

# Protective Role of Antioxidant Vitamins against Polychlorinated Biphenyls-Induced Detrimental Changes in Insulin Signaling and Glucose Oxidation in Liver of Adult Male Rats <sup>†</sup>

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**Abstract:** Diabetes mellitus is one of the world’s most common chronic diseases as changing lifestyles and exposure to contaminants. One such contaminant is polychlorinated biphenyls (PCBs). PCBs are absorbed through the skin, lungs, and GI tract and are transported by the blood to the liver and muscles, and it has been shown to have a negative influence on glucose homeostasis. However, the mechanisms underlying the specific effects of PCB on insulin signaling molecules and glucose homeostasis in hepatocytes are unclear. The study aimed to assess the protective role of antioxidant vitamins (Vitamin C & E) in PCB-induced male Wistar rats. Adult male albino rats were divided into three groups. Group 1-Control; Group 2-PCB treated (2mg/kg b.wt/day for 30 days); Group-3: PCB+vitamin E (50 mg/kg body weight) and C (100 mg/kg body weight) dissolved in olive oil and distilled water, respectively, once daily through gastric intubations for 30 days. After completion of treatment, liver tissues were dissected out to assess various parameters. PCB exposure to normal rats caused hyperglycemia and hyperinsulinemia with a concomitant increase in the levels of H<sub>2</sub>O<sub>2</sub>, OH\*, and LPO. It significantly impaired the expression of insulin receptor (IR) and reduced the glucose transporter-2 (GLUT2) mRNA, glucose uptake, and oxidation and glycogen concentration in the liver. Blood glucose and insulin levels were also elevated as a result of these changes. Our present findings clearly show that PCB exposure affects glucose oxidation in the liver and is mediated through enhanced lipid peroxidation, impaired IR, and GLUT 2 expression. Hence, it is concluded that antioxidant vitamins (C and E) have a protective role against the adverse effect of PCB.

**Keywords:** PCB; Antioxidant vitamins; insulin resistance; liver.

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## **Conflicts of Interest**

The authors declare no conflict of interest.