Plastics: Possible Impacts on Children's Health

Phthalates and **Bisphenol A (BPA),** can act as "endocrine disruptors" in animals. Similar hormonal like activity in human systems is possible.

Health effects attributed to endocrine disrupting compounds include a range of reproductive problems (reduced fertility, male and female reproductive tract abnormalities, and skewed male/female sex ratios, loss of fetus, menstrual problems changes in hormone concentrations; early puberty; brain and behavior problems; thyroid hormone and gland changes; impaired immune functions; and various cancers)

These chemicals can leach from plastic containers into foods and beverages causing exposure from dietary ingestion. In addition, children may be exposed through inhalation from these chemicals in dust and through the skin from dermal transfer.

Detectable concentrations of these chemicals have been found in blood, urine, breast milk, and amniotic fluid in the general population. There are only a few human studies focusing on in utero or childhood exposures, so most of our knowledge of potential health effects stems from published animal studies.

Phthalates

Phthalates are man-made chemicals used as a "plasticizer" in a variety of industrial and commonly used products. These chemicals are anti-androgenic and can adversely impact androgen sensitive tissues during specific windows of development.

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
- kidney and liver malignant tumors (not thought to be relevant to human exposures)

Human Studies

- prenatal phthalate exposure has been associated with a **decreased anogenital distance** (marker of androgenization), **reduced penile size**, and **incomplete testicular descent**
- 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, wheezing**
- several studies relate phthalate exposure with abnormal sperm morphology/sperm DNA damage in adult males

Bisphenol A

Bisphenol A is a man made chemical used in hard, polycarbonate plastics. BPA acts as a pro-estrogenic substance in the body. It has chemical properties similar to estradiol and can impact biological systems in very low doses.

Animal Studies

- **neurotoxic**, stimulates estrogen receptors in brain, prenatal exposures lead to changes in behavior including **hyperactivity, increased aggression, impaired learning**
- 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 at concentrations similar or higher than doses used in several animal studies that document adverse health effects**
- no epidemiologic studies published examining human health effects.

Sources of Phthalate and Bisphenol A Exposures

There isn't a disclosure requirement or comprehensive list to aid consumers in identifying plastic containers with Phthalate or Bisphenol A. However, Recycling Codes can be a clue to phthalate or BPA containing products

Phthalates

Vinyl (Polyvinyl Chloride – PVC) – PVC tubing, clear food and non-food packaging, medical tubing, wire and cable insulation, film and sheet, construction products such as pipes, fittings, siding, floor tiles, carpet backing, plastic toys and other flexible plastics.

Phthalates can also be found in several cosmetics and personal care products such as lotion, aftershave, and perfumes/cologne.

Bisphenol A

#7 is considered the "other category" This can include hard, polycarbonate plastics such as those used in water bottles for hiking/camping, or baby bottles and sippy cups.

Bisphenol A is also used in can linings and products with thin plastic film coatings such as yogurt containers.

Tips on How to Avoid Exposure

Phthalates

- look for recycling code and avoid use of #3 when possible
- do not microwave food/beverages in plastic
- do not microwave or heat plastic cling wraps
- use alternatives to plastic packaging when possible
- buy phthalate-free toys or those approved by the European Union (the EU has placed a ban on using certain types of phthalates in children's toys) (any handy website to refer to?)

Bisphenol A

- look for recycling code and avoid use of #7 (may or may not contain Bisphenol A) when possible
- if using hard polycarbonate plastics (nalgene/baby bottles/sippy cups), take precautions. Do not use for warm/hot liquids, discard old scratched bottles
- use safe alternatives such as glass or poly ethylene plastic
- choose canned foods from makers who don't use BPA (i.e. Eden foods)
- try to buy soups/milk/milk products in cardboard cartons

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