



Contents lists available at ScienceDirect

## Critical Reviews in Oncology / Hematology

journal homepage: [www.elsevier.com/locate/critrevonc](http://www.elsevier.com/locate/critrevonc)

## Do alcoholic beverages, obesity and other nutritional factors modify the risk of familial colorectal cancer? A systematic review

Anthony Fardet<sup>a</sup>, Nathalie Druésne-Pecollo<sup>b,c</sup>, Mathilde Touvier<sup>b,c</sup>, Paule Latino-Martel<sup>b,c,\*</sup>

<sup>a</sup> INRA, UMR 1019, UNH, CRNH Auvergne, F-63000 Clermont-Ferrand & Clermont University, University of Auvergne, Human Nutrition Unit, BP 10448, F-63000 Clermont-Ferrand, France

<sup>b</sup> Sorbonne Paris Cité Epidemiology and Statistics Research Centre (CRESS), Inserm U1153, Inra U1125, Cnam, Nutritional Epidemiology Research Team (EREN), Bobigny, France

<sup>c</sup> French Network on Nutrition and Cancer Research (NACRe Network), France

## ARTICLE INFO

## Keywords:

Colorectal cancer  
Family history  
Lynch syndrome  
Foods  
Diet  
Alcoholic beverages  
Red meat  
Processed meat  
Physical activity  
Dietary patterns  
Prevention

## ABSTRACT

**Purpose:** Individuals with family history of colorectal cancer are at higher risk of colorectal cancer than the general population. Until now, guidelines for familial colorectal cancer risk have only pointed at early diagnosis efforts via screening tests and surveillance, and payed scarce or no attention to lowering exposure to modifiable risk factors, notably nutritional factors.

**Methods:** We conducted a systematic review of epidemiological studies investigating the associations between nutritional factors, family history of colorectal cancer, and colorectal cancer risk. From the 5312 abstracts identified until December 2016, 184 full text articles were examined for eligibility. Finally, 31 articles (21 from case-control studies, 9 from cohort studies and 1 from an intervention study) met inclusion criteria and were analyzed.

**Results:** Mainly, the combinations of family history of colorectal cancer and higher consumptions of alcoholic beverages, red or processed meat, or overweight/obesity increase the risk of colorectal cancer. Consistently, a strong increase is observed with the combinations of family history of colorectal cancer and unhealthy dietary patterns/lifestyles. Statistically significant interactions between these nutritional factors, family history of colorectal cancer and colorectal cancer risk are reported. Other data are inconclusive and additional prospective studies are needed.

**Conclusions:** For the first time, our findings highlight that addressing high consumption of alcoholic beverages, red or processed meat, and overweight/obesity, and more largely the exposure to multiple unhealthy dietary/nutritional behaviors could offer new perspectives of prevention to individuals with family history of colorectal cancer. A better information of these patients and of health professionals on these nutritional modifiable risk factors is recommended.

### 1. Introduction

It is well recognized that subjects with family history (FH) of colorectal cancer (CRC) are at higher risk of CRC (Slattery and Kerber, 1994; Kerber et al., 1998). The overall risk is increased two-fold in subjects with a first-degree relative with CRC, the risk increasing with the number of relatives affected (Potter et al., 1993). Both inherited genetic alterations and acquired lifestyle factors are thought to be involved in such an increased risk but the interaction between them has been quite poorly studied (Keku et al., 2003).

Genetic factors associated with FH of CRC are mainly those

encountered in familial adenomatous polyposis (FAP) and Lynch Syndrome (LS), also known as hereditary nonpolyposis colon cancer (HNPCC). It is estimated that 1–3% of all CRC are due to LS (Aaltonen et al., 1998). The high cancer risk in LS is caused by pathogenic germline mutations in genes involved in or influencing DNA mismatch repair (MMR), i.e., hMLH1, hMSH2, hMSH6, PMS2, or EPCAM (Abdel-Rahman et al., 2006; Ligtenberg et al., 2009). FAP is caused by APC (Adenomatous Polyposis Coli) gene defects on chromosome 5q21, i.e., a flaw in the body's tumor suppressor genes that prevent development of tumors (Cruz-Correa and Giardiello, 2003). FAP accounts for approximately 1% of cases of CRC (Cruz-Correa and Giardiello, 2003).

**Abbreviations:** CC, Colon Cancer; CRC, Colorectal Cancer; FH, Family History; HNPCC, Hereditary Non-Polyposis Colorectal Cancer; LS, Lynch Syndrome

\* Corresponding author at: Sorbonne Paris Cité Epidemiology and Statistics Research Centre (CRESS), Inserm U1153, Inra U1125, Cnam, Nutritional Epidemiology Research Team (EREN), Bobigny, France.

E-mail address: [paule.latino-martel@inra.fr](mailto:paule.latino-martel@inra.fr) (P. Latino-Martel).

<http://dx.doi.org/10.1016/j.critrevonc.2017.09.001>

Received 10 March 2017; Received in revised form 28 July 2017; Accepted 6 September 2017

1040-8428/ © 2017 The Authors. Published by Elsevier Ireland Ltd. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).