

# DECREASED VACCINATION RESPONSES IN CHILDREN WITH PRENATAL AND POSTNATAL EXPOSURES TO IMMUNOTOXICANTS

**Philippe Grandjean**, University of Southern Denmark, Odense, Denmark, and Harvard School of Public Health, Boston, USA

**Elisabeth Wreford Andersen**, University of Copenhagen, Denmark

**Esben Budtz-Joergensen**, University of Copenhagen, Denmark

**Pal Weihe**, Faroese Hospital System, Torshavn, Faroe Islands

**Flemming Nielsen**, University of Southern Denmark, Odense, Denmark

**Carsten Heilmann**, National University Hospital, Copenhagen, Denmark

**Background and Aims:** Polychlorinated biphenyls (PCBs), perfluorinated compounds (PFCs), and methylmercury may cause immunotoxic effects, but the human health significance of this potential is unknown. We assessed the possible adverse effects on serum concentrations of specific antibodies against childhood vaccines.

**Methods:** Within a cohort of 656 singleton births formed in the Faroe Islands during 1999-2001, we measured serum antibody concentrations against tetanus and diphtheria at ages 5 years (before and after a booster vaccination) and at 7 years. We analyzed PCBs, PFCs, and mercury concentrations in blood samples from pregnancy and the child at ages 5 and 7 years. The results were analyzed by regression analysis and structural equation models.

**Results:** A total of 587 children participated in the examinations at ages 5 and/or 7 years. Both PCBs and PFCs revealed negative associations with antibody concentrations. The strongest associations suggested a decrease in the antibody concentration by about 20% for each doubling in PCB exposure and up to 50% for a doubling in PFC exposure. The risk of having an antibody concentration below a clinically protective level of 0.1 IU/L increased with the exposures.

**Conclusions:** Immunotoxicant exposure in children affects their serum concentrations of specific antibodies against vaccination toxoids, thereby counteracting the intended protection offered by childhood vaccinations. These observations may potentially reflect a more general immune system dysfunction, which could have wider implications.