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Genotoxicity testing of low-calorie sweeteners: aspartame, acesulfame-K, and saccharin.

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Source

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Abstract

Low-calorie sweeteners are chemicals that offer the sweetness of sugar without the calories. Consumers are increasingly concerned about the quality and safety of many products present in the diet, in particular, the use of low-calorie sweeteners, flavorings, colorings, preservatives, and dietary supplements. In the present study, we evaluated the mutagenicity of the three low-calorie sweeteners in the Ames/Salmonella/microsome test and their genotoxic potential by comet assay in the bone marrow cells of mice. Swiss albino mice, Mus musculus, were orally administered with different concentrations of aspartame (ASP; 7, 14, 28, and 35 mg/kg body weight), acesulfame-K (ASK; 150, 300, and 600 mg/kg body weight), and saccharin (50, 100, and 200 mg/kg body weight) individually. Concurrently negative and positive control sets were maintained. The animals were sacrificed and the bone marrow cells were processed for comet assay. The standard plate-incorporation assay was carried with the three sweeteners in Salmonella typhimurium TA 97a and TA 100 strains both in the absence and presence of the S9 mix. The comet parameters of DNA were increased in the bone marrow cells due to the sweetener-induced DNA strand breaks, as revealed by increased comet-tail extent and percent DNA in the tail. ASK and saccharin were found to induce greater DNA damage than ASP. However, none could act as a potential mutagen in the Ames/Salmonella /microsome test. These findings are important, since they represent a potential health risk associated with the exposure to these agents.

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