

CONTROVERSY REGARDING THE CORRELATION BETWEEN RED AND PROCESSED MEAT CONSUMPTION AND COLORECTAL CANCER RISK FROM AN ASIAN PERSPECTIVE

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I. INTRODUCTION

In October 2015, the International Agency for Research on Cancer (IARC) working groups classified the consumption of red meat as 'probably carcinogenic' (Group 2A) and processed meat as 'carcinogenic' (Group 1). It was reported that the consumption of 100 g of red meat or 50 g of processed meat is associated with an increased the risk of colorectal cancer (CRC) by 17% and 18%, respectively. The incidence of CRC may be related to causative factors other than meat consumption, such as ethnicity, dietary habits, alcohol consumption, smoking, stress, exercise, medical check-up frequency, and environmental pollution exposure. Therefore, the purpose of this study was to analyse the currently available information on the risk of CRC from red and processed meat consumption in Asian countries, particularly in Korea.

II. MATERIALS AND METHODS

Approximately 800 relevant epidemiological research studies and 73 cohort studies on the safety of red and processed meat consumption, particularly regarding CRC and disease incidence, published between December 1990 and January 2016, were analysed. Our study included electronic searches of the following databases: PubMed, Medline, Scopus, Wiley Online Library, Springer Link, AGRIS, CAB, and Google Scholar. The following search terminologies were applied: processed meat, red meat, beef, pork, chicken, ham, bacon, sausage, harmful substances, carcinogenic, colon cancer, colorectal cancer, prospective study, retrospective study, case-control study, cohort study, systematic review, and meta-analysis (in various combinations).

III. RESULTS AND DISCUSSION

Among 73 cohort studies, approximately 76% were conducted in Western countries (35% in the USA and 40.7% in the EU), whereas only 15% were conducted in Asia. Furthermore, most of the studies conducted in Asia showed that processed meat consumption is not related to the onset of cancer or other diseases. Fifty-three articles (73%) reported that the intake of processed meat was related to CRC incidence and the onset of diseases, while 20 articles (27%) reported the parameters to be unrelated. A greater proportion of studies indicated that the intake of processed meat is related to the onset of diseases. However, as those studies were carried out in different countries with different sample sizes, it was difficult to conclude that a positive relationship exists between processed meat consumption and diseases.

The study by Chan *et al.* [1], which was conducted in collaboration with the World Cancer Research Fund (WCRF) and later became a fundamental part of the 2015 IARC report, failed to prove a positive correlation between the intake of red and processed meats and the incidence of CRC in Asians. In most Asian countries, excluding Japan, few epidemiological investigations have been conducted to prove the correlation between these two parameters. Moreover, a decrease in the relative risk (RR, 1.12) of red meat consumption for CRC incidence compared to that reported in 2015 IARC report (RR, 1.17) was cited in the systematic literature review by Norat *et al.* [2], which was conducted in collaboration with the WCRF [3]. The RR for Asians and North Americans was 1.03 (p-value=0.16) and 1.01, respectively, while for Europeans it was 1.23.

The incidence of CRC increases with age, most notably after the age of 50 years [4]. Other than a high intake of red and processed meat, those factors, either individually or in combination with factors such as ageing; obesity; lack of exercise; heavy alcohol consumption; low intake of calcium, whole-grain fibre, fruits, and vegetables; and long-term smoking, are associated with an increased risk of CRC [4]. The consumption of red and processed meat in Korea is far lower than in Western countries. However, Korea is one of the leading countries in the world with regard to stress index and salt intake rate. According to GLOBOSCAN [5], based on the trend until 2009, the incidence of CRC in Korea was known to be the highest in the world (45/100,000 population), even though the mortality rate in Korea due to CRC was lower than that in European and OECD countries, including Japan [6]. Regarding the CRC incidence, Shin *et al.* [7] recently reported that in a comparison of age-standardized incidence rates, when both sexes were combined, the incidence rates of CRC in Japan, the Netherlands, Australia, and New Zealand were higher than that in Korea. The high incidence of CRC in Korea could be due to the high rate of regular medical examinations (48.3%) and high-end medical technology, as well as the recent remarkable increase in average life expectancy (79.0 years for men and 85.5 years for women) [8]. The average life expectancy in Korea has considerably increased in the last 40 years from 62.1 years (1970) to 82.3 years (2016) [9].

IV. CONCLUSION

This extensive investigation revealed that the IARC report weighted more on the results of studies from Western countries and that the correlation between the intake of red and processed meat and CRC incidence in Asia, including Korea, is not clearly supported. We conclude that the reports that show any significant correlation between various factors that directly or indirectly affect the incidence of CRC are lacking. Compared to Western countries, the definition, types, preparation, and cooking methods of red and processed meat in Asia, including Korea, are considerably different, which could lead to different results in epidemiological investigations. In addition, further epidemiological investigations considering each country's specific food cultures and dietary habits are required to reliably elucidate the effects of the intake of red and processed meat on CRC incidence.

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