606g Genotoxicity of the Unique Radiolytic Product 2-Dodecylcyclobutanone

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A unique radiolytic product, 2-dodecylcyclobutanone (2-DCB), is formed by the radiolysis of palmitic acid and is present at low parts-per million levels in irradiated meat products. A person eating a 125 g portion of irradiated ground beef would be expected to consume about 6 ug (about 0.00012 mg/kg/bw for a 50 kg person)of 2-DCB. Recently, groups opposed to food irradiation have claimed that 2-DCB is mutagenic, and therefore that irradiated foods are carcinogenic, a claim that is not supported by negative results obtained in long-term feeding studies in animals that used irradiated meat and poultry. In order to assess 2-DCB's potential mutagenicity it was tested in a battery of short-term genotoxicity tests. The compound was not able to induce mutations in the Mini-Screen version of the Salmonella Mutagenicity Test or E.coli TRP Test at concentrations up to 2 mg/ml(2g/kg), with and without exogenous metabolic activation. The radiolytic product was not able to generate mutations in the E.coli 5-fluorouracil forward mutation assay or increase the expression of DNA damage inducible genes at concentrations up to 1 mg/ml (1 g/kg). Intrachromosomal recombination in Saccharomyces cerevisiae was not inducible by 2-DCB at concentrations up to 5 mg/ml(5 g/kg). Finally, 2-DCB was tested for the ability to induce 6-thioguanine resistant mutations in human TK-6 lymphoblasts, with and without exogenous metabolic activation. No increase in mutation frequency was obtained. Claims of 2-DCB's alleged mutagenicity have not been verified using commonly used FDA recommended tests.