, 238 cases had occurred in which HER-2 status was known. Four dietary patterns had been identified previously by factor analysis: salad vegetables (high consumption of raw vegetables and olive oil), prudent (cooked vegetables, poultry, fish), western (potatoes, meat, eggs, butter), and canteen (pasta, tomato sauce,	PC		N			Dietary pattern with tomato sauce

		Muti P, Berrino F.  Int J Cancer. 2007 Aug 15;121(4):911-4.		wine). In our study, relative risks (RRs) of developing HER-2-positive and HER-2-negative breast cancers by tertiles of dietary pattern factor scores were assessed by multinomial logistic regression. The salad vegetables dietary pattern had a protective effect against HER-2-positive cancers (RR = 0.25, 95% CI 0.10-0.64, for the highest tertile; p(trend) = 0.001), much stronger than for HER-2-negative cancers (p(heterogeneity) = 0.039). This important finding that a salad vegetables dietary pattern protects mainly against a specific breast cancer subtype indicates that future studies on environmental/dietary risk factors should explicitly take account of the heterogeneity of breast cancer phenotypes.						
Cancer: breast	Agurs-Collins T	Dietary patterns and breast cancer risk in women participating in the Black Women's Health Study.  Agurs-Collins T, Rosenberg L, Makambi K, Palmer JR, Adams-Campbell L.  Am J Clin Nutr. 2009 Sep;90(3):621-8. Epub 2009 Jul 8	2009	BACKGROUND: No studies have examined dietary patterns and breast cancer risk in a large cohort of African American women.  OBJECTIVE: We investigated the association between dietary patterns and breast cancer risk in the Black Women's Health Study.  DESIGN: This is a prospective cohort study of 50,778 participants followed biennially from 1995 through 2007. During 443,742 person-years of follow-up, 1094 incident cases of breast cancer were identified. Factor analysis was used to derive food patterns based on 69 food variables. We used Cox regression models to obtain incident rate ratios (IRRs) for breast cancer in relation to quintiles of each of the 2 dietary patterns, with adjustment for other breast cancer risk factors. RESULTS: Through factor analysis, we identified 2 dietary patterns: Western (refined grains, processed meat, and sweets) and prudent (whole grains, vegetables, fruit, and fish). The prudent diet was weakly associated with lower breast cancer risk overall; P for trend = 0.06. In analyses stratified by body mass index (BMI; in kg/m <sup>2</sup> ), the prudent dietary pattern was associated with a significantly lower risk of breast cancer in women with a BMI <25 (IRR: 0.64; 95% CI: 0.43, 0.93; P for trend = 0.01). The prudent dietary pattern was also associated with a significantly lower risk of breast cancer in premenopausal women (IRR: 0.70; 95% CI: 0.52, 0.96; P for trend = 0.01), and we found a significant inverse	PC	(-)				Diet pattern  BMI on modified diet, <25  Lyco mentioned

				<p>association for the prudent dietary pattern and estrogen receptor-negative breast cancer (IRR: 0.52; 95% CI: 0.28, 0.94; P for trend &lt;0.01).</p> <p>CONCLUSION: Our findings suggest that the prudent dietary pattern may protect against breast cancer in some black women.</p>						
Cancer: breast	McLaughlin JM	<p>Effects of tomato- and soy-rich diets on the IGF-I hormonal network: a crossover study of postmenopausal women at high risk for breast cancer.</p> <p>McLaughlin JM, Olivo-Marston S, Vitolins MZ, Bittoni M, Reeves KW, Degraffinreid CR, Schwartz SJ, Clinton SK, Paskett ED.</p> <p>Cancer Prev Res (Phila). 2011 May;4(5):702-10. Epub 2011 Mar 23</p>	2011	<p>To determine whether dietary modifications with tomato products and/or a soy supplement affected circulating levels of insulin-like growth factor (IGF)-1 and other markers of cell signaling in postmenopausal women at risk for developing breast cancer. Eligible and consented postmenopausal women at high risk for developing breast cancer were enrolled in a 26-week, two-arm (tomato and soy, 10 weeks each) longitudinal dietary intervention study in which each woman served as her own control. Changes in biochemical endpoints including IGF-I, IGF-binding protein (IGFBP)-3, estradiol, sex hormone-binding globulin (SHBG), C-peptide, and insulin were measured for each intervention arm. Carotenoid and isoflavone levels were measured to assess adherence. Significant increases in carotenoid and isoflavone levels during the tomato and soy study arms, respectively, suggested that women were adherent to both arms of the intervention. The tomato-rich diet had little effect on cell-signaling biomarkers previously associated with breast cancer risk. However, results of the soy intervention showed that concentrations of IGF-I and IGFBP-3 increased by 21.6 and 154.7 <math>\mu\text{mol/L}</math>, respectively (<math>P = 0.001</math> for both) and SHBG decreased by 5.4 <math>\mu\text{mol/L}</math> (<math>P &lt; 0.001</math>) after consumption of the soy protein supplement. Increased soy protein intake may lead to small, but significant, increases in IGF-I and IGFBP-3. Soy consumption also led to a significant decrease in SHBG, which has been hypothesized to promote, rather than prevent, cancer growth. Previous epidemiologic studies, however, have confirmed protective effect of soy on breast cancer. Additional investigation about the effect of soy on breast cancer risk and its mechanism of action is warranted.</p>	Interv		N			IGF-1 SHBG