

Systematic mapping of chemicals known to migrate or be extracted from food contact materials and articles

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INTRODUCTION

Food comes into contact with many different materials and articles during transport, processing, storage, preparation and consumption. Over 12 000 chemicals are possibly used in the manufacture of food contact materials (FCMs) and food contact articles (FCAs). The transfer of chemicals from FCMs and FCAs into foodstuffs is common and results in combined exposure to multiple chemicals. However, there is no systematic overview of the food contact chemicals (FCCs) that have been shown to migrate or be extracted from FCMs and FCAs. Therefore, we compiled a systematic evidence map on migrating and extractable FCCs by screening and analysing the publicly available literature on this topic.

METHODOLOGY

We developed a systematic search strategy by creating a list of more than 100 relevant terms and customising it to the requirements of the respective literature databases. This list was used to search five scientific literature databases, two grey literature sources and 13 websites of governmental institutions and interest groups. We considered the literature published up to May 2021 and screened all references in a two-step process, which first focused on titles and abstracts, and then on full texts (Martin, O. et al. (2018) doi:10.5281/zenodo.2525277). Ten percent of the records were double screened for quality control, and disagreements were resolved before proceeding. Data extraction was performed by 11 trained researchers and supported by the software tools tagtog and SciExtract. We developed SciExtract during the project to simplify and standardise data extraction. Where available, CAS numbers were assigned during post-processing to group FCCs with different synonyms and spellings under one identifier.

RESULTS

The systematic literature search resulted in over 15,000 studies. After the screening process, more than 1200 studies were included and found to be accessible for data extraction. We summarised the extracted data from all the included studies in the FCCmigex database. This source provides details on over 3000 different FCCs that have migrated or been extracted from FCMs/FCAs, along with references to the original studies these data were obtained from. Each FCC that was exported from a study was assigned predefined information about the FCA, FCM(s), type of experiment and detection.

In the presentation, we will provide examples of research questions that can be answered using the FCCmigex database (e.g. the most frequently studied FCC, the number of different FCCs measured in a specific FCM). We will also introduce how the FCCmigex can be used by interested stakeholders.

DISCUSSION

This work helps to provide an overview of the variety of migrating and extractable FCCs and to better understand chemical exposures from FCMs/FCAs. The database also supports the identification of knowledge gaps and shifts the focus from a few well-known and widely tested FCCs to the entirety of FCCs. In addition, the FCCmigex facilitates the recognition of trends in chemicals use over time, which may also be of importance for exposure assessments and biomonitoring, enables further, more detailed systematic reviews, and provides a basis for the prioritisation of toxicological analyses. In the next step of the project, chemicals from the FCCmigex will be compared to human biomonitoring data to characterise evidence of human exposure to FCCs. This information will contribute to bridging the gap between research and policy during the revision of the European Food Contact Materials Regulation.