

How safe is the inclusion of recycled material for plastics used in food industry?

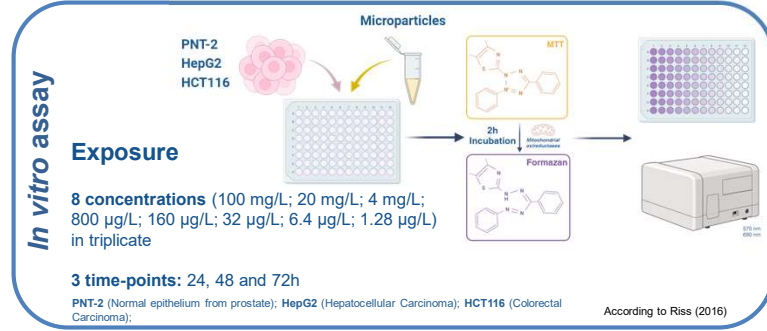
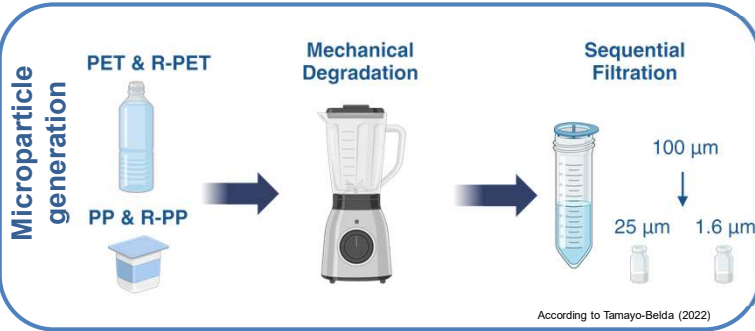
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INTRODUCTION & AIM

Plastic Pollution awareness in the public has increased exponentially in the last decade. European Union strategy towards a circular economy (EU Green Deal (2019)) has pushed the industry to innovate their products, while still conforming to food safety rules (e.g. EU rules on recycled plastics for food-contact materials (2022)). The number of products incorporating recycled material has been increasing, complying with EU regulations and increasing their perceived value. However, all the new products should follow rigorous testing to evaluate possible impacts in human health. This study aimed to assess the potential impact of products with and without incorporated recycled materials.

METHOD



RESULTS

PET & R-PET

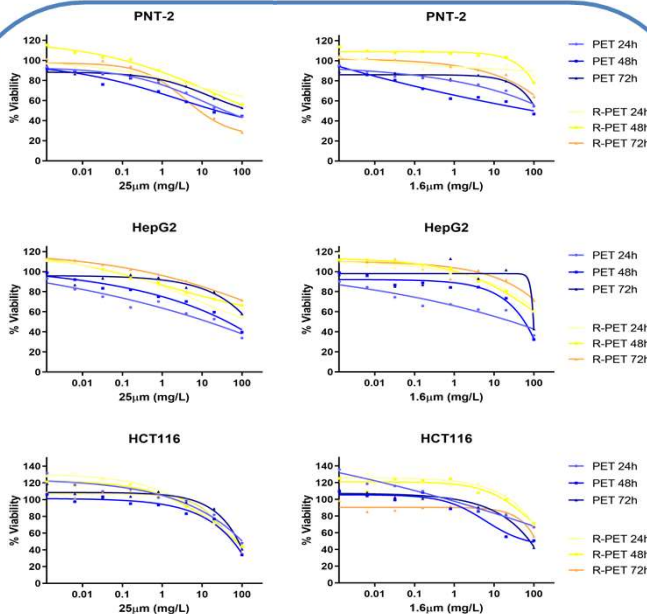


Table 1. Calculated LC₅₀ of PET and R-PET microparticles

Time (h)	25 µm			1.6 µm		
	PET (mg/L)	R-PET (mg/L)	LC ₅₀ (mg/L)	PET (mg/L)	R-PET (mg/L)	LC ₅₀ (mg/L)
PNT-2	36.658	22.894	176.702	-	220.336	8.429
HepG2	14.059	43.383	153.307	217.147	-	2312.148
HCT116	102.702	59.956	81.950	82.273	71.792	59.061

PP & R-PP

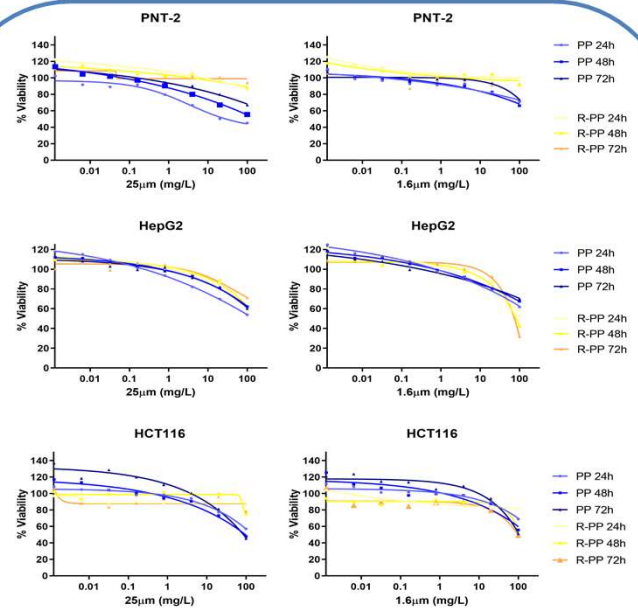


Table 2. Calculated LC₅₀ of PP and R-PP microparticles

Time (h)	25 µm			1.6 µm		
	PP (mg/L)	R-PP (mg/L)	LC ₅₀ (mg/L)	PP (mg/L)	R-PP (mg/L)	LC ₅₀ (mg/L)
PNT-2	28.870	167.783	794.961	8449.936	-	-
HepG2	147.833	234.475	198.161	216.938	191.428	1279.6
HCT116	219.673	96.390	86.230	-	-	-

CONCLUSIONS

REFERENCES

- The microparticles originating from the recycled material tend to be less toxic than the commercial version, both for PET and PP
- Microparticles of 25 µm are more toxic than smaller 1.6 µm
- Normal cell line, PNT-2 is more resistant to damage than HepG2 and HCT116
- The present data support the safety of the use products with recycled material. However, more studies with different polymers and sizes are needed.

EU Green Deal in - https://commission.europa.eu/strategy-and-policy/priorities-2019-2024/european-green-deal_en Regulating recycled plastics for food contact. Regulation (EU) No 2022/1616. in https://food.ec.europa.eu/safety/chemical-safety/food-contact-materials/plastic-cooking_en Tamayo-Belda, Miguel et al. The Science of the total environment vol. 883 (2023): 163447. doi:10.1016/j.scotenv.2023.163447. Riss, Terry L. et al. Assay Guidance Manual, edited by Sanna Marzocchini et al. (Ed.) Lilly & Company and the National Center for Advancing Translational Sciences. 1 May 2015.