

INTRODUCTION

Genotoxicity is a word in genetics defined as a destructive effect on a cell's genetic material (DNA, RNA) affecting its integrity. Genotoxins are mutagens; they can cause mutations. Genotoxins include both radiation and chemical genotoxins. A substance that has the property of genotoxicity is known as a genotoxin. There are three primary effects that genotoxins can have on organisms by affecting their genetic information

Genotoxins can be carcinogens, or cancer-causing agents, mutagens, or mutation-causing agents, or teratogens, birth defect-causing agents. In most cases, genotoxicity leads to mutations in various cells and other bodily systems. Mutations can lead to a host of other problems, from cancer to a wide variety of different diseases. Mutations can come in many different forms; genetic information can be duplicated, deleted, or inserted. While genotoxicity is often confused with mutagenicity, all mutagens are genotoxic; however, not all genotoxic substances are mutagenic.

The alteration can have direct or indirect effects on the DNA: the induction of mutations, mistimed event activation, and direct DNA damage leading to mutations. The permanent, heritable changes can affect either somatic cells of the organism or germ cells to be passed on to future generations. Cells prevent expression of the genotoxic mutation by either DNA repair or apoptosis; however, the damage may not always be fixed leading to mutagenesis. Genotoxicity refers to interaction with, or damage to, DNA and/or other cellular components which regulate the fidelity of the genome. It is a broad term that, as well as mutation includes damage to DNA such as the production of DNA adducts by the chemical itself or its metabolites. Cells have the capacity to protect themselves from such potentially lethal or mutagenic genotoxic effects by many repair processes and therefore many genotoxic events do not become evident as mutations. However, the capacity to damage the genome (genotoxicity) is an indicator of potential mutagenicity. Thus, some methods that measure genotoxicity may not provide direct evidence of heritable mutation. Genotoxicity and mutagenicity testing are an important part of the hazard assessment of chemicals for regulatory purposes. To assess genotoxicity and/or mutagenicity, different endpoints must be taken into considerations: beside point mutations induction, a compound can induce changes in chromosomal number (polyploidy or aneuploidy) or in chromosome structure (breaks, deletions, rearrangements). However, aneuploidy can arise as a result of both genotoxic and non-genotoxic events, since loss of chromosomes can be caused either by direct effects on the chromosome to produce an acentric fragment, or by interference with the site of attachment of the chromosome on the spindle. Due to the diversity of the endpoints, it is then clear that the potential genotoxicity and/or mutagenicity of a compound cannot be assessed by a single assay system. For this reason, the group of experts has attempted to suggest a strategy to better investigate the mutagenic and/or genotoxic potential of the cosmetic products taking into consideration the needs of the cosmetic industry.