NAEM
National Association of Environmental Medicine

PLASTICS: PATIENT HANDOUT

Plastics are an unavoidable part of our daily life. They are used in water bottles, food processing and packaging, kitchen utensils, clothing, personal care, building materials, medical equipment, PVC water pipes, and even the lining of aluminum cans and disposable paper cups. It is very hard to avoid plastic completely – so you need to be aware of your points of exposure. While your body can eliminate smaller doses, our environment is overwhelming our bodies with plastics! The purpose of this guideline is to help you identify areas of exposure so you can protect yourself.

I DON'T EAT PLASTICS. SO, WHAT IS THE RISK?

While plastic is technically a solid, the chemicals in plastic are shown to leach into our food, water, and air due to heat, moisture, repeated use, washing, friction and time. In addition to the chemicals, small, microscopic particles, or microplastics, and even smaller nanoplastics are also entering our bodies through our food, water, air and skin.

In a recent analysis prepared for World Wildlife Fund it is suggested that human beings may ingest two recycling bins of plastic in their lifetimes, or the equivalent of one credit card (5g) per week. The great majority of this is from water ingestion.

Plastics include harmful chemicals from two main groups, phthalates and bisphenols, and can also be broken down in to microscopic particles known as microplastics. These 3 main categories of exposure are known to contaminate our food, water, and air.

Phthalates

- Primarily used to make plastics more flexible.
- Major exposure from dairy and personal care, in addition to inhalation from contaminated indoor dust and artificial fragrances.
- Known endocrine disrupting chemical, obesogen, and has ability to cause cancer.
- While they are considered to be rapidly eliminated through urine, their ubiquitous and continuous exposure and adverse health effects have raised concerns.

Bisphenols

- Family of compounds including BPA, BPF, BPS, BPAF, BPE, and BADGE. Importantly, BPA-free does NOT mean that it does not have BPF, BPS, BPAF, BPE, or BADGE, which all have similar health effects.
- Major exposure from food and drink packaging, in addition to inhalation from contaminated indoor dust.
- Health effects are related to cardiovascular, breast and prostate cancer, neurodevelopment in children, diabetes and obesogenic effects.
- Present in 95% of Americans as established in the NHANES data from 2013-2014. Specifically, BPA was found in 95.7%, BPS in 89.4% and BPF in 66.5% of U.S. participants.

Microplastics

- Smaller than 5mm in size, microplastics are pervasive in our oceans and other water supplies and are adsorbing other contaminants in our environment.
- Microplastics can exist as fragments, films, fibers, and foam.
- The chemical constituents of environmental microplastics are diverse and include polymers, such as polyethylene (PE), polypropylene (PP), polystyrene (PS), and other toxic chemicals.
- Microplastics do not decompose, but are broken down via UV rays, heat, and wind into smaller and smaller particles, or nanoplastics (≤ 0.1 µm).
- Approximately 39,000-52,000 microplastics particles are ingested annually; these estimates increase to 74,000-121,000 when inhalation is considered. PMID: 31184127
- More research is needed to determine the health effects of the accumulating plastics in our bodies.

CHEMICAL	FOUND IN
Phthalates	• Dairy products (plastic tubing used during production) • Food packaging and wraps, including prepackaged meats • Cosmetics and personal care products • Plastic and vinyl toys • Shower curtains, miniblinds and wallpaper, vinyl flooring, raincoats • Detergents, adhesives • Plastic pipes and other PVC plastics • Medical equipment and devices, including IV bags and tubing
Bisphenols BPA, BPS, BPF, BPAF, BPE, BADGE	• Polycarbonate plastic containers • Epoxy resins that coat food/beverage cans, pipes, and bottle tops • Water bottles • Baby bottles, sippy cups • Store receipts • Eyewear • Textiles • Dental sealants
Microplastics	• Water is the greatest source, especially bottled water • Disposable paper cups and plastic lids • Tea made from plastic or silk tea bags • Seafood (from bioaccumulation in oceans, lakes) • Salt, beer, honey, some animal products • Plastic baby bottles (even higher than bottled water) • Indoor and outdoor air • Personal care products • Tires, paint, textiles • Leachates from both active and closed landfills • Biosludge and plastic-coated pesticides

DAILY COFFEE-TO-GO = #1 MICROPLASTIC EXPOSURE

Disposable paper cups release approximately 25,000 microplastic particles into one cup of hot water in 15 minutes. Toxic heavy metals like Pb, Cr, and Cd were detected in the films which can be transferred into the hot water. PMID: 33091697

NAEM's comment: The number is so high for one cup of a hot beverage that it makes the microplastics statistics above (39,000-52,000 or 74,000-121,000 particles) really too low. *Daily hot beverage consumption from these disposable paper cups could overshadow microplastic exposure from bottled water, tap water, and fish.*

PLASTIC AVOIDANCE

DON'T	DO
 DRINK OR EAT OUT OF DISPOSABLE COFFEE CUPS, PLASTIC BOTTLES OR CONTAINERS, OR ALUMINUM CANS	 FILTER YOUR WATER & INDOOR AIR, AND USE REUSABLE STAINLESS STEEL MUGS AND WATER BOTTLES

FOOD	• AVOID coffee in disposable paper cups and plastic lids! Bring a reusable, stainless-steel, or ceramic mug. • AVOID using nylon/plastic tea bags regularly. • DO use loose leaf teas stored in glass, ceramic, or stainless-steel containers. • AVOID canned foods or drinks in aluminum cans – glass is best. • DON'T store your food in plastic containers. • DON'T heat your food in plastic containers, plates, or cups. • LIMIT fish consumption due to moderate amounts of microplastics. • For babies, use a glass bottle as plastic bottles leach microplastics when heated. • DO consume plenty of protective polyphenols, compounds found in plant-based foods that act as an antioxidant and may lower disease risk. Examples of polyphenols include flavonoids, phenolic acid, resveratrol, curcumin and lignans. • DO eat a high protein, low carb diet, with lots of cruciferous vegetables, fiber; quercertin, calcium-d-glucurate, and probiotics.

WATER	• Exposure from tap and bottled water is high, especially for microplastics.
	• DON'T drink bottled water or any beverage in a plastic bottle or disposable paper cup.
	• DO use refillable stainless-steel water bottles.
	• At home, use a water filtration system for all drinking AND cooking water.
	  ○ Look for 0.5 micron particle removal but allows natural mineral ions and electrolytes to pass through. Recommended: Pure Effect Filtration.
	  ○ Note: reverse osmosis provides effective filtration but also removes minerals.

AIR	• Indoor dust accumulates phthalates and BPA, use a High Efficiency Particulate (Certified HEPA) air filter, such as Austin Air Healthmate in bedroom and other frequently used rooms. ○ Certified HEPA filters are proven to capture 99.97% of particles larger than 0.3 microns. Note: HEPA-type or HEPA-style do not meet this criteria. • Use a strong HEPA filter on your furnace. Recommended: MERV 13. • Dust with damp cloth and wet mop floors at least once a week. • Avoid all air fresheners, fragrant candles, and scent sticks.
OTHER	• DON'T touch store receipts. Instead put receipt in a cloth container to keep separate. • Be mindful of disposable plastic materials like antibacterial wipes and masks.

RESOURCES

- Environmental Working Group
  - Tapwater database
  - Brands that use BPA
- MadeSafe.org
- Million Marker