Nutrient-Gene Interaction in Colon Cancer, from the Membrane to Cellular Physiology.

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Abstract

The International Agency for Research on Cancer recently released an assessment classifying red and processed meat as "carcinogenic to humans" on the basis of the positive association between increased consumption and risk for colorectal cancer. Diet, however, can also decrease the risk for colorectal cancer and be used as a chemopreventive strategy. Bioactive dietary molecules, such as n-3 polyunsaturated fatty acids, curcumin, and fermentable fiber, have been proposed to exert chemoprotective effects, and their molecular mechanisms have been the focus of research in the dietary/chemoprevention field. Using these bioactives as examples, this review surveys the proposed mechanisms by which they exert their effects, from the nucleus to the cellular membrane. In addition, we discuss emerging technologies involving the culturing of colonic organoids to study the physiological effects of dietary bioactives. Finally, we address future challenges to the field regarding the identification of additional molecular mechanisms and other bioactive dietary molecules that can be utilized in our fight to reduce the incidence of colorectal cancer.