How Nanotechnology and Microbes May Solve The 'Forever Chemicals' Problem in Food Packaging

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In recent months, several companies have announced plans to eliminate forever chemicals from their food packaging. Forever chemicals can accumulate in the human body and do not break down in the environment. Now, researchers from the University of Pittsburgh and the University at Buffalo are working to determine how nanotechnology and microbes may help degrade these chemicals through a new treatment process.

What Are Forever Chemicals?

Forever chemicals are PFAS (per- and polyfluoroalkyl substances) that manufactures use in some food packaging and other products. PFAS chemicals can be found in certain cardboard and paper wrapper products used for food.

The U.S. Food and Drug Administration (FDA) list of authorized uses of PFAS in food contact applications includes microwave popcorn bags, take-out containers and other items. PFAS are used because of their non-stick properties and their ability to repel water, oil and grease. The FDA acknowledges there is a possibility for PFAS to migrate from the packaging to the food. This means that the contact may allow the chemicals to enter the food a person eats.

The U.S. Environmental Protection Agency (EPA) explains that PFAS may cause adverse health outcomes. They may increase the risk of reproductive, developmental, kidney and liver problems. PFAS may cause different types of cancer, low birth weight in infants, thyroid hormone disruption and immune system damage.

Phasing Out PFAS

In 2016, the FDA phased out all long-chain PFAS, which are types of chemicals with eight or more carbon atoms in length, from food contact applications in the U.S. The decision was made based on research that showed long-chain PFAS may be toxic to animals and humans.

Short-chain PFAS, which have seven or fewer carbons, replaced the long-chain PFAS. However, concerns remain about the safety of short-chain PFAS and their impact on human health and the environment.

In 2020, the FDA shared data about one type of short-chain PFAS called 6:2 fluorotelomer alcohol (6:2 FTOH) and human health risks. After the publication of the data, three manufacturers agreed to voluntarily phase out 6:2 FTOH starting in 2021. It is important to note that other types of short-chain PFAS are still being made and sold.

Response from Companies

Some companies have decided to eliminate PFAS in their products. Amazon banned the use of chemicals of concern, including PFAS, from its Amazon Kitchen brand products and food packaging. The company is encouraging other manufacturers to avoid using these types of chemicals, but it can only control its own private brand products.

McDonald’s also announced it plans to remove all PFAS from packaging by 2025. The company previously stopped using long-chain PFAS, BPA/BPS, phthalates and other chemicals in its food packaging.

New Research Offers Hope

One of the concerns about PFAS chemicals are their ability to persist in the body and the environment. Forever chemicals can accumulate over time and are difficult to destroy. Food packaging that contains PFAS contaminates landfills and cannot be used in compost. Researchers from the University of Pittsburgh and the University at Buffalo are working on a solution to degrade PFAS.

The research focuses on using nanotechnology and microbes to break down forever chemicals. Nanomaterials may be able to react with and cut PFAS into smaller pieces, so bacteria can eat the smaller parts. The goal is to create an effective treatment process for removing PFAS from the environment.

Although the researchers are only studying 15 types of PFAS, their findings may have wider applications and uses. They plan to examine how PFAS breaks down, the toxicity of the

byproducts and the performance of the microbes consuming the chemicals.

An estimated 95% of the U.S. population has PFAS in its blood, and there is no way to remove it at this time. The detailed research from the University of Pittsburgh and the University at Buffalo about the degradation of PFAS may reveal new information that helps others find a way to eliminate the chemicals from the human body.

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