

IMMUNOLOGICAL EFFECTS OF BACKGROUND EXPOSURE TO POLYCHLORINATED BIPHENYLS AND DIOXINS IN DUTCH TODDLERS

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Introduction

Prenatal exposure to polychlorinated biphenyls (PCBs) and dioxins is associated with changes in the T-cell lymphocyte population in healthy Dutch infants. We investigated whether these changes persist into later childhood and whether background exposure to PCBs and dioxins is associated with the prevalence of infectious or allergic diseases and humoral immunity at toddler age.

Material and Methods

The study group consisted of 207 healthy mother-infant pairs. Prenatal exposure to PCBs and dioxins was estimated by the sum of PCBs 118, 138, 153 and 180 (Σ PCB) in maternal and cord plasma and in breast-fed infants by the total toxic equivalent (TEQ) level in human milk. Current exposure was estimated by the Σ PCB in plasma at 42 months of age. The prevalence of infectious and allergic diseases was assessed by parent questionnaire. Humoral immunity was measured by detecting antibody levels to mumps, measles and rubella after primary vaccination. Immunological marker analyses of lymphocytes were done in a subgroup of 89 children.

Results and Discussion

At toddler age prenatal PCB exposure was associated with an increased number of T-cells as well as CD8+ (cytotoxic), TcR $\alpha\beta$ + and CD3+HLA-DR+ (activated) T cells, lower antibody levels to measles, a higher prevalence of chickenpox, and less shortness of breath with wheeze while current PCB exposure was associated with a higher prevalence of recurrent middle ear infections and a lower prevalence of allergic reactions.

Conclusion

In Dutch toddlers the effects of perinatal background exposure to PCBs and dioxins persist into childhood and might be associated with a greater susceptibility to infectious diseases. Common infections acquired early in life may possibly prevent the development of atopy and therefore PCB exposure might be associated with a lower prevalence of allergic diseases.

