Colon Cancer: Dietary Risk Factors and the Relevance of Gut Microbiota

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Abstract: Colon cancer is the third most common cause of cancer-derived death worldwide and the most common carcinoma of the digestive tract. The worldwide incidence is increasing, mainly due to the rise of its modifiable risk factors (i.e. are smoking, alcohol abuse, high intake of red and processed meat, low intake of fruits and vegetables, and high body fat content and obesity).

In this mini review I will offer a brief introduction of the risk factors of colon cancer and the relevance of microbiota alterations (i.e. dysbiosis). For deeper insights into this promising preventive, diagnostic and therapeutical option, I will refer to more exhaustive recently-published review articles.

Colon Cancer and its Risk Factors

Colon cancer, also known as colorectal cancer (CRC), is the third most common cause of cancer-derived death worldwide and the most common carcinoma of the digestive tract. The most frequent form of CRC is colon adenocarcinoma, but in here we offer a very general overview of CRC [1,2].

CRC occurrence is influenced by non-modifiable factors and modifiable factors, which contribute in a positive of negative way. The most prominent non-modifiable risk factors for the development of CRC are age, male gender, type 2 diabetes, inflammatory bowel disease and hereditary factors, while modifiable (non-heritable) risk factors are smoking, alcohol abuse, high intake of red and processed meat, low intake of fruits and vegetables, and high body fat content and obesity [3,4]. With respect to factors that protect the organism against CRC tumorigenesis, it is important to highlight that they are mainly modifiable factors, including physical activity and regular consumption of dietary fiber, whole grains, nuts, fish, vitamins (D and C, among others), dairy products and enough quantities of calcium [5-8]. Some therapies, such as aspirin or non-steroidal anti-inflammatory drugs (i.e. ibuprofen), statins (cholesterol-lowering drugs) and menopausal hormone therapy, are also considered to be protective against CRC [9-11].

CRC is clearly related to Western diet and its incidence can be considered a marker of socioeconomic development [12]. Even though temporal patterns of incidence and mortality are very variable among countries [2], the global burden of CRC is expected to increase in the next years [13]. Indeed, the World Health Organization estimates that around 1.1 million patients will die from CRC in 2030 [14,15].

The Gut Microbiota and Colon Cancer

The term dysbiosis is commonly referred to alterations in the composition of the microorganisms living in the intestine (i.e. gut microbiota). Dysbiosis is linked to CRC risk factors, such as obesity [16], and to the CRC oncogenic process itself [17], and can be reversed [18]. Changes of microbiota are present even in precancerous CRC lesions [19]. In this sense, specific dietary interventions, including pre- and probiotics, have been suggested since diet-induced modifications of the gut microbiota could prevent or improve the prognosis of CRC [20,21].

Conclusion and Further Directions

In summary, although the role of diet in CRC development was already known, the microbiota provides a targetable and measurable way of understanding the impact of dietary interventions in the prevention and management of CRC [22].

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