

Health Care Provider Guide to Safer Plastics:

Phthalates and Bisphenol A

Phthalates

Phthalates are man-made chemicals used in soft, flexible plastics, polyvinyl chloride (PVC) products, and in a variety of personal care products (shampoos, lotions, etc.). These chemicals are anti-androgenic and can adversely impact androgen-sensitive tissues during specific windows of development.

Bisphenol A

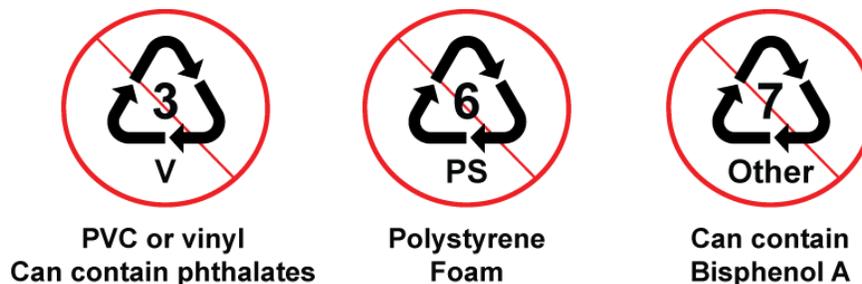
Bisphenol A, or BPA is a man-made chemical used in hard, polycarbonate plastics and in food can linings to prevent degradation of the metal. BPA acts as a weak estrogen in animals and probably does so in humans as well. It has chemical properties similar to estradiol and can impact biological systems in very low doses.

- Children may be exposed to phthalates or bisphenol A from ingestion through diet and sucking/mouthing plastics, inhalation through dust, and dermal exposures.
- Because evidence is still emerging, the Pediatric Environmental Health Specialty Units (PEHSU) recommends a precautionary approach. The information below will help avoid exposures.
- You can use the following guide to counsel families on how to choose safer plastics. Consumers should be instructed to check the symbol on the bottom of the plastic items before buying.

The safer plastic choices for toys and food and beverage containers:¹



Plastics to avoid:^{2,3}



1. Luz Claudio and Reeve Chace. Quick Guide to Plastics. Staying Healthy in a Changing Environment #3. Mount Sinai Community Health Bulletin. June 2006.
2. Code #6: Styrene, a potentially toxic chemical, may be released from containers made from polystyrene foam (Styrofoam and related brands) when they are used to heat or store foods or liquids at temperatures exceeding 80°C (176°F).
3. Code #7 covers "other" plastics, which includes polycarbonate. Therefore not all code #7 plastic bottles contain polycarbonate and leach BPA. Also, BPA can be given off from other products.

Possible Human Health Impact:

Both phthalates and bisphenol A are endocrine disruptors - chemicals that may interfere with the production/function of hormones leading to adverse health effects.

Phthalates

Animal Studies (all are high dose exposures in utero)

- significant **testicular toxicity** in utero and in early development (testicular dysgenesis syndrome)
- increased incidence of **male reproductive tract abnormalities** in offspring of prenatally exposed rats including hypospadias, cryptorchidism, and testicular tumors
- **decreased birth weight** after prenatal exposure
- malignant kidney and liver tumors (not thought to be relevant to human exposures)

Human Studies

- prenatal phthalate exposure associated with a **decreased anogenital distance** (marker of androgenization)
- phthalate exposure through breast milk has been associated with **increased LH, decreased free testosterone** and **increased serum human binding globulin** in 3 month old male infants
- early childhood exposure to phthalates has been associated with increased **rhinitis, eczema, asthma and wheezing**
- several studies relate phthalate exposure with abnormal sperm morphology/sperm DNA damage in adult males

Bisphenol A

Animal Studies

- **neurotoxic**, stimulates estrogen receptors in brain, prenatal exposures lead to changes in behavior including **hyperactivity, increased aggression, impaired learning**
- low dose prenatal exposure is associated with **early puberty** and **increased mammary tumors** in offspring, increased risk of **prostate hypertrophy**
- prenatal exposure associated with **increased adipocytes and increased body weight** in offspring
- adult exposure associated with modulation of helper T1 and T2 cells which in turn adversely affects antibody production

Human Studies

- extensive evidence that **humans are exposed to concentrations similar or higher than doses used in several animal studies that document adverse health effects.**
- no epidemiologic studies published examining human health effects.

Tips on Teaching Patients & Parents How to Avoid Exposure

Disclaimer: Based upon interpretation of the current literature, the PEHSU program is providing this guidance for persons who wish to take a precautionary approach to personal decisions, and is not meant to substitute for personal medical consultation with your health care provider.

Phthalates

- Do not microwave food/beverages in plastic
- Do not microwave or heat plastic cling wraps
- Do not place plastics in the dishwasher
- Use safe alternatives such as glass or polyethylene plastic (symbol #1)
- Buy products labeled as “phthalate-free” or “BPA-free”

Bisphenol A

- If using hard polycarbonate plastics (water bottles/baby bottles/sippy cups), do not use for warm/hot liquids
- Use safe alternatives such as glass or polyethylene plastic (symbol #1)
- Avoid canned foods when possible (BPA may be used in can linings)

You or your patients may contact your local Pediatric Environmental Health Specialty Unit. Find our contact information at www.aoec.org/PEHSU.htm or call 1-888-347-2632

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Key References

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