Impacts of microplastics on intestinal microflora, metabolism and inflammation in mice

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Outline

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Abstract

Microplastics refer to plastic debris, particles or thin films with a diameter less than 5 mm, which can be divided into primary and secondary microplastics. Primary microplastics are manufactured to be less than 5 mm for direct use or as precursors for other products; secondary microplastics means larger plastic products that gradually form smaller particles through physical or chemical action in the environment. Due to their small size and low degradation rate, they are easily ingested and accumulated by various organisms. Disperse a suspension of 5 μm pristine and fluorescent polystyrene (PS) microplastic (MP) in deionized water according to the concentration, then vibrate it with ultrasonic for 30 minutes to make the microplastic uniformly dispersed, and the sample preparation can be completed. In this animal experiment, 5-week-old ICR mice were used. After one week of domestication, they were divided into control groups, tube-fed 100 μg/L MP and tube-fed 1000 μg/L pristine and fluorescent MP. After 6 weeks of tube feeding, sacrifice them and take out blood, liver, colon, ileum, and cecum for biochemical and histological analysis. The results showed that there is 5 μm fluorescent polystyrene MP in the mouse intestine, and polystyrene MP can cause intestinal microbiota imbalance, intestinal barrier dysfunction and metabolic disorders. The 10~150 μm large polyethylene (PE) plastic particles are kneaded in the feed according to different weights, and the samples with the concentration of 2, 20, and 200 μg/g PE are obtained respectively. In this experiment, five-week-old male C57BL/6 mice were used. After one week of domestication, they were divided into control groups and special feed groups with different PE concentrations. After 5 weeks, they were sacrificed and their blood, feces, spleen, colon, and duodenum were taken out for biochemical and histological analysis. The results showed that the composition and diversity of the intestinal flora of mice have changed, and high concentrations of PE

will cause intestinal inflammation. Conclusively, two different types of microplastics will affect the composition of the intestinal flora and cause a certain degree of damage to the intestinal tract.

Reference

Jin, Y., Lu, L., Tu, W., Luo, T., & Fu, Z. (2019). Impacts of polystyrene microplastic on the gut barrier, microbiota and metabolism of mice. Science of the Total Environment, 649, 308-317.

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