

PRESS RELEASE

Do micro- and nano- plastic particles in our environment affect our health?

April 1st, 2021 – The European Union Horizon 2020 project Imptox - *An innovative analytical platform to investigate the effect and toxicity of micro and nanoplastics (MNPs) combined with environmental contaminants on the risk of allergic disease in pre-clinical and clinical studies*, will start on April 1st, 2021. The main aim is to understand how micro- and nanoplastic particles (MNPs) impact human health.

A consortium consisting of 12 partners from 8 European countries will investigate the complex role of micro and nanoplastics combined with environmental contaminants on food safety and human health, focusing on allergy and asthma. MNPs are out in the environment and part of our everyday life. They are in the food we eat, the water we drink and the air we breathe, yet we do not know how dangerous they are to human health. Some of the project's goals will be to determine the types and quantities of MNPs in specific environments, identify the sorts of contaminants that attach to them and evaluate where they wind-up in our bodies after inhaling and ingesting them. These results will help us understand the effects of microplastics on human health and provide crucial knowledge for legislators.

The extent of MNPs in the environment

Plastic is exceptionally durable and can persist in the environment, where it undergoes slow degradation by microorganisms, heat, oxidation, light, or water. When plastics degrade, they form microplastic and sub-micron-sized nanoplastic particles in all shapes, chemical composition, sizes and concentrations. Manufactured MNPs for commercial use in exfoliating cleansers, cosmetics, medicines, food, shed from synthetic textiles, and tires also wind-up in the environment.

We don't know how many MNPs are in our environment because we lack the tools for measuring and characterizing them. But estimates suggest that 5.25 trillion plastic particles circulate in ocean surface waters, and even more is likely because of the increased plastic use and waste during the COVID-19 pandemic. These tiny particles are in oceans, lakes, rivers, groundwater, air, and food. They can be ingested or inhaled and, pollutants such as heavy metals, allergens, toxins, and microorganisms can latch on to them and may further endanger the environment and human and animal health. Imptox, which starts in April 2021 and will run for four years, has been awarded € 6,104,823 from the EU's Horizon 2020 programme to contribute to understanding microplastics and health.

MNPs and allergic disease

Allergy is one of the most common chronic diseases in Europe. More than 150 million Europeans suffer from at least one chronic form of allergy, while 20% live with a severe form of allergic disease, which significantly impacts their health. Currently, 70 million Europeans have allergic asthma and 7 million live with food allergies. The costs to society are immense, with more than 100 million lost work/school days per year and annual healthcare costs exceeding €140 billion. The prevalence of allergic diseases is rising, and current predictions estimate that by 2025, half of the entire EU population will be affected.

There is a possibility that high concentrations of MNPs in the environment could increase the number of allergic people or worsen their allergies. “Little is known on how MNPs influence allergic disease”, comments Imptox coordinator, Tanja Ćirković Veličković from the Faculty of Chemistry at the University of Belgrade in Serbia. “In the Imptox project, we will study, for the first time, the effects of environmental or dietary exposure to MNPs on allergy and asthma, using different preclinical models and clinical studies in allergic children”. To address potential MNP-induced health effects in allergic disease, the multidisciplinary Imptox team will capitalize on the consortium partners’ knowledge and expertise in the fields of food chemistry, food contaminants, polymer and metal chemistry, toxicology, -omics, clinical immunology and allergy.

“We don’t yet know what the risks of MNPs are on allergic disease”, says, Imptox partner Michelle Epstein, an allergist and immunologist who will study the effects of MNPs in allergic asthma and food allergy models at the Medical University of Vienna in Austria. “Furthermore, we don’t understand how MNPs interact with allergens in our environment and with our immune system”, says Imptox partner Marianne van Hage, Prof. of Clinical Immunology at Karolinska Institutet.

Andreja Rajkovic, a professor at Ghent University and one of the partners, highlights the complexity of interactions among MNPs and human health: “We do realize that MNPs serve as carriers of microbial pathogens, toxins, and toxic chemicals. Together, MNPs and these contaminants may create a unique environment that is little understood so far and requires further research. In particular, we will ask whether different MNP-contaminant combinations can impact aspects such as antibiotic resistance and microbial ability to cause disease. To decipher this will be one of our major goals in Imptox.” Dr. Lea Ann Dailey from the University of Vienna in Austria adds: “But we urgently need better analytical tools to improve MNP and contaminant identification and quantification and to understand exposure better.”

A unique approach

A multidisciplinary team from universities, research institutions, small and medium-sized enterprises in Serbia, Belgium, Austria, Sweden, France, Croatia, Italy and Switzerland, will collaborate on this ambitious 4-year project. The project goes beyond Europe by cooperating with scientists from the South Korean campus of Ghent University supplying samples from the Yellow Sea.

This unique approach aims to develop innovative tools to identify, extract, characterize, and quantify MNPs, evaluate MNP prevalence in the environment, track MNP fate, accumulation, and toxicity in pre-clinical studies, and investigate MNP exposure in children.

“Our scientific data will provide a basis for future regulatory actions for protecting against hazards and risks, food, water and air safety, in addition to actions regarding plastic use and disposal, guidance for patients with allergic disease, asthma, and more,” says Prof. Ćirković Veličković.

Synergies in action

Imptox is one of five projects in the EU Horizon 2020 programme that will work together with the European Commission’s Joint Research Center to form a collaborative network on MNPs and Health that will launch in June 2021. The European Commission has identified plastics as a key priority and committed itself to address the challenges posed by plastics and anticipate that this collaborative network will significantly contribute to the European Strategy for Plastics.

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