



Original Investigation | Oncology

Role of Diet in Colorectal Cancer Incidence

Umbrella Review of Meta-analyses of Prospective Observational Studies

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Abstract

IMPORTANCE Several meta-analyses have summarized evidence for the association between dietary factors and the incidence of colorectal cancer (CRC). However, to date, there has been little synthesis of the strength, precision, and quality of this evidence in aggregate.

OBJECTIVE To grade the evidence from published meta-analyses of prospective observational studies that assessed the association of dietary patterns, specific foods, food groups, beverages (including alcohol), macronutrients, and micronutrients with the incidence of CRC.

DATA SOURCES MEDLINE, Embase, and the Cochrane Library were searched from database inception to September 2019.

EVIDENCE REVIEW Only meta-analyses of prospective observational studies with a cohort study design were eligible. Evidence of association was graded according to established criteria as follows: convincing, highly suggestive, suggestive, weak, or not significant.

RESULTS From 9954 publications, 222 full-text articles (2.2%) were evaluated for eligibility, and 45 meta-analyses (20.3%) that described 109 associations between dietary factors and CRC incidence were selected. Overall, 35 of the 109 associations (32.1%) were nominally statistically significant using random-effects meta-analysis models; 17 associations (15.6%) demonstrated large heterogeneity between studies ($I^2 > 50\%$), whereas small-study effects were found for 11 associations (10.1%). Excess significance bias was not detected for any association between diet and CRC. The primary analysis identified 5 (4.6%) convincing, 2 (1.8%) highly suggestive, 10 (9.2%) suggestive, and 18 (16.5%) weak associations between diet and CRC, while there was no evidence for 74 (67.9%) associations. There was convincing evidence of an association of intake of red meat (high vs low) and alcohol (≥ 4 drinks/d vs 0 or occasional drinks) with the incidence of CRC and an inverse association of higher vs lower intakes of dietary fiber, calcium, and yogurt with CRC risk. The evidence for convincing associations remained robust following sensitivity analyses.

CONCLUSIONS AND RELEVANCE This umbrella review found convincing evidence of an association between lower CRC risk and higher intakes of dietary fiber, dietary calcium, and yogurt and lower intakes of alcohol and red meat. More research is needed on specific foods for which evidence remains suggestive, including other dairy products, whole grains, processed meat, and specific dietary patterns.

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Key Points

Question How credible is the evidence behind the association of dietary factors with colorectal cancer (CRC) risk in published meta-analyses of prospective observational studies?

Findings This umbrella review of 45 meta-analyses describing 109 associations found convincing evidence for an association between lower CRC risk and higher intakes of dietary fiber, dietary calcium, and yogurt and lower intakes of alcohol and red meat.

Meaning This study suggests that dietary factors may have a role in the development and prevention of CRC, but more research is needed on specific foods for which the evidence remains suggestive.

+ Supplemental content

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