What is the relationship between the intake of animal protein products and colorectal cancer?

Conclusion

Moderate evidence reports inconsistent positive associations between colorectal cancer and the intake of certain animal protein products, mainly red and processed meat.

Grade: Moderate

Overall strength of the available supporting evidence: Strong; Moderate; Limited; Expert Opinion Only; Grade not assignable For additional information regarding how to interpret grades, click here.

Evidence Summary Overview

This review included 13 studies (Chao, 2005; Cross, 2007; English, 2004; Flood, 2003; Jarvinen, 2001; Kojima, 2004; Larsson, 2005; Lee, 2009b; Norat, 2005; Oba, 2006; Sato, 2006; Wei, 2004; Wu, 2006) representing prospective cohorts from the US, Europe, Australia, Finland, Japan, China and Sweden published since 2000. In studies examining total meat intake, none reported a relationship with overall colorectal cancer risk (Flood, 2003; Jarvinen, 2001; Lee, 2009b; Oba, 2006; Sato, 2006) or risk associated with specific subsites (Lee, 2009b; Sato, 2006; Wu, 2006).

However, more varied results were reported for red and processed meats. For example, in the National Institutes of Health-American Association of Retired Persons (NIH-AARP) Diet and Health Study, positive associations between red meat and processed meat and colorectal cancer were observed (Cross, 2007). However, no associations were observed between red or processed meats and colorectal cancer in the Breast Cancer Detection Demonstration Project (Flood, 2003). The European Prospective Investigation into Cancer and Nutrition (EPIC) study observed no association between red meat and colorectal cancer, but did observe a positive association for processed meat. Further risk may vary depending on subsite. Some studies found a relationship with rectal cancer and red meat intake (Chao, 2005; English, 2004), while others found no association (Kojima, 2004; Larsson, 2005; Lee, 2009b; Wei, 2004; Wu, 2006).

Studies also report inconsistent results for the intake of poultry and colorectal cancer at various subsites, with studies reporting a positive association (Jarvinen, 2001; Kojima, 2004; Sato, 2006), no association (Flood, 2003; Lee, 2009b; Norat, 2005; Wu, 2006) or an inverse association (Chao, 2005; English, 2004; Larsson, 2005).

In general, the studies showed no consistent findings on type of meat or meat product and colorectal cancer. Little information also is available about how much meat is consumed, and the association may differ depending on amount as well as the way it is cooked. Further, although it has been suggested that animal protein products have a different effect in different sites of the colon and rectum, no consistent findings are available. Future studies should consider the subsite of the cancer.

Evidence summary paragraphs:

Chao et al, 2005 (positive quality) used data from the Cancer Prevention Study II (CPS II) Nutrition Cohort (N=148,610; aged 50 to 74 years) to examine the relationship between recent and

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long-term meat consumption and the risk of incident colon and rectal cancer in the United States. Dietary intake was assessed using a 68-item modified Block food frequency questionnaire (FFQ). Intake of red meat, poultry and fish, and processed meat (grams per week) was computed by summing across meat items that contributed to each meat group and categorizing by quintile. Long-term consumption was examined by considering consumption reported in 1982 and in 1992 to 1993. Consumption at each time point was categorized into tertiles (low, moderate, high) and participants were classified as low intake in 1982 and 1992 to 1993 (referent group), high intake in 1982 and 1992 to 1993 and all other combinations of intake over time. Follow-up from time of enrollment in 1992/1993 through August 31, 2001, identified 1,667 incident colorectal cancers. Eighty percent of cancer cases were self-reported and verified by medical record or linkage with state cancer registries, 3% were identified while verifying a different reported cancer and 17% were identified using death certificates. High intake of red and processed meat reported in 1992 to 1993 was associated with higher risk of colon cancer after adjusting for age and energy intake but not after further adjustment for body mass index (BMI), cigarette smoking and other covariates. When long-term consumption was considered, persons in the highest tertile of consumption in both 1982 and 1992 to 1993 had higher risk of distal colon cancer associated with processed meat (RR=1.50; 95% CI: 1.04, 2.17), and ratio of red meat to poultry and fish (RR=1.53; 95% CI: 1.08 to 2.18) relative to those persons in the lowest tertile at both time points. Long-term consumption of poultry and fish was inversely associated with risk of both proximal and distal colon cancer. High consumption of red meat reported in 1992 to 1993 was associated with higher risk of rectal cancer (RR=1.71; 95% CI: 1.15, 2.52; P=0.007), as was high consumption reported in both 1982 and 1992 to 1993 (RR=1.43; 95% CI: 1.00, 2.05). The authors concluded that prolonged high consumption of red and processed meat may increase the risk of cancer in the distal portion of the large intestine.

Cross et al, 2007 (positive quality) investigated whether red or processed meat intake increases cancer risk using data from the NIH-AARP Diet and Health Study (N=494,036; aged 50 to 71 years) in the US. Cancer cases were identified by linkage to state cancer registries and the National Death Index Plus. A 124-item FFQ based on the Diet History Questionnaire developed at the National Cancer Institute (NCI) was completed at baseline. Red meat intake included all types of beef, pork and lamb (i.e., bacon, beef, cold cuts, ham, hamburger, hot dogs, liver, pork, sausage and steak). The processed meat variable included bacon, red meat sausage, poultry sausage, luncheon meats (red and white meat), cold cuts (red and white meat), ham, regular hot dogs and low-fat hot dogs made from poultry. The meat variables also included meats added to complex food mixtures, such as pizza, chili, lasagna and stew. Follow-up for these analyses was calculated from baseline (1995 to 1996) until the end of 2003. During a mean follow-up of 6.8 years, 5,107 cases of colorectal cancer were observed. Individuals in the highest quintile of red meat intake, compared with those in lowest, had a statistically significant elevated risk of colorectal cancer (multivariate HR=1.24;95% CI: 1.12, 1.36; P<0.001). Individuals in the highest quintile, compared with those in the lowest quintile, of processed meat intake were at elevated risk for colorectal cancer (multivariate HR=1.20; 95% CI: 1.09, 1.32; P<0.001). The authors concluded that both red and processed meat intakes were positively associated with colorectal cancer.

English et al, 2004 (positive quality) investigated the relationship between red meat, chicken and fish consumption and the risk of colorectal cancer using data from the Melbourne Collaborative Cohort Study (N=37,112; aged 27 to 75 years) in Australia. Cancer cases were identified from the Victorian Cancer Registry. Participants completed a 121-item FFQ including 22 items on intake of fresh red meat, processed meat, chicken and fish. Follow-up was conducted from baseline (1990 to 1994) to June 30, 2002. Over an average of nine years of follow-up per person, 451 incident colorectal cancer cases were observed, including 283 colon and 169 rectal tumors (one subject had a colon and rectal tumor). For rectal cancer, the hazard ratios (HR) in the highest quartile of

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consumption of fresh red meat and processed meat were 2.3 (95% CI: 1.2, 4.2; P=0.07) and 2.0 (95% CI: 1.1, 3.4; P=0.09), respectively. The corresponding HRs for colon cancer were 1.1 (0.7 to 1.6; P=0.9) and 1.3 (0.9 to 1.9; P=0.06). Chicken consumption was weakly negatively associated with colorectal cancer (HR for the highest quartile = 0.7; 95% CI: 0.6, 1.0; P=0.03), whereas hazard ratios for fish consumption were close to unity. The authors concluded that consumption of fresh red meat and processed meat seemed to be associated with an increased risk of rectal cancer. Consumption of chicken and fish did not increase risk.

Flood et al, 2003 (positive quality) investigated the association of intakes of total meat, red meat, white meat and processed meat, as well as for total fat, saturated fat and unsaturated fat with colorectal cancer in a prospective cohort of women in the United States from the Breast Cancer Detection Demonstration Project (BCDDP) (N=45,496). Questionnaires were completed at three time points: 1987 to 1989, 1992 to 1995 and 1995 to 1998. Colorectal case ascertainment was from self-reports on 1992 to 1995 and 1995 to 1998 questionnaires, state-wide cancer registries, and the National Death Index (through 1997). A 62-item National Cancer Institute/ Block FFQ was used to assess usual dietary intake over the previous year. The FFQ had 17 line items containing meat. During an average of 8.5 years of follow-up, there were 487 incident cases of colorectal cancer. For total meat, no association between increased consumption and colorectal cancer was observed, with the relative risk in the top quintile being 1.05 (95% CI: 0.80, 1.38; P=0.28). Similarly, no significant (NS) associations between colorectal cancer and red meat, white meat or processed meat were observed in energy-adjusted or energy- and total meat-adjusted models. The authors concluded that this study provided no evidence of an association between either meat or fat (or any subtypes) and colorectal cancer incidence.

Jarvinen et al, 2001 (positive quality) investigated the relationships between consumption of total fat, major dietary fatty acids, cholesterol, consumption of meat and eggs and the incidence of colorectal cancers in a cohort (N=9,959) based on the Finnish Mobile Clinic Health Examination Survey in Finland. Cancer incidence was ascertained through the national Finnish Cancer Registry. Habitual food consumption during the preceding year was obtained through interview. A structured questionnaire listing more than 100 foods and mixed dishes was used to guide the interview. The average daily consumption of food items was computed utilizing a software package specifically developed for this study. From 1967 to 1972 to 1999, 109 new colorectal cancer cases (63 in colon and 46 in rectum) were ascertained. Total consumption of meat (all), red meat or liver was not significantly associated with the incidence of colorectal cancers. The RR between extreme quartiles for colorectal cancer and meat (all) and red meat were 1.52 (95% CI: 0.78, 2.96) and 1.50 (95% CI: 0.77, 2.94), respectively. Poultry intake was analyzed as a dichotomous variable (yes/no). Those who consumed poultry meat had an increased risk for colorectal cancers mainly due to an increased risk for colon cancer (RR=1.93; 95% CI: 1.12–3.35). Egg consumption was not significantly related to colorectal cancer risk. The authors concluded that non-significant associations between consumption of meat and eggs and colorectal cancer risk were found.

Kojima et al, 2004 (positive quality) used data from a prospective cohort study to investigate the association between diet and colorectal cancer risk in Japanese adults participating in the Japan Collaborative Cohort Study. Subjects (N=107,824, 58% women, ages 40 to 79 years) completed a FFQ containing 33 foods typical in the Japanese diet, recorded three-day diet records every three months for a year, and then filled out the FFQ again. Fatal deaths due to colon cancer were determined using resident registration records of municipalities. Cause of death was confirmed by death certificates. Over an average follow-up period of 9.9±2.2 years or 1,064,448 person-years at risk, there were 284 cases of death from colon cancer and 173 deaths from rectal cancer. Colon cancer mortality risk was significantly higher among men with a high intake of chicken compared with men with a low intake of chicken (adjusted HR=1.7; 95% CI: 1.1, 2.6). No other significant

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association between meat (including beef, pork and ham and sausage) and colon or rectal cancer mortality in men or women was observed. Egg consumption was significantly associated with colon cancer mortality only in men (HR for high vs. low intake = 1.5; 95% CI: 1.0, 2.4; P=0.04). However, the authors caution that the study lacked statistical power due to small sample size and the measurement error in the FFQ, so that results should be interpreted with caution.

Larson et al, 2005 (positive quality) examined the association of red meat consumption with cancer risk by subsite within the large bowel. Participants were 61,433 women from the Swedish Mammography Cohort (aged 40 to 75 years). Colon and rectal cancer cases were identified by linkages to the National Swedish Cancer Registry (from March 1987 through December 21, 2002) and the Regional Cancer Registry in the study area (from January 1, 2003 through June 30,2003). Dietary intake during the past six months was assessed by a self-administered FFQ with 67 food items (including nine items about red and processed meats). Over a mean follow-up of 13.9 years, 234 proximal colon cancers, 155 distal colon cancers and 230 rectal cancers were identified. A significant positive association between red meat consumption and risk of distal colon cancer (P=0.001), but not of cancers of the proximal colon (P=0.95) or rectum (P=0.32) was observed. The multivariate rate ratio for women who consumed ≥94 g per day of red meat compared to those who consumed <50g per day was 2.22 (95% CI: 1.34, 3.68) for distal colon, 1.03 (95% CI: 0.67, 1.60) for proximal colon and 1.28 (95% CI: 0.83, 1.98) for rectal cancer. Multivariate RR of overall colorectal cancer according to red meat intake was 1.32 (95% CI: 1.03, 1.68; P=0.03) among extreme quartiles. No significant association between processed meat intake and colorectal cancer at any subsite was observed. Poultry consumption was weakly inversely related to risk of total colorectal cancer; multivariate RR of colorectal cancer for women who consumed on average one serving of poultry per week was 0.75 (95% CI: 0.55, 1.02; P=0.04) compared to women who rarely or never consumed poultry. The authors concluded that high consumption of red meat may substantially increase the risk of distal colon cancer, and future investigations on red meat and colorectal cancer risk should consider cancer subsites separately.

Lee et al, 2009 (positive quality) used prospective cohort data to describe the association between consumption of animal-origin foods and colorectal cancer among 73,224 women (40 to 70 years of age) participating in the Shanghai Women's Health Study (China). A validated, quantitative FFQ was administered by in-person interviews. Participants were asked how often, on average, during the past year they had consumed a specific food or food group and were also asked about the cooking methods used. Colorectal cancer cases were identified by in-person follow-up surveys, annual record linkage with the Shanghai Cancer Registry and death certificate registry. Cases were verified through home visits, medical charts and pathological evidence. Adjustments were made for age, education, income, season of recruitment, tea consumption, nonsteroidal anti-inflammatory drug use, total energy intake and fiber intake. After a mean follow-up of 7.4 years, 394 incident cases of colorectal (236 colon, 158 rectal) cancer were observed. Total meat intake was not associated with risk of colorectal cancer (P=0.30) nor was red meat (P=0.53), poultry intake (P=0.23) or eggs (P=0.57). Similarly, no significant (NS) associations were observed when colon and rectal cancer were considered separately. The authors concluded that they did not find an association between total consumption of animal origin food and colorectal cancer.

Norat et al, 2005 (positive quality) examined the relationship between intakes of red and processed meat, poultry and fish and colorectal cancer risk in the European Prospective Investigation into Cancer and Nutrition (EPIC) study (N=478,040; aged 35 to 70 years at baseline). Colorectal cancer cases were identified from population cancer registries, health insurance records, cancer and pathology registries, and active follow-up of study subjects and their next-of-kin. Diet over 12 months before enrollment was measured by country-specific validated questionnaires. Most centers used a self-administered dietary questionnaire of 88 to 266 food items. In Greece, all centers in Spain

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and Ragusa, Italy, the questionnaire was administered at a personal interview. In Sweden, a questionnaire method combined with a food record was used. Meats were grouped into red meat, processed meat and poultry. After a mean follow-up of 4.8 years, 1,329 incident colorectal cancers were documented. Colorectal cancer risk was positively associated with intake of red and processed meat [highest (>160 g per day) vs. lowest (<20g per day) intake, HR=1.35; 95% CI: 0.96, 1.88; P=0.03], but was not related to poultry intake. In separate analyses, intake of red meat was positively but not significantly associated with colorectal cancer (HR for highest vs. lowest intake = 1.17; 95% CI: 0.92, 1.49, P=0.08), whereas intake of processed meat was significantly associated with increased colorectal cancer risk (HR for highest vs. lowest intake = 1.42, 95% CI: 1.09, 1.86; P=0.02). The authors concluded that their results confirm that colorectal cancer risk is positively associated with high consumption of red and processed meat.

Oba et al, 2006 (positive quality) used data from a Japanese prospective cohort study to determine the relationship between a western diet, characterized by high fat intake and meat consumption, and the risk of developing colon cancer. Analyses included 30,221 subjects, 54% women, ages 35 to 101 years with a mean BMI of approximately 22.0kg/m^2. Dietary intake data was collected using a validated, 169-item, semi-quantitative FFQ. For this study "red meat" included beef and pork, and "processed meat" included ham, sausage, bacon and yakibuta (Chinese-style roasted pork). Mean red meat intake was 32.3±2.06g per day for men and 22.1±2.30g per day for women; mean processed meat intake was 9.21±2.28g per day for men and 7.42±2.31g per day for women. From January 1, 1993 to December 31, 2000, 111 men and 102 women were diagnosed with colon cancer. Total meat and red meat intake was unrelated to the risk of colon cancer in men and women. Processed meat intake was significantly, positively associated with the risk of colon cancer in men only (RR in the highest tertile vs. the lowest tertile = 1.98; 95% CI: 1.24, 3.16; P<0.01). The authors concluded that they provided evidence to suggest a possible linkage between a western diet and risk of colon cancer.

Sato et al, 2006 (positive quality) conducted a prospective cohort study to examine the association between total meat consumption and the risk of colorectal cancer in Japanese adults participating in the Miyagi Cohort Study. A self-administered 40-item FFQ, with five items assessing meat intake (beef, pork, ham or sausage, chicken and liver) was used to calculate the total weight of each type of meat consumed per day. Colon cancer cases were identified by the linkage of computerized records with the Miyagi Prefectural Cancer Registry. The final sample consisted of 41,835 adult subjects, age 40 to 64 years at baseline. There were 474 incident cases of colorectal cancer during 11 years of follow-up, to March 2001, and median intake of total meat in the cohort was 52.1 g per day. The age-adjusted and sex-adjusted relative risks (RR) for the highest vs. the lowest quartiles of meat consumption were non-significant for colorectal cancer (1.15; 95% CI: 0.89, 1.49; P=0.14), colon cancer (1.23; 95% CI: 0.87, 1.73; P=0.11), and rectal cancer (1.01; 95% CI: 0.68, 1.50; P=0.86). Multivariate analyses did not substantially change these estimates. Intake of chicken had a significant dose-response relationship to the risk of colon cancer only (multivariate RR = 1.58; 95% CI: 0.84, 2.95; P=0.03). Analyses of beef, pork, ham or sausage and liver as individual meat sources were not significant. The authors concluded that their data do not support the hypothesis that meat consumption is a risk factor for colorectal cancer.

Wei et al, 2004 (positive quality) examined established risk factors to determine whether they were differentially associated with colon and rectal cancer using data from the Nurses' Health Study (NHS) and the Health Professionals Follow-up Study (HPFS). Participants were 87,733 women from the NHS (aged 30 to 55 years) and 46,632 men from the HPFS (aged 40 to 75 years). Colon or rectal cancer was reported on questionnaires and verified by review of hospital records and pathology reports. Dietary intake was assessed using FFQs. Baseline values of "beef, pork or lamb as a main dish" and "processed meat" were included in analyses. The combined cohort had 1,139

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colon cancer cases and 339 rectal cancer cases over 2,302,712 person years. In the pooled analyses of the two cohorts, the multivariate RR of colon cancer was 1.43 (95% CI: 1.00, 2.05; P=0.25) for those who consumed five or more servings per day of beef, pork or lamb as a main dish compared to those who consumed none; the combined cohort multivariate RR of rectal cancer was 0.90 (95% CI: 0.47, 1.75; P=0.55). A significant association between processed meat and colon cancer was observed in the combined cohorts (multivariate RR=1.33; 95% CI: 1.04, 1.70; P=0.008) between those who consumed five or more servings per day of processed meats, compared to those who consumed none. The multivariate RR of colon cancer was 1.32 (95% CI: 0.95, 1.83; P=0.02) for women in the NHS who consumed five or more servings per day of processed meats compared to those who consumed none. However, no significant (NS) association was observed in the HPFS. For processed meat, the pooled multivariate RR of rectal cancer was 0.90 (95% CI: 0.52, 1.57; P=0.93). The authors concluded that beef, pork or lamb as a main dish and processed meat were related to colon cancer, but not rectal cancer. In addition, they stated that future investigations into risk for colorectal cancer should ideally be done differentially by subsite.

Wu et al, 2006 (positive quality) conducted a cohort study to prospectively examine the associations between heterocyclic amine and meat-derived mutagenicity and risk of developing colon cancer in a group of men participating in Health Professionals Follow-up Study (N=14,032). Distal colon adenoma diagnosis was self-reported by participants on the biennial follow-up questionnaire, and medical records were reviewed and cases were confirmed by pathology reports. Food frequency questionnaires were used to assess meat intake and cooking methods and the Charred Database was used to determine the amount of heterocyclic amines and meat-derived mutagenicity in meats. Cumulative average intake from 1986, 1990, 1994 and 1998 assessments were used to estimate long-term dietary intake. Total red meat; hamburger; beef, lamb or pork as main dish; processed meat; and chicken or turkey were included in analyses. Between 1996 and 2002, 581 distal colon adenoma cases were identified. Total red meat; hamburger; beef, lamb or pork as main dish; and chicken or turkey were not associated with distal colon adenoma before or after adjusting for MDM or MeIQx (meat mutagens). There was a positive association between higher intake of processed meat and risk of adenoma (multivariate OR of extreme quintiles = 1.52; 95% CI: 1.12, 2.08; P=0.02). This association was 1.46 (95% CI: 1.06, 1.99; P=0.04) and 1.47 (95% CI: 1.06, 2.04; P=0.05) after adjusting for MDM and MeIQx, respectively. The authors concluded that higher consumption of mutagens from meats cooked at higher temperature and longer duration may be associated with higher risk of distal colon adenoma independent of overall meat intake.

View table in new window

Author, Year, Study Design, Class, Rating	Study Name/Location	Total Meat Association (Pos, Neg, None)	Red Meat Association (Pos, Neg, None)	Processed Meat Association (Pos, Neg, None)	Poultry Association (Pos, Neg, None)
Chao et al 2005 Study Design: prospective cohort Class: B	Cancer Prevention Study II Nutrition Cohort. Location: US.	Not examined.	(+) Rectal. (+) Distal (Ratio of red meat to poultry or fish).	(+) Distal.	Poultry and fish: (-) Proximal and distal.

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Rating:					
Cross et al 2007 Study Design: Prospective Cohort Study Class: B Rating:	NIH-AARP Diet and Health Study. Location: US.	Not examined.	(+) CRC.	(+) CRC.	Not examined.
English et al 2004 Study Design: Prospective Cohort Study Class: B Rating:	Melbourne Collaborative Cohort Study. Location: Australia.	Not examined.	(+) Rectal. (+) Colon.	(+) Rectal. (+) Colon.	Chicken: (-) CRC.
Flood et al 2003 Study Design: Prospective Cohort Study Class: B Rating:	Breast Cancer Detection Demonstration Project (BCDDP). Location: US.	Ø CRC.	Ø CRC.	Ø CRC.	White meat: Ø CRC.
Jarvinen et al 2001 Study Design: Prospective cohort design Class: B Rating:	Finnish Mobile Clinic Health Examination Survey. Location: Finland.	Ø CRC.	Ø CRC.	Not examined.	Poultry (intake = yes or no): (+) CRC. Egg: Ø CRC.

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Kojima M, Wakai K et al, 2004 Study Design: Prospective cohort study Class: B Rating:	Japan Collaborative Cohort Study. Location: Japan.	Not examined.	Beef or pork: Ø Colon or rectal cancer mortality.	Ham and sausage: Ø Colon or rectal cancer mortality.	Chicken: (+) Colon cancer mortality. Egg: (+) Colon cancer mortality (men only).
Larsson et al 2005 Study Design: Prospective cohort study Class: B Rating:	Swedish Mammography Cohort. Location: Sweden.	Not examined.	(+) CRC and distal. Ø Proximal and rectal	Ø CRC or any subsite.	Poultry: (-) CRC.
Lee SA, Shu XO et al, 2009 Study Design: Prospective Cohort Study Class: B Rating:	Shanghai Women's Health Study. Location: China.	Ø CRC, colon or rectal.	Ø CRC, colon or rectal.	Not examined.	Poultry: Ø CRC, colon or rectal. Eggs: Ø CRC, colon or rectal.
Norat et al 2005 Study Design: prospective cohort study Class: B Rating:	European Prospective Investigation into Cancer and Nutrition (EPIC). Location: Europe.	Red and processed meat: (+) CRC.	Ø CRC.	(+) CRC.	Poultry: Ø CRC.

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Oba S, Shimizu N et al, 2006 Study Design: Prospective cohort study Class: B Rating:	Location: Japan.	Ø CRC.	Ø CRC.	Not examined.	(+) Colon in men only.
Sato Y, Nakaya N et al, 2006 Study Design: Prospective cohort Class: B Rating:	Miyagi Cohort Study. Location: Japan.	Ø CRC, colon or rectal.	Beef: Ø CRC. Pork: Ø CRC.	Ham: Ø CRC. Sausage: Ø CRC.	Chicken: (+) Colon only.
Wei et al 2004 Study Design: prospective cohorts (pooled) Class: B Rating:	Nurses' Health and Health Professionals Follow Up Studies. Location: US.	Not examined.	Beef, pork or lamb as main dish: (+) Colon, Ø Rectal.	(+) Colon (pooled analyses and women only), Ø Rectal.	Not examined.
Wu K, Giovannucci E et al, 2006 Study Design: Prospective Cohort Study Class: B	Health Professionals Follow-up Study. Location: US.	Ø Distal.	Hamburger: Ø Distal. Beef, pork or lamb main dish: Ø Distal.	(+) Distal.	Chicken or turkey: Ø Distal.

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Rating:					

Research Design and Implementation Rating Summary
For a summary of the Research Design and Implementation Rating results, click here.

Worksheets

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