Use of reliable bioassays to detect potential hazard of food contact materials extracts to ensure quality, safety and innovation of paperboards

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Food contact materials (FCM) represent a major economic issue and also a field of innovation. Food packaging production must meet manufacturing good practices, safety for human health and thus be in compliance with 1935/2004 European regulations. Its third article specifies that FCM do not transfer their constituents to food in quantities which could endanger human health under normal or foreseeable conditions of use. Indeed, these materials are not inert and, in addition to starting substances, non-intentionally added substances (NIAS) are able to migrate from FCM into food. NIAS can be contaminants from recycled materials, impurities, new substances occurred during the packaging production chain, synthetic residues etc., and they could represent great part of migrating substances (Grab et al., 2006 ; Skejervik et al., 2005). The European Regulation No 10/2011 on plastic materials, multilayers and articles intended to come into contact with food is the first Commission regulation that regulates NIAS, but there are no available guidelines to assess the risk of NIAS. Furthermore, NIAS may also be present in other materials, such as paper and boards. Because of the complex nature of FCM, it is pertinent to evaluate the potential toxicity of FCM as a whole and then to take into account any « cocktail effect ». The objectives of this study are to provide to packaging and food companies scientific relevant tools combining physicochemical and toxicological strategies based on biosays applied to FCM extracts, especially paper and boards. Three toxicological endpoints must be checked as relevant for low dose exposure : cytotoxicity, genotoxicity and aneuploidy disruption.

**Anonymous**

**Food contact materials**

**Food Contact Materials (FCM) used**

- *Sensitiv biosay to quantify cell viability.
- *Resazurin assay.
- *Ames test.
- *Microinvasive assay.
- *Cytotoxicity.
- *Microinvasive assay.
- *Discussion/Conclusion.

**Resazurin assay**

- *Sensitive biosay to detect and quantifying DNA primary damages.

**Ames test**

- *Reverse mutation assay performed to evaluate potential mutagenic properties of test substances.

**Microinvasive assay**

- *Sensitive biosay to detect aneugenic and clastogenic activity of treated substances.

**Cytotoxicity**

- None of the samples were significantly cytotoxic for HepG2 cells.

**Genotoxicity**

- Ames test: None of the tested samples were significantly mutagenic on both strains of Salmonella Typhimurium used.

**Discussion/Conclusion**

- *Positive effect detected with Comet assay and negative effect with microinvasive assay maybe due to DNA repairation.
- *Need to establish a dose effect using Comet assay and microinvasive assay.
- *Comet FPG could be performed to detect oxidized DNA bases.
- *Potential oxidizing effect of samples of the production chain could be checked with DCFDA assay.
- *Check, using a chemical analysis, which substances could be responsible of the hazardous effects.
- *Check the endocrine disruption effect as an other toxicological endpoint.