

O Vasiliu et al. *Epidemiology* (2006) Vol. 17 p 352 – 359

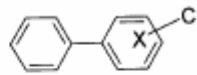
**Polybrominated Biphenyls (PBB), Polychlorinated Biphenyls (PCB), Body Weight, and Incidence of Adult-Onset Diabetes Mellitus**

This study finds evidence that exposure to PCBs is associated with increased risk of adult onset diabetes 25 years after exposure (PCB concentrations greater than 5 ppb in blood samples) was confirmed. The association only applied to women. There was no link with PBBs. PCBs are still found in food, decades after strict controls were introduced.

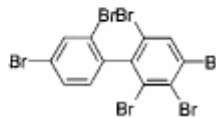
Adult onset diabetes (AOD) is probably caused by insulin resistance (where the target organs and tissues fail to react properly to insulin) or by a deficit in insulin production (perhaps because the insulin production mechanism fails to trigger properly). There is no evidence of autoimmunity in AOD but strong evidence of familial risk factors. Recognised risk factors also include age and obesity.

PCB and PBB are thought to have biological half lives in excess of 5 years. They accumulate in fatty tissue and have biological activity that could, theoretically, interfere with insulin regulation.

Poly chlorinated bi-phenyl (PCBs)



Poly brominated biphenyl (PBBs)  
E.g. hexabromo-1,1'-biphenyl  
CAS 36355-01-8



This study began in 1976 and was followed up until 2001. At baseline, exposure to PCB and PBB was determined by blood analysis. Diabetes status, body mass index, smoking and alcohol consumption were controlled for.

The study was prompted by inadvertent addition of PBB to the food web via farm animal feed; the mistake was discovered 8 months later. PCBs were used in this area of the USA until the year after the study began and were found at high levels in local fish for several years afterwards.

After legitimate exclusions from the study, the 25 year follow up was based on 1,384 persons (99.8% white). At baseline, 13% were obese, 24% were smokers and 60% ever consumed alcohol. At 25 years there were 180 cases of adult onset diabetes, corresponding to 13% of the final population. 53% of these cases had developed diabetes within 15 years of baseline.

There was no association between baseline PBB blood levels and adult onset diabetes in men or women. There was no association between PCB and adult onset diabetes in men. However for women with more than 5 ppb PCB as baseline the risk of adult onset diabetes more than doubled. The only other risk of comparable magnitude was associated with BMI  $\geq 30\text{kg/m}^2$ . Smoking appeared to have no effect on risk.

**Comment**

The risk of adult onset diabetes in women exposed to PCB was more than doubled when concentrations in blood exceeded 5 ppb. Risk increased slowly as exposure increased. That there was no effect from PBB tends to reinforce the likelihood that this is a genuine effect; both chemicals would be taken up from food.

Use of PCBs has been highly regulated for several decades but exposures could still be occurring e.g. as a result of fires, scrap and waste processing. Surveys of food find PCBs are quite common. PCBs will pass through intact skin. The Workplace Exposure Limit (8hours) is  $0.1\text{mgm}^{-3}$ .