CONTAMINATION OF FOODS WITH MICROPLASTICS AND IT'S IMPACT ON HUMAN HEALTH

Piotr Kowalczyk[1], Kornelia Kadac-Czapska[2], Małgorzata Grembecka[2]

[1]Student Scientific Circle, Department of Bromatology, Faculty of Pharmacy, Medical University of Gdansk, Gdansk, Poland
[2]Department of Bromatology, Faculty of Pharmacy, Medical University of Gdansk, Gdansk, Poland
e-mail: gamma@gumed.edu.pl

www.gumed.edu.pl

INTRODUCTION: Microplastic has become an ubiquitous contaminant in today's world. The main exposure route for humans is cosidered to be the gastrointestinal tract. The presence of microplastic has been confirmed in everyday food products such as water and other beverages, salt, sugar, honey, poultry, fish, fruits and vegetables [1]. It has also been found in meconium, placenta, breastmilk and infant formula, which sparks concern among scientists [2].

AIM: The aim of the study was to asses the current state of knowledge about microplastics and their potential impact un human health.

Microplastics are particles of synthetic polymers with a size range from 0,1 to 5000µm. They can be manufactured in such sizes (primary microplastics – microbeads) or be a product of degradation of polymers through hydrolysis, photooxidation or mechanical impact. Most commonly found in foods are polyethylene terephthalate (PET), polyethylene (PE), polypropylene (PP), polystyrene (PS), polyvinyl chloride (PVC), polyamide (PA) and polycarbonate (PC).

The toxicity of microplastic is related to the type of the polymer as well as it's size. Particles below 150µm can be absorbed, below 20µm penatrate organs, and below 2µm can cross the blood-brain barrier. Nanoplastics (1-100nm in size) have much stronger effects and can penetrate cells. [1]

	Inflammatory response, oxidative stress	Absorption	Penetration of organs	Crossing of the blood - brain barrier	Penetration of cells
<150 µm	+	+	-	-	-
<20 µm	+	+	+	-	-
<2 µm	+	+	+	+	-
<0.1 µm	++	+	+	+	+

Table 1. Differences between microplastic sizes

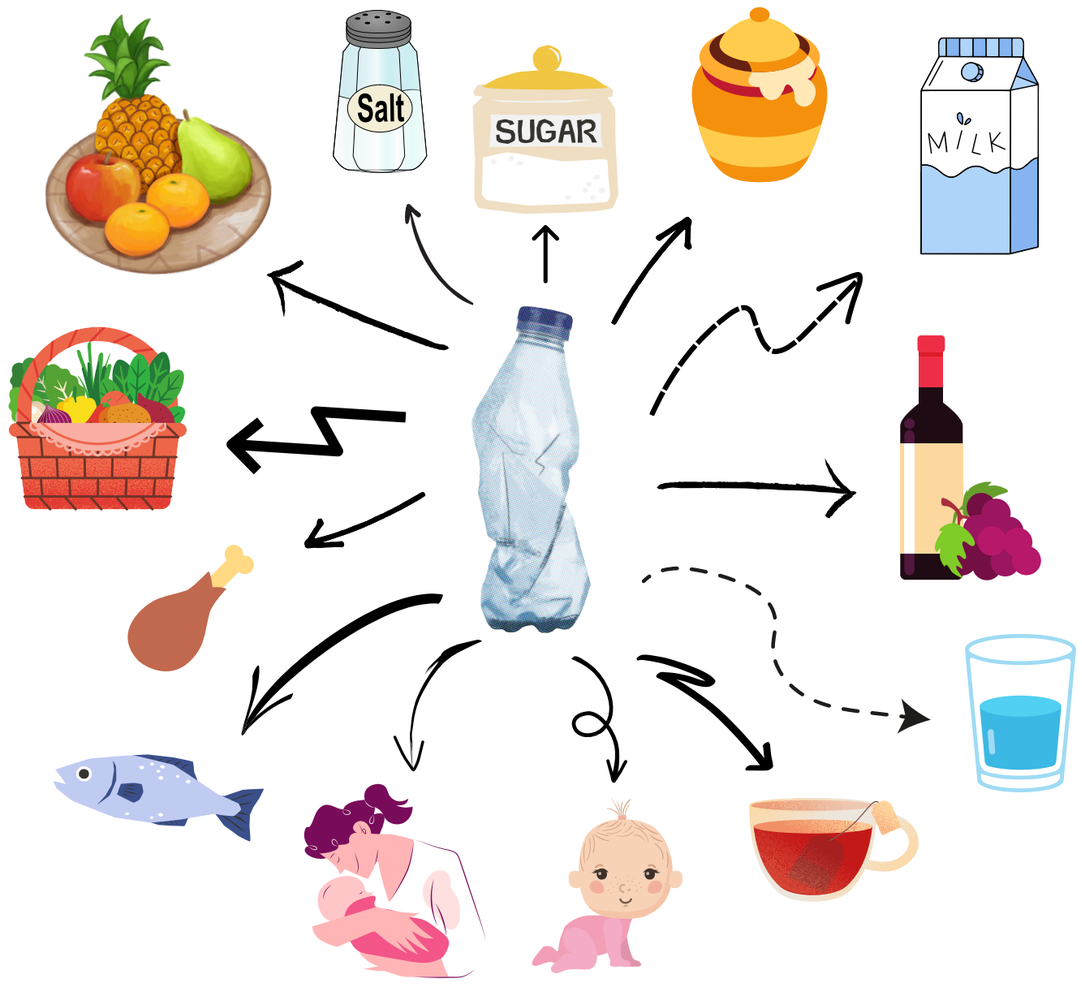

Figure 1. Microplastic contamination in our surroundings

The toxicity of microplastic is also related to the type of the polymer. All microplastics can cause oxydative stress and inflammatory response. Monomers like bisphenol A and styrene (of polycarbonate and polystyrene respectively) are endocrine-disrupting chemicals. Additives like phthalates, which are used as plasticizers in polyvinyl chloride, impaire human development and reproductive health [3]. Microplastic can also adsorb bacteria, heavy metals and other chemical pollutants, further increasing it's toxic potential, making even the more inert polymers like polyethylene and polypropylene dangerous [1,3].

LITERATURE:

[1] Kornelia Kadac-Czapska, Eliza Knez & Małgorzata Grembecka: Food and human safety: the impact of microplastics, Critical Reviews in Food Science and Nutrition, 2022. DOI: 10.1080/10408398.2022.2132212
[2] Shaojie Liu, Jialin Guo, Xinyuan Liu, Ruoru Yang, Hangwei Wang, Yongyun Sun, Bo Chen, Ruihua Dong: Detection of various microplastics in placentas, meconium, infant feces, breastmilk and infant formula: A pilot prospective study, Science of The Total Environment, Volume 854, 2023, 158699, ISSN 0048-9697. DOI: 10.1016/j.scitotenv.2022.158699.
[3] Zhihao Yuan, Rajat Nag, Enda Cummins: Human health concerns regarding microplastics in the aquatic environment - From marine to food systems, Science of The Total Environment, Volume 823, 2022, 153730, ISSN 0048-9697. DOI: 10.1016/j.scitotenv.2022.153730.