

*Editorial***Red Meat: A Potential Carcinogen to Human**

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Meat is one of the important sources of high quality protein, having appealing taste and flavor. The annual per capita meat consumption has steadily increased from 32.10 kg/year in 1961 to 62.57 kg/year in 2019. This trend is particularly noteworthy in developing countries.¹ Usually, the meat is classified into red meat and white meat. Although there is no universally accepted definition, the red meat is defined as mammalian muscle meat, including beef, goat, lamb, and pork, while white meat refers to non-mammalian sources such as poultry, seafood and fish.² Red meat contains more total iron and haem iron than white meat. Beef, lamb, goat and horse meat are richer in haem iron and total iron than pork meat. The age of the animal is also important in iron intake, as older animals contain more iron. Red meat contains high biological value proteins and essential micronutrients, including vitamins and minerals.³

Recent evidence suggesting that higher red meat consumption (RMC) is injurious to human health. Several epidemiological and pathological studies have reported a positive association between RMC and the incidence of cancer particularly breast, prostate, pancreatic and colorectal cancer.^{2,4,5} No positive association has been found between the consumption of white meat and cancer incidence.⁶ Meat processing, such as curing and smoking, can result in formation of carcinogenic chemicals, including N-nitroso-compounds (NOC) and polycyclic aromatic hydrocarbons (PAH). Cooking improves the digestibility and palatability of meat, but can

also produce known or suspected carcinogens, including heterocyclic aromatic amines (HAA) and PAH. High-temperature cooking by panfrying, grilling, or barbecuing generally produces the highest amounts of these chemicals.^{7,8}

Data on the association of red meat consumption with colorectal cancer were available from 14 cohort studies. Positive associations were seen with high versus low consumption of red meat in half of those studies.⁹ Haem iron mediates formation of N-nitroso-compounds (NOC), and of lipid oxidation products in the digestive tract of human beings and rodents. Meat heated at a high temperature contains heterocyclic aromatic amines (HAA). HAA is genotoxic. Meat smoked or cooked over a heated surface or open flame contains polycyclic aromatic hydrocarbons (PAH). These chemicals cause DNA damage, but little direct evidence exists that this occurs following meat consumption.⁹ Although there is some controversy over the direct association between red meat consumption and cancer risk, the International Agency for Research on Cancer (IARC) classified red meat as a Group 2A carcinogen (probably carcinogenic to humans) in 2015.¹⁰

References

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