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The Science of PCBs and Health: A Selective Summary

Compiled by New York Lawyers for the Public Interest

The articles in parenthesis are identified in full in the bibliography on the last page.

ATTENTIONAL DEFICITS AND COGNITIVE FUNCTION

- Adults who work in buildings in which window caulk is contaminated with PCBs showed higher rates of attentional deficits (Peper, 2005).
- Low-level prenatal exposure to organochlorine compounds including PCBs is associated with an increase in ADHD-like behaviors in children (Sagiv, 2010).
- Children who had prenatal exposure to PCBs had higher incidence of behavioral disorders and lower IQ scores when they were 9 years old (Stewart, 2008).
- Adolescents with elevated serum PCBs do more poorly on several tests of cognitive function than do adolescents with low PCBs (Newman et al., 2009).

CHILDHOOD LEUKEMIA

- Children's risk of developing the most common form of childhood leukemia, acute lymphocytic leukemia, increased by two-fold when PCBs were detected in the dust of a room in which the child spent a significant amount of time (Ward, 2009). (The Environmental Protection Agency, the World Health Organization, and the United States Department of Health and Human Services have long characterized PCBs as a known animal carcinogen and a probable human carcinogen.)

DIABETES

- After accounting for other risk factors, this study found that people who had high levels of PCBs were up to nine times more likely to be diagnosed with type 2 diabetes than those with very low levels of pollutants in their blood (Lee, 2011).
- Hospitalization rates for diabetes in communities near a toxic waste site containing PCBs were amplified (Kouznetsova, 2007).

DIABETES (continued)

- Elevated levels of PCBs are associated with an increased risk of having diabetes (Codru et al., 2007).

- Having elevated PCB levels early in life is predictive of developing diabetes later (Lee et al., 2010).

ELEVATED PCB LEVELS IN BLOOD DUE TO ENVIRONMENTAL EXPOSURE

- Teachers in PCB-containing schools had elevated levels of PCB congeners in their blood. In particular, they exhibited higher concentrations of lighter PCB congeners, which are more likely to come from non-dietary sources, such as building materials. These lighter congeners include several that are believed to be endocrine disrupting, and developmental toxins (Herrick, 2011).

- Workers disturbing PCB caulk had elevated PCB concentrations in their blood (Kontsas, 2003; Wingfors, 2006; Herrick, 2007).

ENDOCRINE EFFECTS

- Adolescent girls with high PCB levels reach puberty at a younger age than girls with lower PCBs (Denham et al., 2005).

- In adolescents, thyroid function is reduced if their serum PCB level is elevated (Schell et al., 2008).

- Higher PCB levels in men are associated with a reduction in the levels of the male sex hormone, testosterone (Goncharov et al., 2009).

FAILED *IN VITRO* FERTILIZATION

- Associations were reported between blood serum PCB concentrations at levels similar to the US general population and increased odds of failed implantation among women undergoing *in vitro* fertilization (Meeker, 2011).

HEART DISEASE

- Other than age, total serum PCB concentration is the strongest determinant of any range of blood pressure, including hypertension (Goncharov et al., 2010; Goncharov et al., 2010).

- Residents living in communities adjacent to the Hudson River, which contains high levels of PCBs, had an increased rate of hospitalization for coronary heart disease by over 35% and for acute myocardial infarction by nearly 40% (Sergeev, 2005).

- High levels of PCBs cause the liver to make more cholesterol and lipids, which then increase the risk of cardiovascular disease (Goncharov et al., 2008).

- Elevated blood serum concentrations of PCBs were positively associated with self-reported history of cardiovascular disease among females (Ha, Myung-Hwa et al. 2007)

IMMUNE SYSTEM

- PCBs are associated with immune system disruptions including increases in B cells and decreases in CD8+ and natural killer cells (Svesson, 1994).

- Babies, in this case Dutch newborns, with higher prenatal PCB exposures had reduced immune response after vaccination for measles, mumps and rubella (Weisglas-Kuperus, 2000).

- Reduced antibodies against diphtheria and tetanus later in childhood were associated with higher PCB exposure in toddlerhood (Barrett, 2010).

- PCB exposure altered lymphocyte distributions, decreased wheeze, and increased otitis media (Weisglas-Kuperus, 2004).

- Children living in the Faroe Islands where the diet includes PCB-contaminated whale blubber exhibited decreased antibody response after vaccination against tetanus and diphtheria. This effect was associated both with the concentrations of PCBs in their mothers' blood during pregnancy and milk soon after birth, and in the children's own blood at the time of the study (Heilmann, 2006).

INHALATION

- Inhalation of PCBs was associated with multiple system disturbances including "significant serum thyroid hormone elevation" and "[h]istopathologic changes … in the urinary bladder, thymus, and the thyroid" during animal testing (Casey, 1999).

- Inhalation is a major exposure pathway for PCBs and may lead to a greater uptake of PCBs than ingestion (Currado, 2008).

LIVER DISEASE

- Low-level environmental PCB pollution was associated with the development of liver disease and suspected nonalcoholic fatty liver disease (Cave, 2010).

PERSISTENCE OF PCB BODY BURDEN OVER TIME

- Elevated levels of PCBs can persist in the human body over many years (Seegal, 2010).

PRENATAL & INFANT EXPOSURE

- Even low level prenatal exposure to PCBs may affect thyroid hormone homeostasis (Chevrier, 2007).

- Prenatal exposure to PCBs may affect growth, especially in girls (Lamb, 2006).

- Growth deficits were also seen among infants born in eastern Slovakia, where a chemical manufacturing plant produced PCBs until 1985 (Hertz-Picciotto, 2003)

- Lower thymic index, which is an estimate of the volume of the thymus, an organ that plays a role in the differentiation and maturation of t-lymphocytes (T-cells, a critical part of the immune system), was also observed in infants born near a PCB producing manufacturing plant (Park, 2008).

- Associations were reported between prenatal PCB and p,p-DDE exposures and poor attention in early infancy, including alertness, quality of alert responsiveness, and cost of attention (Sagiv, 2008).

RESPIRATORY EFFECTS

- Adults and children have an increased risk of asthma and infectious respiratory diseases when exposed to persistent organic pollutants, including PCBs (Carpenter, 2008; Ma, 2007).

- There is a relationship between PCB exposures and lowered levels of immunoglobulins M and A (IgM and IgA) and increases in respiratory infections (Nakanishi, 1985).

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