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4-Methylimidazole risks on our life

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Naramel colors of foods have been grouped in four classes by the Joint FAO/WHO (Food and Agriculture Organization of the United Nations/World Health Organization) Expert Committee on Food Additives (JECFA) and the European Union Scientific Committee for Food, 4-Methylimidazole (4-MI) (a heterocyclic organic chemical compound) is subjected to unavoidable formation during cooking in some foods and beverages, including coffee, beers, soy sauces. Some of these soft drinks which use caramel coloring will contain 4-MEI. 4-MEI (4-methylimidazole) is light yellow, 4-MEI is used as a chemical intermediate in the manufacture of photographic chemicals, dyes and some pigments and some rubbers. 4-MEI is formed as a result of the interaction of ammonia with reducing sugars. It will be used as byproduct in some foods and beverages during some of the cooking process associated with heat and browning. For example cola drinks may contain more than 100 µg of this compound per 12-ounce serving. The toxicity of 4-MEI has been reported in many international agencies including the National toxicology program and many articles. In 2007, NTP reported clear evidence of carcinogenic activity of 4-MEI in animal studies, based on increased incidences of alveolar/ bronchiolar neoplasms. The National Toxicology Program (NTP) conducted a two year feeding cancer bioassay of 4-MEI in mice and rats. In F344/N rat ambiguous evidence of carcinogenic activity in female rats based on incidences of mononuclear cell leukemia and no evidence of carcinogenic activity in male rats were observed. In 2015, we reported that 4-MEI might not anti-genotoxic and protective effects in bone marrow cells of Swiss Abino mice, because 4-MEI could not reduce the chromosomal aberrations induced by EMS. In 2016, we reported that 4-MEI induced structural CAs at all concentrations for 12 hours and at highest concentration for 24 hours treatment periods and decreased the MI at highest concentration for 12 hours and at all concentrations for 24 hours in bone marrow cells of Swiss Albino mice. This result showed that 4-MEI has cytotoxic and genotoxic effect in bone marrow cells of Swiss Albino mice. At another research from same researchers 4-MEI has cytotoxic effect on 3T3-L1 cell line and has necrotic effect on rat liver cells. Therefore, it can be concluded that 4-MEI might pose a potential risk for humans. However, it must be investigated in other test systems for genotoxic and cytotoxic effects.

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