

# DNA damage induced by acute exposures to the plasticizers DEHP, BBP, and DBP, in the model species *Chironomus riparius* (Diptera)

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Plasticizers are additives that increase the plasticity or viscosity of plastic materials, especially polyvinyl chloride (PVC), making them soft and flexible. Other uses outside the PVC industry include their presence in fragrances and personal care products, adhesives, paints, household cleaning products, printing inks, textiles, and many more. Among the many substances used for these purposes, phthalates are a widely-used group of chemicals with a very high production worldwide. Given that phthalates are not chemically bound to the polymeric matrix and due to their high production worldwide, they are considered as ubiquitous contaminants that can be found in almost any environmental compartment.

Three of the most common phthalates used in the manufacture of plastics are: bis(2-ethylhexyl) phthalate (DEHP), benzyl butyl phthalate (BBP), and di-n-butyl phthalate (DBP). They have been found in a diversity of environmental samples, detected in tissues of exposed animals and humans, and classified as toxic in numerous studies, especially regarding their activity as endocrine disrupting compounds (EDCs). Several international agencies have classified DEHP as carcinogenic, while there is some controversy regarding the carcinogenic potential of BBP, and no evidences of carcinogenicity have been described for DBP.

In the present study, we used the comet assay to assess the ability these three phthalates to induce DNA damage in insects. *Chironomus riparius* larvae were exposed for 24 hours to environmentally relevant concentrations (1 and 100 µg/L). Several parameters (mainly %DNA in tail) demonstrated that 100 µg/L DEHP, BBP, or DBP altered the DNA integrity (2.4-fold, 1.7-fold, and 1.8-fold, respectively), while 1 µg/L showed a genotoxic response only in the case of DEHP (1.8-fold).

These findings provide new insights into the genotoxic potential of DEHP, BBP, and DBP, particularly in invertebrates, and bring attention on potential human and environmental health risks arising from widespread and continuous exposure to these substances.

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