Fact Sheet 2: Health Implications

How harmful are phthalates?

DEHP: It is considered one of the most toxic phthalates and has been banned in toys in several countries. Exposure to it via house dust is known to cause asthma and allergy in children. In mammals it has been found to interfere with male and female reproductive systems such as early development of testes. It has also been found responsible for poor semen quality, genital defects and premature breast development in humans, and reduced testosterone in male rats. Exposure to DEHP during pregnancy has also been linked to pre-term birth in human beings.

DINP: Prenatal toxicity studies on rats have shown slightly increased rates of skeletal retardation and occurrence of soft tissue and skeletal malformations. When fed to rats it leads to increased liver and kidney weights.

DBP: It has been linked to poor semen quality in men, premature breast development in females and asthma and allergic symptoms in children. In male rat pups developmental defects similar to the testicular dysgenesis syndrome have been documented. Genital defects and reduced anogenital distance — between the anus and the base of the penis — a sign of reproductive disorder, in male rats have also been observed.

Studies done to test phthalate toxicity

2000: Study examines premature breast development among young girls under eight years in Puerto Rico. Analysis was done on 41 serum samples from thelarche patients (with premature breast development) and 35 control samples. Results show high levels of DEHP and DBP among young girls with premature breast development. (Colon I, Caro D, Bourdony CJ, Bourdony CJ and Rosario O., http://www.ncbi.nlm.nih.gov/pmc/articles/PMC2556932/)

2000: Study examines the health effects of various phthalates including DEHP, BBP and DINP in male rat pups. Shows that male pups exposed to DEHP, BBP and DINP displayed nipples when compared with rat pups which did not receive these. (Parks LG, Ostby JS, Lambright CR, Abbott BD, Klinefelter GR, Barlow NJ and Gray LE., http://toxsci.oxfordjournals.org/cgi/content/full/58/2/339?ct)

2003: The aim of the study was to evaluate prenatal exposure to DEHP and/or MEHP and its possible biological effects. DEHP is the most commonly used plasticizer in flexible polyvinylchloride formulations. MEHP-positive newborns showed a significantly lower gestational age compared with MEHP-negative infants. (Latini G, De Felice C, Presta G, Vecchio AD , Paris I, Ruggieri R, Mazzeo P., http://www.ncbi.nlm.nih.gov/pmc/articles/PMC1241724/)

2003: Study examines how di-n-butyl phthalate (DBP) exposure in unborn male rats is linked to genital defects. It was found that DBP can initiate testicular changes that may not manifest clearly until adulthood. (NJ, Foster PM, http://tpx.sagepub.com/cgi/content/abstract/31/4/39)

2003: One of first studies from Harvard School of Public Health to link phthalate exposure with harm to reproductive health among humans. The study recruited 168 men and found that those who had monobutyl phthalate (MBP) or monobenzyl phthalate in their urine tended to have lower sperm counts. The study shows an inverse relationship between high concentration of these chemicals and low sperm count. (Duty SM, Silva MJ, Barr DB, Brock JW, Ryan L, Chen Z Herrick RF, Christiani DC, HauserR, http://www.jstor.org/pss/3703846)

2005: Prenatal phthalate exposure impairs testicular function and shortens anogenital distance (AGD) -- between the anus and base of penis -- in male rodents. The study using young boys shows that prenatal phthalate exposure can adversely affect male reproductive development in humans. Four phthalate metabolites monoethyl phthalate (MEP), mono-*n*-butyl phthalate (MBP), monobenzyl phthalate (MBzP), and monoisobutyl phthalate (MiBP) were inversely related to anogenital index. (Swan SH, Main KM, Liu F, Stewart SL, Kruse RL, Calafat AM, Mao CS, Redmon JB, Ternand CL, Sullivan S, Teague JL., http://www.ncbi.nlm.nih.gov/pmc/articles/PMC1280349/)

2008: Phthalates from PVC may have adverse immunologic systems. This study reviews the evidence for the role of exposure to phthalates from PVC products in the development of asthma and allergies. Results show mono-2-ethylhexyl phthalate (MEHP) released from heated PVC flames possibly contribute to development of asthma in adults. (Jaakkola JJ and Knight TL, http://www.ncbi.nlm.nih.gov/pmc/articles/PMC2453150/)