

The possible DNA damage induced by environmental organic compounds: a case of Nonylphenol

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Short title: Nonylphenol and DNA damage

Type of Article: Systematic Review

Manuscript word counter: 3860

Abstract word counter: 271

Number of Figure/Table: 8

Conflict of Interest: No

Funding Source: No

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Abstract

Human impact on the environment leads to the release of many pollutants, artificially produced compounds, in which appear to be an endocrine disruptor (ED). Nonylphenol (NP) is a chemical compound with a *nonyl group* that attached to the *phenol* ring. NP-induced H₂AX is a sensitive genotoxic biomarker for detecting DNA-damaging potential. As well as, induces male infertility, and the potential impact (apoptosis and carcinogenesis). We attempt to comprehensively review all available literature about the side-effects of NP on DNA damage. We systematically searched several databases, including PubMed, Scopus, and gray literature such as Google scholar and using MeSH terms and various combinations of these keywords from Jan1970 to Nov2016 with no language limit. The initial search identified 62737 potentially eligible studies, of which 28 were included according to the established inclusion criteria. Twenty-eight selected studies, include animal model (n=17), cell line (n=5), human model (n=4), microorganisms (n=1), solid DNA (n=1), infertility (n=4), apoptosis (n=5) and carcinogenesis (n=3). This review highlighted the possible deleterious effects of NP on DNA damage through the abilities to produce ROS/RNS. Finally, it is substantial to take caution at this stage with the continued use of environmental pollutants such as NP, which may induce DNA damage and apoptosis.

Keywords: DNA damage, H₂AX, Oxidative Stress, Nonylphenol.

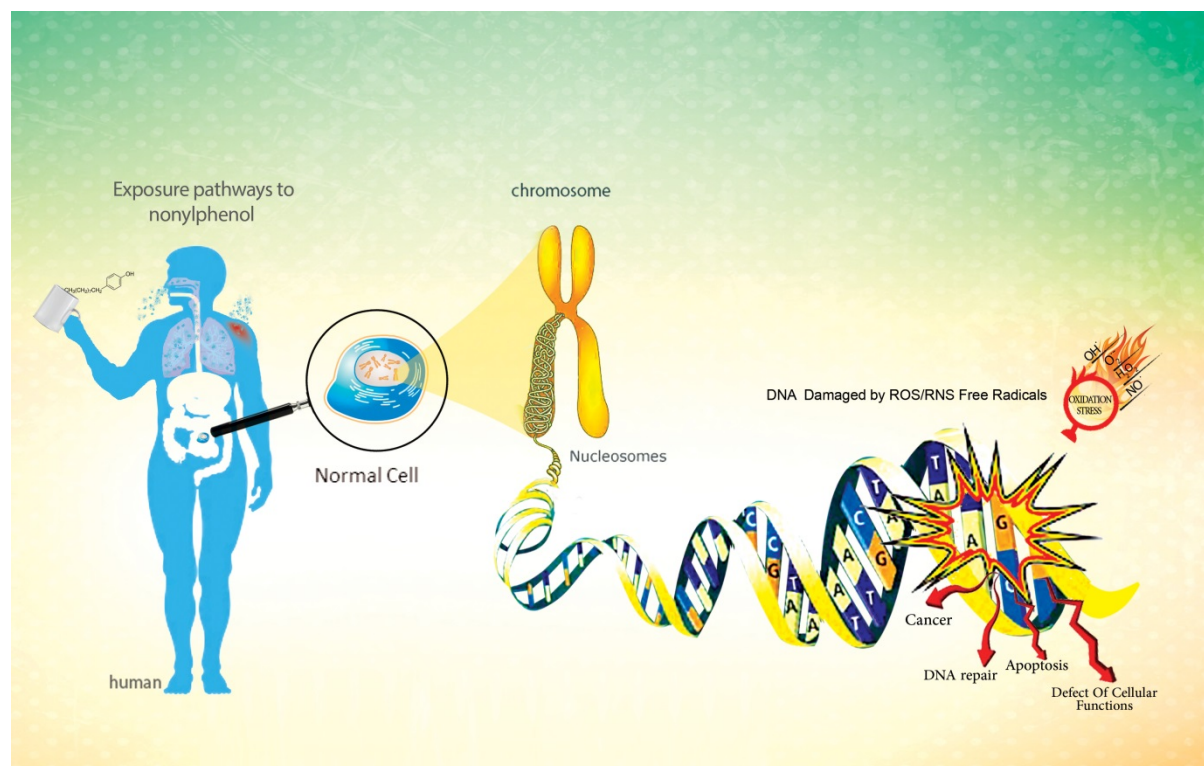


Fig. 2: Summary of variety routes of entrance nonylphenol to human body (such as ingestion, inhalation of polluted air and contact with skin). The major route of exposure to nonylphenol is oral consumption (contaminated food and drinking water). After entering the Nonylphenol to the body through various exposure routes, it may exert both toxic and estrogenic effects on mammalian cells. Nonylphenol may interrupt the endocrine system and alter hormonal functions, as well as nonylphenol induced oxidative stress. Oxidative stress causes long-term adverse effects on the DNA, which leads to deleterious effects in the DNA human and wildlife health. DNA damage-induced mutations that ultimately cause cancer, cell death by apoptosis, defect of cellular functions and etc.