

RIMICIA project: diet's impact on human and animal gut microbiomes in risk assessment

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INTRODUCTION

Review Impact Microbiome In Assessment (RIMICIA) is an ongoing project (launched in May 2021) funded by EFSA within the call 'Thematic grants: Preparedness for future challenges in specific areas of EFSA's work. Lot 1'. Lot 1 aims at building capacity for evaluating the impact (i) on microbiomes by various modulators under EFSA's assessments, and (2) of microbiomes on human and animal health, to determine whether evidence-based knowledge on microbiomes can be included in risk assessments under EFSA's remit. The RIMICIA project will address this objective over a period of 30 months, with a final report expected for autumn 2023. The RIMICIA project is providing a unique opportunity for an international consortium of experts in a wide range of disciplines (i.e. bibliometrics and science analysis, microbiology, food science & technology, analytical chemistry, bioinformatics, genomics, transcriptomics, metabolomics, systems biology, food allergy, immunology, food safety, animal health and welfare, human and animal (poultry, cattle and pigs) gut microbiota and risk assessment) to collaborate and foster mutual understanding on their respective expertise and risk evaluations.

METHODOLOGY

The first objective of the RIMICIA project, which is the main subject of this communication, is to share scientific evidence-based knowledge, data and methods relevant for risk assessment to account for effects on/by gut microbiomes in humans and animals (poultry, cattle and pigs). To meet this objective, the RIMICIA consortium has started to explore MEDLINE/PubMed together with Scopus and Web of Science as the preferred sources for bibliographic information, as well as specialised databases for clinical trials and systematic reviews. Given the complexity of the topic and the vast amount of available scientific literature on gut microbiome, an ad hoc web interface has been designed and the potential complementarity of additional software tools has been considered to assist experts' knowledge and judgement. Finally, the usefulness of text-mining studies addressing the automatic detection of significant co-mentions in the literature to find unexpected

relationships among dietary modulators – gut microbes/metabolites – diseases has been preliminary explored.

RESULTS

A flexible and manageable strategy has been developed to carry out either targeted literature searches or broad literature searches to collect scientific evidence on gut microbiome. This has allowed for review of a wide range of potentially dietary gastrointestinal microbiome modulators which are under EFSA's remit, as well as their impact on human/poultry/cattle/pig health. As a starting point, the RIMICIA consortium has identified more than 5 000 records (without any restriction of time frame or type of peer-reviewed scientific articles) on modulation of both animal and human gut microbiomes and they have been automatically subdivided into different collections thematically consistent and of manageable size by clustering by their assigned MeSH terms (controlled vocabulary used in PubMed to manually annotate abstracts). The RIMICIA consortium is addressing the complexity and interdependence of diet-microbiome-host interactions and their role in gastro-intestinal tract-related disorders and diseases.

DISCUSSION

It is expected that the comprehensive assessment carried out by the RIMICIA consortium will direct the identification (or reinforcement) of keystone bacterial species or taxa (or functions) relevant for the host, as well as features of the microbial community, such as metabolic outputs including short-chain fatty acids or bile acid metabolites. In this context, the RIMICIA project will provide hints about the impact on human and domestic animal microbiomes by various modulators under EFSA's assessments. It will also inform on the role of gut microbiota and their unique metabolites in conferring host protection (or induction) against several and relevant pathologies, among other aspects. Ultimately, it will discuss the potential usefulness of the scientific evidence and methods in the context of risk assessment by identifying: i) data available that may have relevance for current risk assessment; and ii) missing information that would be required in risk assessment.