COMMENTARY

THE AMERICAN JOURNAL of MEDICINE®

Microwaving Food in Plastic Containers

Over many years, we have been warned not to heat food in plastic containers in the microwave oven because this can result in migration of harmful plastic components into the food. Despite such warnings, many foods in our supermarkets are packaged in a variety of plastic containers often labeled as microwave safe. We wondered whether this practice was truly warranted, and if, indeed, there was scientific evidence that potentially harmful substances were transferred from plastic containers into food during heating in the microwave oven.

Before reviewing the literature and the internet posts concerning migration of plastic components into food, we needed to understand basic information about the plastics themselves as well as what components might be transferred into food. Plastic is a generic term; there is no single component of plastic in terms of chemical composition. The term describes a family of polymer substances ranging from polyvinyl chloride (the compound in white PVC plumbing pipes) to one of the original synthetic plastic compounds, Bakelite, once used to make tableware. Plastics can be composed of organic polymers and organic or inorganic additives compounded in a variety of forms. Most plastics are made from petrochemicals. The toxicity of the various plastic compounds depends on what is in the specific plastic and how stable it is under a variety of conditions, for example, heating in a microwave oven. Because most plastics are insoluble in water, they are almost always quite stable and chemically inert.

Two additives in various plastics, however, have concerned toxicologists for many years as potential human health hazards: bisphenol A (BPA) and phthalates.[1-3] BPA is an additive used to make hard, clear plastics such as that employed in the manufacture of water bottles.

Phthalates, on the other hand, are added to plastics to make them soft and pliable, for example, rubber duckies and food packaging materials. Both BPA and phthalates are believed by many authorities to be endocrine disruptors, sometimes called hormone disruptors, because they interfere with the biological effects of testosterone and estrogen when introduced into the body.[4]

The hormone that BPA and phthalates are most suspected of imitating is estrogen, affecting the male hormone testosterone production. In 1 pediatric investigation, this substance was linked to childhood obesity.[5] Moreover, there are links between both of these chemicals (and other additives in plastic) to a variety of fertility problems, immune system issues, malignancies, and disabilities.[6,7] Average human male sperm counts and male fertility are apparently declining during recent decades, possibly related to endocrine disruptors released from plastic containers into the diet.[8] Experiments in fishes have linked mutations to plastic endocrine disruptors in the environment.[9] Therefore, either BPA or phthalate or both could be a human health concern.

BPA and phthalates are ubiquitous in the environment, and BPA is even found in many cash register receipts. However, most human exposure is thought to occur through ingestion of food. Both BPA and phthalates are commonly found in plastics used for food containers, some plastic wraps, and in the linings of food and drink cans.

But how dangerous are minute quantities of these plastics following ingestion in daily life? There is considerable disagreement here among scientists and regulatory agencies. Because most plastics are quite stable, it is likely that contact with food or drink results in only tiny amounts of BPA or phthalates eaten. Indeed, food packaging materials must pass the standards set by the Food and Drug Association (FDA) under the Food Contact Notification Program.[10] Thus, any product labeled "microwave safe" according to the FDA standards should be safe in theory when used in a microwave oven. Critics of the FDA standards cite a lack of thorough scientific oversight into this question with the burden of proof resting in test data provided by the manufacturers themselves. The conflict of interest here is obvious. The American Chemistry Council, a trade association representing more than 190 companies, claims that BPA is 1 of the most thoroughly tested chemicals used today with a safety track record of more than 50 years. The council also notes that regulatory bodies around the world have

Funding: None.

Conflicts of Interest: None.

Authorship: Both authors had access to the data and a role in writing this manuscript.

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0002-9343/© 2022 Published by Elsevier Inc.
https://doi.org/10.1016/j.amjmed.2022.07.003

reviewed the scientific publications and have found BPA to be safe.[11] Because plastic use in humans has a relatively short history, whether BPA or phthalate released from food containers is safe requires further investigation into possible long-term effects.

What then is our approach to the warming of food in plastic containers in the microwave oven? In our home, we transfer food from plastic packages into glass or terracotta bowls before placing them into the microwave oven. We never put any plastic container in our microwave device to warm the food. Perhaps this is being a bit too cautious, but the extra effort is minimal, and as Dr. Anthony Fauci has said in another context "We've got to be careful we don't get complacent."

As always, we are happy to hear from readers about this or any other commentary in The Green Journal at jalpert@shc.arizona.edu

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