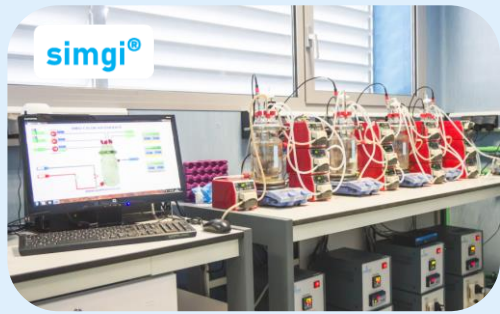


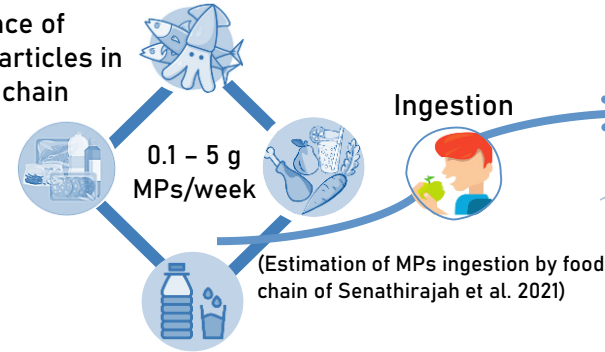
Simgi® as an advanced model for the study of the interaction between food-derived microplastics, the human gastrointestinal tract and gut microbiota



The dynamic gastrointestinal simulator (**simgi®**) pursues the need for a dynamic *in vitro* simulation of the human gastrointestinal tract adapted to food safety and health fields which can simulate gastric, intestinal digestion and colonic fermentation, under computer control of the physicochemical parameters.

simgi® : https://www.cial.uam-csic.es/simgi/index_eng.html

Prevalence of plastic particles in the food chain



Potential hazard effects in human health

Metabolic disorders

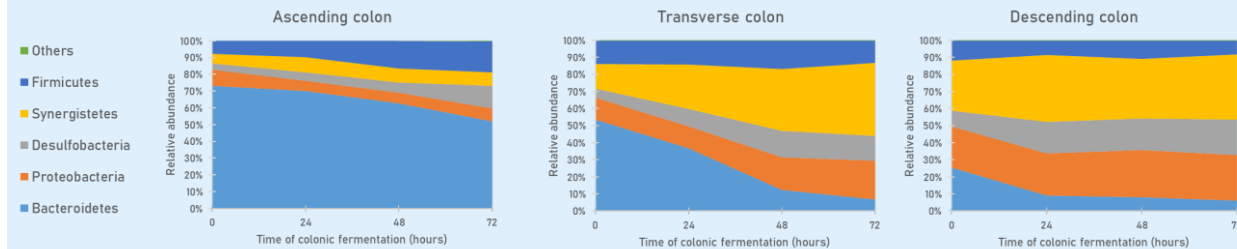
Toxicity

Altered immune response

Intestinal dysbiosis

This study evaluated for the first time the effect of microplastics on human colonic microbiota

Microbial diversity



Colonic bacterial populations showed a decrease in microbial diversity and health-related indexes

↓ α-diversity (Shannon index)

↓ Ratio Firmicutes/Bacteroidetes

↑ *Enterobacteriaceae*

↓ *Bacteroides* ↓ *Parabacteroides*

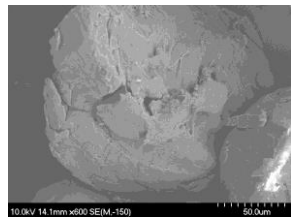
Key members of the microbiota at family and genus levels point to a possible intestinal dysbiosis after being fed with microplastics, as it has been reported for mice models

Intestinal dysbiosis?

Intestinal dysbiosis should be considered within microplastics health risks

Chronic exposition

Polyethylene terephthalate (PET) Acute ingestion: 0.166 mg

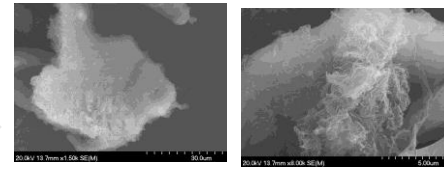


Microplastics: PET particles 160 ± 110 µm



In vitro static gastrointestinal digestion (INFOGEST method)

Formation of an organic corona in particles by the simulated digestive fluids.

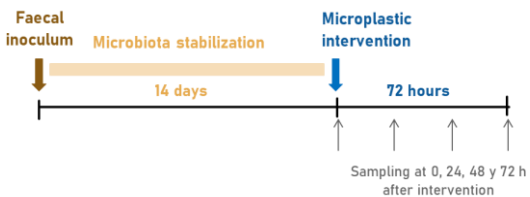


No remarkable changes for size or structure during gastrointestinal digestion

Microscopy scanning electron (SEM)

In vitro dynamic colonic fermentation **simgi®**

Microbial RNAr 16S gene analysis (Illumina®)



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simgi® platform appears a useful tool to study the effects of microplastics along the gastrointestinal tract and an effective support on research and food industry development by acting complementary and/or as a previous level to human studies given their ethical and economic restrictions