

Increasing the production of various types of plastic, and the problem posed by the lack of effective methods of its environmental-friendly degradation and consequently contamination of the environment makes it constitutes a growing threat to human and animal health. It is widely detected in food and beverages. Currently, one of the most important issues concerning the scientists is microplastic (MP). Microplastics are defined as plastic particles with a diameter less than 5 mm. Scientific publications inform about two main ways of getting MP into the body: inhalation and orally. Despite the numerous of research articles on the MP toxicity in aquatic organisms there are no reports of its influence on the health of mammals other than rodents.

The aim of the experiment is to evaluate the effect of low and high doses MP administered orally, the change in the expression of biologically active substances in neurons of the enteric nervous system (ENS), assess the level of pro-and anti-inflammatory cytokines and to define pathological changes in the small intestine caused by MP. The experiment will be carried out on gilts, which due to the high similarity in the anatomy and physiology of the gastrointestinal tract to humans are used as an animal model in biomedical research.

Eight-week-old pigs weighing about 20 kg will be divided into 3 groups of 5 animals: control group (C) receiving empty gelatin capsules, experimental group (L) receiving gelatin capsules containing low dose of MP and experimental group (H) receiving high dose of MP in gelatin capsules. After 4 weeks of daily supplementation, the animals will be euthanized and the small intestine tissues will be obtained for further testing.

In the next stage of research, double immunofluorescence staining of obtained tissues relative to selected neurotransmitters will be carried out.

Using the ELISA test, the levels of proinflammatory and anti-inflammatory cytokines will be determinate in the control group and the experimental groups.

Pathological changes (or lack thereof) caused by oral supplementation MP will be evaluated using standard histopathology methods.

Previous studies using non-steroidal anti-inflammatory drugs or bisphenol A have shown that ENS neurons respond by a decrease or increase in the production of biologically active substances to toxic substances that appear in the gut. These changes determine the adaptation processes in digestive tract that take place in ENS in response to these substances. Therefore, these malifications may indicate the involvement of ENS in local processes of adaptation on the MP.

Analysis of the results of the experiment will allow to expand our knowledge about the influence of microplastics on chemically coding neuroactive substances and adaptation processes in ENS. Obtained results in future may be implemented in human medicine.