Epigallocatechin-3-gallate reduces DNA damage induced by benzo[a]pyrene diol epoxide and cigarette smoke condensate in human mucosa tissue cultures.

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Although epidemiological studies indicate cancer preventive effects of diets rich in fruit and vegetables, large clinical intervention studies conducted to evaluate dietary supplementation with micronutrients, mostly vitamins, showed disappointing results in large parts. In contrast, there is encouraging epidemiologic data indicating great chemopreventive potential of a large group of phytochemicals, namely polyphenols. This study shows the DNA protective effect epigallocatechin-3-gallate, a tea catechin, and one of the best-studied substances within this group, on carcinogen-induced DNA fragmentation in upper aerodigestive tract cells. Cell cultures from fresh oropharyngeal mucosa biopsies were preincubated with epigallocatechin-3-gallate in different concentrations before DNA damage was introduced with the metabolically activated carcinogen benzo[a]pyrene-7,8-dihydrodiol-9,10-epoxide or cigarette smoke condensate. Effects on resulting DNA fragmentation were measured using the alkaline single-cell microgel electrophoresis (comet assay). Epigallocatechin-3-gallate significantly reduced benzo[a]pyrene-7,8-dihydrodiol-9,10-epoxide-induced DNA damage by up to 51% (P<0.001). Fragmentation induced by cigarette smoke condensate could be lowered by 47% (P<0.001). Data suggest a cancer preventive potential of epigallocatechin-3-gallate as demonstrated on a subcellular level. An additional mechanism of tea catechin action is revealed by using a primary mucosa culture model.

PMID: 19491610 [PubMed - indexed for MEDLINE]