

THE EUROPEAN RESEARCH CLUSTER TO UNDERSTAND THE HEALTH IMPACTS OF MICRO- AND NANOPLASTICS



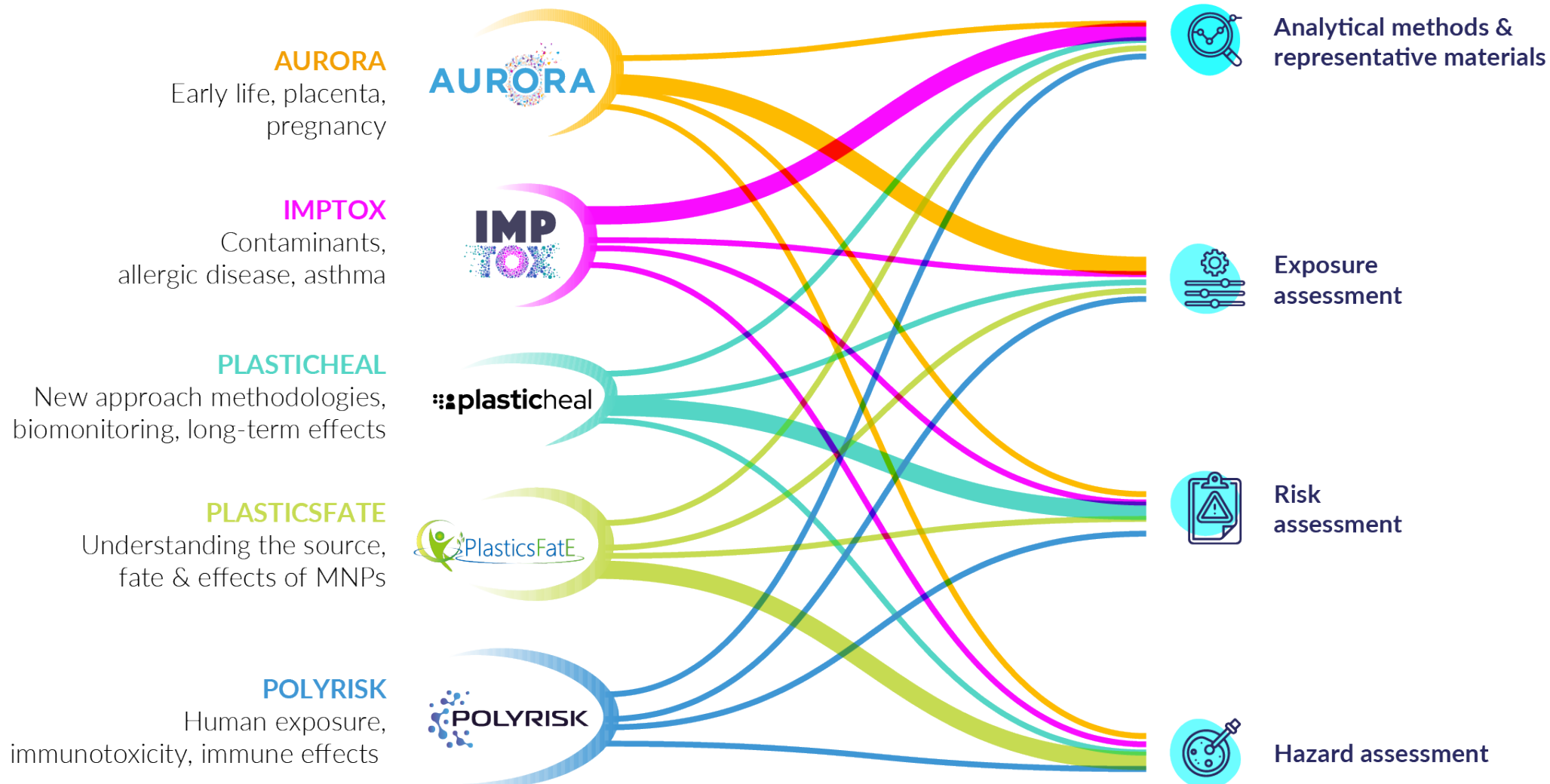
These projects have received funding from the European Union's Horizon 2020 research and innovation program.

CUSP projects

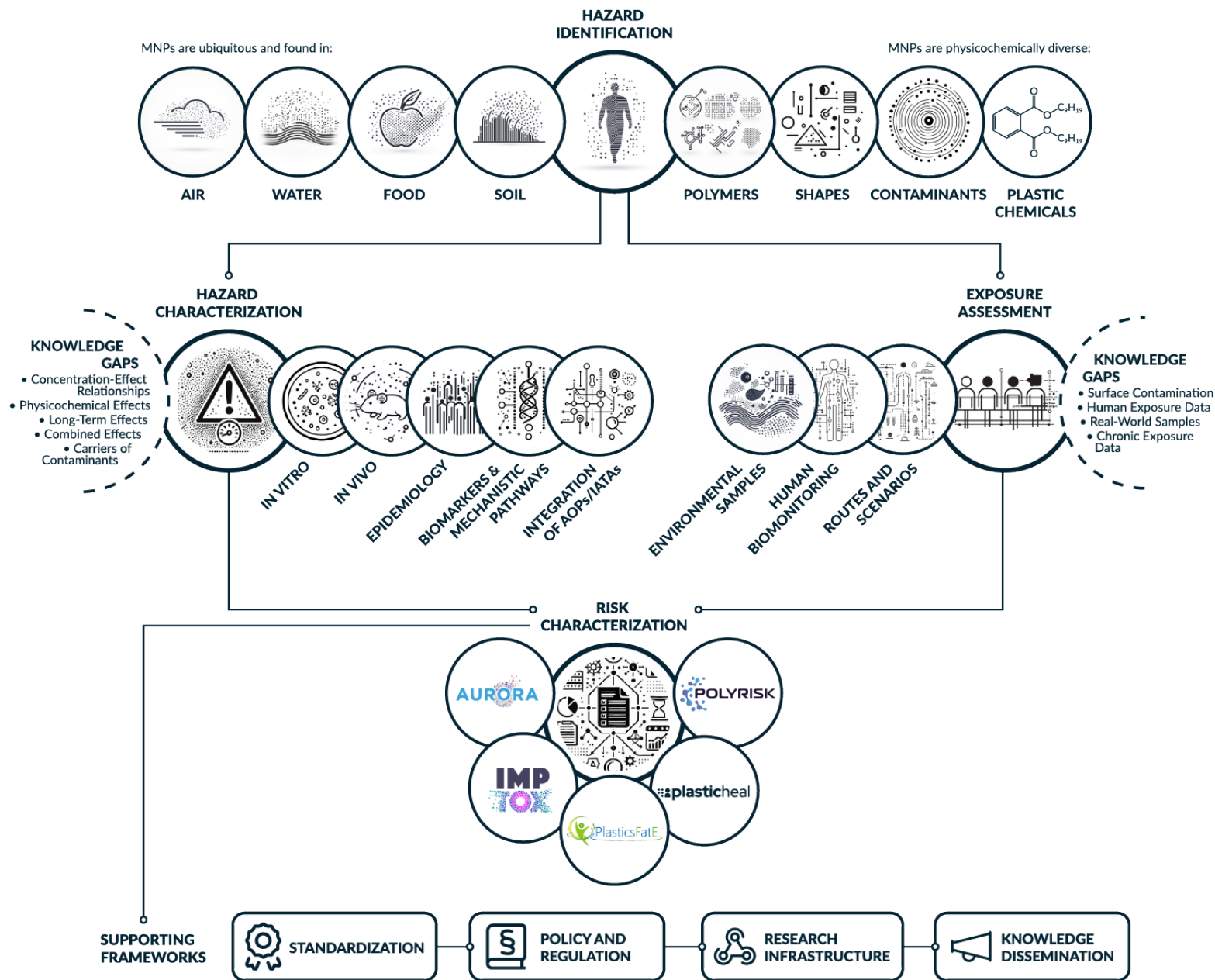
and their specific studies related to MNPs

CUSP key transversal themes

a coordinated effort across the cluster



RISK ASSESSMENT MNP



- Produced standardized test materials and methods
- Performed interlaboratory comparisons
- In-vitro assays have been developed for testing of MNPs, including dosimetry
- Reporting ontology for experimental data (i.e. eNanomapper)



-
- The infographic depicts a human silhouette with internal organs (lungs, liver, stomach, intestines) highlighted in blue and pink. Surrounding the body are various icons representing environmental and lifestyle factors: air pollution (smokestacks, clouds), water (waves, glass), food (apple, banana), and healthcare (pill bottle, microscope). Dotted lines connect these external factors to specific organs, illustrating their potential impact on health.



	No effect		
	Statistically significant effect		
	Not assessed		

Effects on macrophages (THP1 cell line)

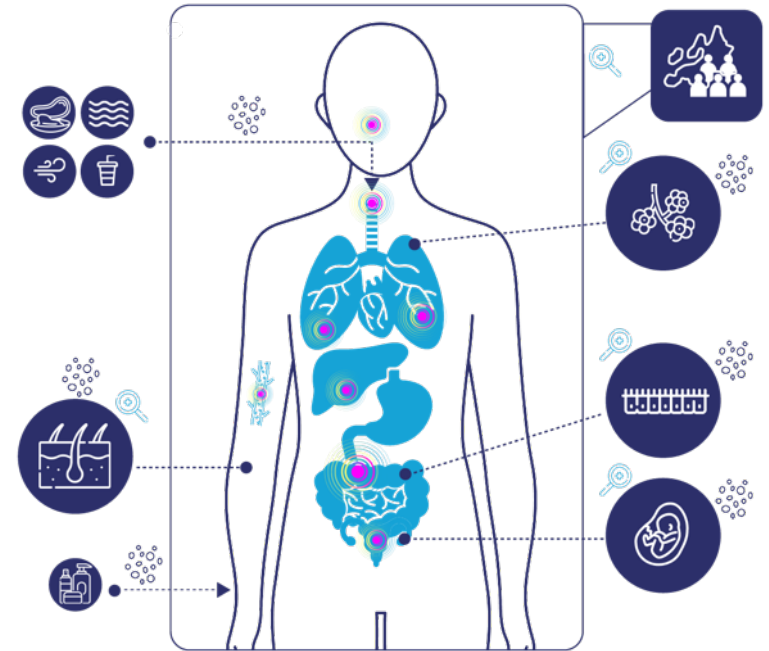
immunosuppression and immunostimulation



		Lysosomal activity			Metabolic activity (MTT)			Membrane integrity (LDH)			NFκB			Cytokines (TNF, IL6, IL1β)			Uptake		
exposure time (h)		24			24			24			24						24		
Concentration (ug/ml)		1	10	100	1	10	100	1	10	100	1	10	100	1	10	100	1	10	100
PS	PS_0.05																		
	PS_0.2																		
	PS_1																		
	PS_NH2_0.2																		
	PS_COOH_0.2																		
	PS_10																		
PTFE	PTFE_0.05																		
Momentum																			
	PVC<1																		
	PVC1-5																		
	PP/talc <1 μm																		
	PP/talc 1-5 μm																		
	PA6.6 1-5 μm																		
BAM																			
PP	PP																		
	PP_PmB																		
PE	PE																		
	PE_PmB																		
PET	PET_<10																		
Vehicle	BSA 0.025%																		

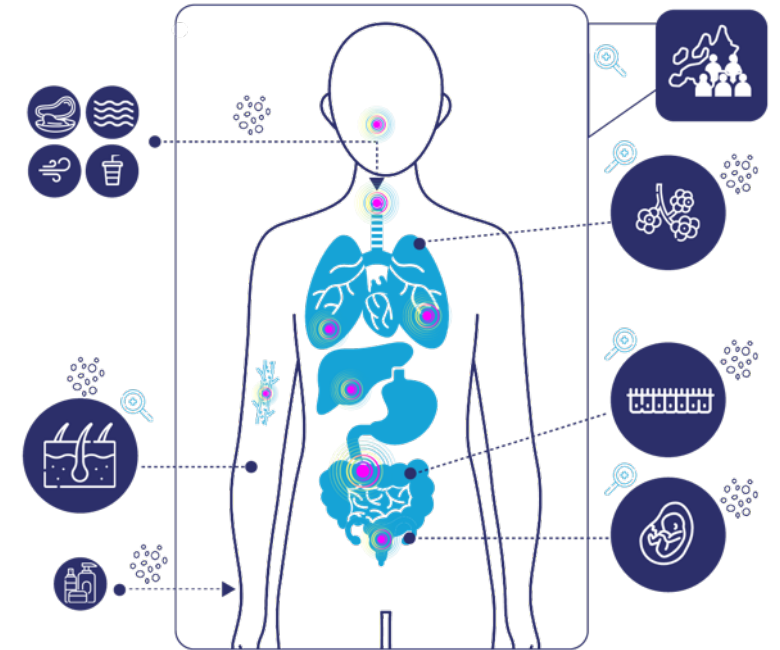
EXPOSURE ASSESSMENT

- *MNP exposure routes quantified*
 - *Inhalation/ingestion*
- *Transfer over biological barriers identified*
 - *Lung and intestinal epithelia*
- *Human biomonitoring pioneered*
 - *external (air, food, dust) and internal (blood) exposure assessments*
 - *Effect biomarkers (eg immune effects)*



HUMAN STUDIES

- *Cross-sectional studies*
 - *Household*
 - *School*
 - *Work (e.g. textile workers)*
- *Panel studies*
 - *Randomised across different tyre wear exposures in real-life circumstances*
 - *Soccer players on rubber infilled indoor playgrounds*
- *Epidemiological studies*
 - *Placenta and early life health*



2024 – 2025 Initial steps: FOUNDATION FOR RISK ASSESSMENT

Establish frameworks for the regulatory risk assessment of MNPs.

Develop analytical methods, reference materials, and inter-lab comparison protocols.

Gather data on MNP physicochemical properties and their effects on health.

Conduct workshops for harmonizing methods.

2028-2030 Milestone: POLICY AND REGULATORY DEVELOPMENTS

Deliver policy briefs with recommendations for managing MNP risks

Implement targeted interventions and policies to reduce health disparities.

Foster collaboration between industry, academia, and government for safer plastic usage.

2030 Ongoing Steps: KNOWLEDGE GENERATION & INTEGRATION

Conduct epidemiological investigations to establish health effects of MNP exposure.

Perform aggregated exposure assessments using real-world scenarios.

Develop harmonized protocols for advanced in vitro models and dosimetry.

Explore the environmental aging of plastics and their combined effects with pollutants.

Advance research into plastic degradation and environmental cleanup.

VERIFICATION METHODS

Deliverables: frameworks, protocols, briefs.

Peer Review: academic publications and expert review.

Stakeholder Feedback: input from industry, academia, and policymakers.

Implementation Evidence: track the integration of recommendations into policies or industry practices.

Impact Assessments: monitor outcomes of applied policies or interventions using predefined metrics.

2025 Milestone: INTERIM ROADMAP DEVELOPMENT

Address knowledge gaps in exposure assessment and human biomonitoring data.

Assess the use of existing test guidelines (e.g., OECD, ECHA, EFSA) and propose updates.

Incorporate findings from CUSP projects and affiliated initiatives.

2025 – 2030 Final Roadmap: COMPREHENSIVE RA STRATEGY

Develop detailed risk characterization frameworks that include both quantitative and qualitative assessments.

Propose methodologies for evaluating both acute and long-term effects of MNP exposure.

Address vulnerable populations, including unborn children, workers, and low-income communities.

Prioritize reliable biomonitoring techniques to track human exposure and refine detection methods for microplastics and nanoplastics.

Harmonize data collection and analysis by establishing standardized protocols.

Define and produce relevant reference materials for use in varied testing and regulatory contexts.

Strengthen public communication and engagement, fostering awareness and scientific literacy on the impact of MNPs.

PARTNERS & STAKEHOLDERS

Project partners, research labs, academic institutions, regulators (EFSA, ECHA), industry, policymakers (EU), NGOs, advisory panels...

Healthcare sector, environmental agencies, toxicologists, public health bodies, data providers, advocacy groups, international organisations (WHO).

