



Carcinogenic Contaminants in Food Substances and their Impact

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Description

Cancer is a disease that causes abnormal cell growth and has the potential to invade and spread to other parts of the body. It has become a leading cause of death worldwide, killing nearly 10 million people by 2020. As the global prevalence of cancer rises, new disease management strategies are being sought. Cancer is a multifactorial disease, and various factors such as diet and lifestyle, radiation exposure, and hormonal factors can all play a role in its development. Lifestyle factors such as smoking, alcohol consumption, and dietary habits are thought to be significant contributors to cancer aetiology and are also primary prevention targets. A carcinogen is any of several agents that can cause cancer in humans. Chemical carcinogens (including those derived from biological sources), physical carcinogens, and oncogenic (cancer-causing) viruses are the three major categories. Most carcinogens cause cancer by interacting with the DNA in cells and interfering with normal cellular function, either single or in combination. This eventually leads to the formation of a tumor (an abnormal tissue growth) with the ability to spread (metastasize) from its site of origin and invade and cause dysfunction in other tissues, ultimately leading to organ failure and death. The two main ways that carcinogens cause these tumors to develop are through DNA changes that promote cell division and stop cells from being able to self-destruct in response to common triggers like DNA damage or cellular injury (a process known as apoptosis). Moreover, some carcinogens can cause cancer by suppressing the immune system and

causing inflammation in a particular tissue, which are both non-genotoxic ways of causing cancer.

Foods and beverages are essentially complex chemical mixtures that are consumed for sustenance or pleasure. The variety of chemicals found in food is enormous, as are their various properties. Chemicals with carcinogenic activity in rodent models have long been known to be present in many commonly consumed foods from a variety of sources, including plants, microorganisms, contaminations, additive uses, and reactions that occur during storage, processing, and cooking. Carcinogens can also be formed endogenously, from food materials. Pesticide residues that can cause tumors may contaminate foods through direct application on crops or other sources of environmental contamination. Chemicals found naturally in foods, such as hydrazines in mushrooms, may also be carcinogenic. Certain unavoidable contaminants in foods, such as aflatoxin B1 and polychlorinated biphenyls are carcinogenic. In addition to known carcinogens found in food as natural constituents, contaminants, or additives, there are a number of chemicals in food whose carcinogenic potential has not been adequately assessed but are suspected carcinogens due to their known mutagenic activity, i.e., they can cause heritable changes in the genetic material of cells. Chemical mutagenicity testing systems include tests in bacteria, fungi, mammalian cells in culture, and laboratory animals. Dietary protein appears to have a significant effect on carcinogenesis due to its caloric value. Excess dietary protein raises colonic ammonia levels, which may aid in the development of chemically induced colonic tumors. Fat-rich diets have been shown in numerous models to accelerate the process of carcinogenesis. The effect is determined by the type and quantity of fat consumed. Vegetable oils containing polyunsaturated fatty acids of the linoleic acid family are known to promote mammary tumorigenesis, but fish oils containing polyunsaturated fatty acids of the linolenic acid family inhibit tumorigenesis at higher doses.

Conclusion

Humans consume a wide range of carcinogens in their foods and beverages. Most importantly, several DNA-reactive carcinogens found in the diet, such as aflatoxins, aristolochic-acid, benzene, benzo[a]pyrene, ethylene-oxide, and preserved food components, are known to cause human cancer. Overall, avoiding cancer-causing agents in food and beverages is an important step towards lowering cancer risk.

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