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Inflammation and risk of chronic diseases
with a focus on colorectal cancer
and the impact of dietary patterns

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Abstract

Background: Inflammation is implicated in the development of chronic diseases such as cardiovascular disease and cancer. Whether dietary patterns contribute to these major public health diseases in part through chronic low-grade inflammation is a research question of increasing interest in recent years, in the hope of improving prevention. For this purpose, biomarkers can be used to explore potential mechanistic links between diet and chronic diseases.

Aim: The aim of this thesis was to investigate the role of chronic low-grade inflammation in chronic disease risk, with a focus on colorectal cancer, and in particular the impact of dietary patterns but also biomarkers.

Methods: The studies were based on prospectively collected data and biological samples from the population-based cohorts of the Northern Sweden Health and Disease Study. Paper I was a nested case-control study of the Dietary inflammatory index and risk of myocardial infarction, including 1389 cases and 5555 matched controls. A subset of 605 control participants with data on two circulating inflammatory biomarkers, C-reactive protein (CRP) and Interleukin-6 (IL-6), were used for validation of the index. Paper II was a large cohort study investigating the Dietary inflammatory index and the Mediterranean diet score in relation to cancer risk in 100 881 participants (of which 9 250 later developed cancer), as well as longitudinal changes in dietary patterns in 35 393 of the participants. Papers III and IV were nested case-control studies, including 1010 and 735 colorectal cancer cases, respectively. Paper III investigated baseline and longitudinal changes in plasma levels of CRP and future risk of clinical and molecular subtypes of colorectal cancer. In Paper IV, data-driven dietary patterns were investigated in relation to colorectal cancer risk and also to untargeted metabolite profiles measured in plasma.

Results: In Paper I, higher Dietary inflammatory index scores, indicative of a more “pro-inflammatory” diet, were associated with a higher risk of myocardial infarction in men but not in women. Higher levels of CRP and IL-6 were mostly associated with higher Dietary inflammatory index scores. In Paper II, the two dietary patterns Dietary inflammatory index and Mediterranean diet score showed similar weak associations with overall cancer risk, and particularly with lung and gastric cancer risks in men. Ten-year changes in dietary patterns were not associated with overall cancer risk. In Paper III, no associations were found between plasma concentrations of CRP and future colorectal cancer risk, regardless of clinical or molecular subtype, except for a possible increased risk of advanced colorectal cancer in participants with <5 years between sampling and diagnosis. Results in Paper IV suggested that a data-driven *breakfast food* pattern was associated with a lower risk of distal colon cancer, particularly in women. Associations to metabolite profiles in plasma were found for intakes of alcohol, fiber, wholegrain, and fruit and vegetables.

Conclusion: Results from these population-based studies support a modest contribution of dietary patterns to the development of cardiovascular disease and cancer. Although the findings were somewhat consistent with a weak inflammatory effect of diet in the link between diet and chronic diseases, it appears unlikely to be a major causal mechanism.

Keywords

Cancer, colorectal cancer, cardiovascular disease, nutritional epidemiology, dietary patterns, chronic low-grade inflammation, C-reactive protein, biomarkers, metabolomics

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