**Effect of microplastic exposure on hematological parameters in mice**

Georgi Pramatarov1\*, Lubomir Petrov1, Elina Tsvetanova1, Almira Georgieva1, Madlena Andreeva1, Georgi Petrov3, Konstantin Dobrev1, Nesho Chipev1, Albena Alexandrova1

*1Department of Biotechnology, Faculty of Biology, Sofia University “St. Kliment Ohridski”, 8 Dragan Tsankov Blvd., 1164 Sofia, Bulgaria*

*2Institute of Neurobiology, Bulgarian Academy of Sciences, 23, Acad. G. Bonchev, str., 1113 Sofia, Bulgaria*

*3Institute of Reproduction Biology and Immunology of Reproduction „Acad. Kiril Bratanov”, Bulgarian Academy of Sciences, 73, Tsarigradsko shose Blvd., 1113 Sofia, Bulgaria*

*\*e-mail:* [*g\_pramatarov@uni-sofia.bg*](mailto:g_pramatarov@uni-sofia.bg)

**Key words**: polystyrene; microplastics; mice; blood; toxicokinetic

Microplastics (MPs), defined as plastic particles smaller than 5 mm, are an emerging class of environmental contaminants. Widely distributed in air, water, and soil, they can enter biological systems mainly through ingestion and inhalation. The first detection of MPs in human blood was recently reported, confirming their ability to cross the epithelial barriers and circulate systemically. These findings raise significant concerns about the potential physiological impacts of MPs' exposure in humans. Therefore, this study aimed to evaluate the effects of subchronic oral exposure to polystyrene microplastics (PS-MPs) on hematological parameters in a mouse model. Male Swiss albino mice were randomly assigned to a control group or an experimental group that received 1 μm PS-MPs suspended in drinking water at a dose of 0.01 mg/day for four weeks. Blood samples were collected weekly and analyzed for complete blood count (CBC) parameters to assess potential alterations in hematological profiles. Exposure to PS-MPs induced marked alterations in white blood cell populations, with the strongest effects observed during the early exposure period. Total leukocyte, lymphocyte, and granulocyte counts increased significantly, while monocytes initially declined before partially recovering, indicating a dynamic, stress-related immune response. Red blood cell and platelet indices showed modest fluctuations over six weeks, with a late-stage rise in RBC, HGB, HCT, and PLT values, suggesting compensatory or adaptive responses. Most morphometric parameters (MCV, MCH, MCHC, MPV, PDW) remained stable. Biochemical analyses revealed elevated ALT, AST, urea, and BUN/CRE ratios, suggesting hepatic and renal stress. Glucose levels peaked in Week 5, possibly due to pancreatic disruption, before normalizing by Week 6. The findings of this study demonstrated that subchronic oral exposure to PS-MPs can induce significant alterations in hematological parameters in mice. The observed shifts in leukocytes and erythrocytes suggest impaired hematopoiesis, potential inflammatory responses, and disruptions in blood homeostasis. These results highlight the capacity of MPs to affect systemic physiology and underscore the need for further research into their short- and long-term health impacts, particularly concerning immune and hematological function in both animals and humans.

**Acknowledgements**: This work was supported by Grant № КP-06-Н81/2, National Science Fund.