More Paleolithic-like lifestyles and diets associated with lower colorectal cancer risk

Colorectal cancer (CRC) is the second leading cause of cancer deaths among women and men combined in the United States. CRC incidence (i.e., the rate of new diagnoses) varies about 20-fold across countries. The incidence among immigrants from low-risk (generally less-developed) to high-risk (generally more developed and Westernized) countries becomes about the same as those in their adopted country within one to two generations. This strongly implicates lifestyle and diet in CRC causation. Despite these findings, the within-countries findings for associations of particular aspects of lifestyle and diet (e.g., vitamin E) with CRC have largely been too weak and/or inconsistent to explain the large international differences and immigration-related incidence changes. This suggests that the contributions of individual lifestyle and diet components to CRC risk may be small, but collectively may be large.

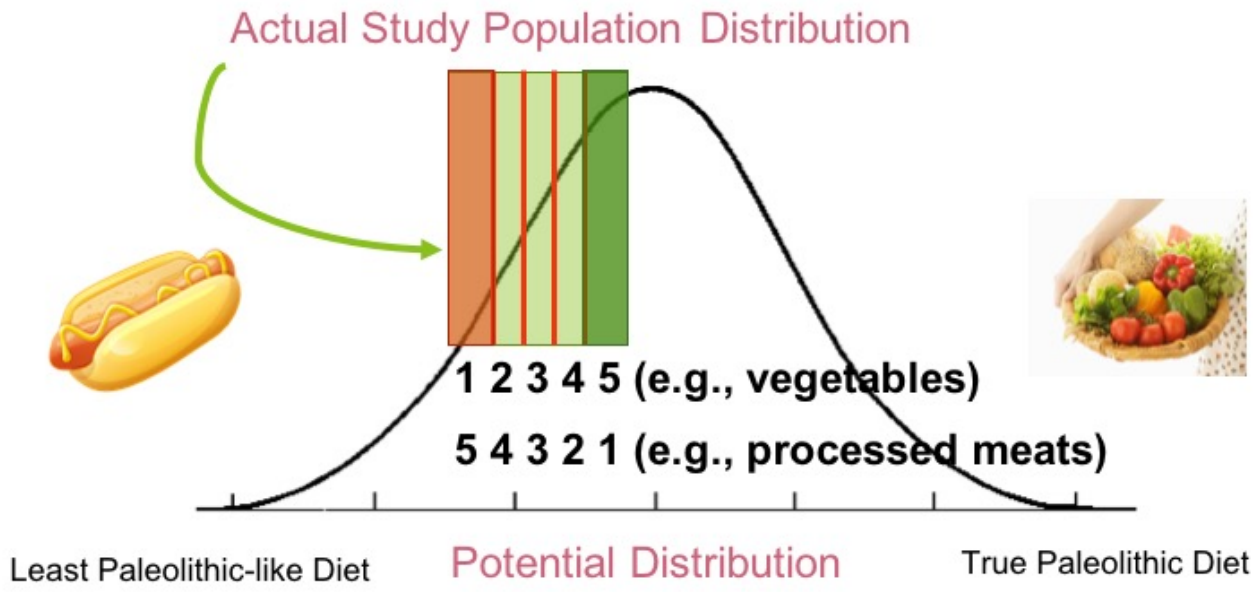

Fig. 1. Calculating an evolutionary-concordance diet score.

Furthermore, that incidence tends to be higher in countries with more Westernized lifestyles and diets suggest that CRC may be an evolutionary discordance disease. Our bodies were shaped across millions of years of evolution, with our species emerging about 200,000 years ago. With this emergence through to the advent of agriculture about 9,000 years ago, we became optimally adapted to certain lifestyles and diets. Since then, we have been exposed to lifestyles and diets that have been progressively different from those we were optimally adapted to.

To address the above observations and hypotheses, we developed evolutionary-concordance lifestyle and diet ("Paleolithic diet") pattern scores to assess the relative closeness of lifestyles and diets to those of our pre-historic ancestors. Among other characteristics, such as those noted below, the Paleolithic diet pattern is characterized as being about 65% plant foods and 35% low-fat meats. In a population of 35,221 women (described in next paragraph) who completed lifestyle and diet questionnaires, we ranked each person according to their closeness to more evolutionary-concordant exposures, defined as not smoking, higher physical activity, and being lean; higher vegetables, fruit, lean meat, fish, nuts, and calcium (adjusted for dairy food intakes) intakes; a high variety of vegetable and fruit intakes; and lower fatty and processed meats, grains and starches, dairy foods, alcohol, baked goods, and sugar-sweetened beverages intakes. Then, for each study participant, we assigned points for each of the dietary and lifestyle exposures (Fig. 1), and then summed them to constitute their evolutionary-concordance lifestyle and dietary scores, such that higher scores represented greater concordance.

To assess associations of these evolutionary-concordance lifestyle and diet scores with incident CRC, we analyzed data from the Iowa Women's Health Study, a study of 55 – 69-year-old Iowa women who were cancer-free in 1986, and followed through 2012. During follow up, 1,731 participants developed CRC. We calculated lifestyle and diet scores for each participant and grouped participants into five equal-sized categories (quintiles), ranked from low to high. We then calculated associations of the scores with CRC using a statistical method, multivariable Cox proportional hazards regression, which accounts for how long each participant was alive and CRC-free in the study, and adjusts for other CRC risk factors (e.g., age).

We found a statistically significant pattern of decreasing CRC risk with an increasing lifestyle score, and women in the highest lifestyle score quintile had statistically significant 34% lower risk of developing CRC. By themselves, neither the evolutionary concordance diet score nor a Mediterranean diet score we also calculated were associated with CRC risk; however, women who had both high evolutionary-concordance lifestyle and dietary scores had the lowest risk, a statistically significant finding.

Our findings support that a more evolutionary-concordant lifestyle, alone and jointly with a more evolutionary-concordant diet pattern, may be associated with lower CRC risk.

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Publication

Evolutionary-Concordance Lifestyle and Diet and Mediterranean Diet Pattern Scores and Risk of Incident Colorectal Cancer in Iowa Women.
Cheng E, Um CY, Prizment AE, Lazovich D, Bostick RM

Cancer Epidemiol Biomarkers Prev. 2018 Oct