Lack of genotoxic potential of acetylated monoglyceride: An alternative plasticiser to phthalates - DTU Orbit (09/08/2019)

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Purpose: With a yearly polymer production of more than 400 million tons, phthalates based on non sustainable petrochemical materials are the most used group of plasticisers. Their low biodegradability and endocrine activity suspected to affect reproductive ability of animals and humans caused an interest in alternatives. Biodegradable plasticisers produced from sustainable materials, of low toxicity and no endocrine activity offer desirable alternatives to phthalates. The aim of the project was to screen an alternative plasticiser acetoxylylated monoglyceride for genotoxic potential.

Methods: The ability of acetylated monoglyceride to induce genotoxicity in vitro was investigated in silico by QSAR modelling. The first step was to assure that an obtained prediction falls within the applicability domain of the models – that there was sufficient similarity (in relevant descriptors) between the query substance and the substances in the training set of the model. The (Q)SAR's prediction was followed by in vitro testing using Salmonella/microsome assay (Ames test) with strains TA 98 and TA 100, with and without metabolic activation. Results: There were no warnings for genotoxic fragments (Ashby-Tenant rules) and predictions were negative for several assays: Ames test, chromosomal aberration in Chinese hamster lung cells, mouse lymphoma TK cell mutation and unscheduled DNA synthesis in rat hepatocytes. The in vitro Ames test showed that the plasticiser did not induce gene mutations in bacteria. Presently, an in vivo comet assay to investigate the ability of the plasticiser to induce DNA strand breaks after oral exposure in the liver and kidney of rats is under conduction.

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