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Genotoxicity Assessment of Birch-Bark Tar—A Most Versatile Prehistoric Adhesive

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ABSTRACT

In the Mesolithic, birch-bark tar was commonly utilized across Europe and much of Asia as an adhesive to bind, seal and coat surfaces, but also quite frequently it was found to be chewed. The tar is known to contain biomarker triterpenoid compounds like betulin, crucial in preserving food and for medical applications. Aqueous, ethanolic and DMSO extracts were prepared from solid birch-bark tar and evaluated in vitro for the induction of DNA damage using Comet, micronucleus and sister-chromatid-exchange assays. Additionally, apoptosis induction was assessed. For the ethanolic extract, only the Comet assay showed a significant increase of DNA damage. All three extracts were able to significantly induce apoptosis. Thus, birch-bark tar seems capable of inducing genotoxic damage as well as apoptotic effects possibly originating from the triterpenoids ' antimicrobial properties. We examine why prehistoric tar is found with tooth marks, the beneficial effects of birch-bark tar, and evidence for increased genotoxic risk upon exposure.

KEYWORDS

Birch-Bark Tar; Genotoxicity; Micronuclei; Comet Assay; Apoptosis; Anthropology

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