Serum Vaccine Antibody Concentrations in Children Exposed to Perfluorinated Compounds
- DTU Orbit (08/08/2016)

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Context Perfluorinated compounds (PFCs) have emerged as important food contaminants. They cause immune suppression in a rodent model at serum concentrations similar to those occurring in the US population, but adverse health effects of PFC exposure are poorly understood. Objective To determine whether PFC exposure is associated with antibody response to childhood vaccinations. Design, Setting, and Participants Prospective study of a birth cohort from the National Hospital in the Faroe Islands. A total of 656 consecutive singleton births were recruited during 1999-2001, and 587 participated in follow-up through 2008. Main Outcome Measures Serum antibody concentrations against tetanus and diphtheria toxoids at ages 5 and 7 years. Results Similar to results of prior studies in the United States, the PFCs with the highest serum concentrations were perfluorooctane sulfonic acid (PFOS) and perfluorooctanoic acid (PFOA). Among PFCs in maternal pregnancy serum, PFOS showed the strongest negative correlations with antibody concentrations at age 5 years, for which a 2-fold greater concentration of exposure was associated with a difference of -39% (95% CI, -55% to -17%) in the diphtheria antibody concentration. PFCs in the child's serum at age 5 years showed uniformly negative associations with antibody levels, especially at age 7 years, except that the tetanus antibody level following PFOS exposure was not statistically significant. In a structural equation model, a 2-fold greater concentration of major PFCs in child serum was associated with a difference of -49% (95% CI, -67% to -23%) in the overall antibody concentration. A 2-fold increase in PFOS and PFOA concentrations at age 5 years was associated with odds ratios between 2.38 (95% CI, 0.89 to 6.35) and 4.20 (95% CI, 1.54 to 11.44) for falling below a clinically protective level of 0.1 IU/mL for tetanus and diphtheria antibodies at age 7 years. Conclusion Elevated exposures to PFCs were associated with reduced humoral immune response to routine childhood immunizations in children aged 5 and 7 years.

General information
State: Published
Organisations: Harvard School of Public Health, University of Southern Denmark, Statens Serum Institut, Faroese Hospital System, Copenhagen University Hospital, University of Copenhagen
Authors: Grandjean, P. (Ekstern), Andersen, E. W. (Intern), Budtz-Jørgensen, E. (Ekstern), Nielsen, F. (Ekstern), Mølbak, K. (Ekstern), Weihe, P. (Ekstern), Heilmann, C. (Ekstern)
Keywords: (United States North America Nearctic region, Primates Mammalia Vertebrata Chordata Animalia (Animals, Chordates, Humans, Mammals, Primates, Vertebrates) - Hominidae [86215] human common child female, male, diphtheria antibody, diphtheria toxoid, perfluorooctane sulfonic acid PFOS 1763-23-1 perfluorinated compound, perfluorooctanoic acid PFOA 335-67-1 perfluorinated compound, tetanus antibody, tetanus toxoid, 12512, Pathology - Therapy, 15002, Blood - Blood and lymph studies, 15004, Blood - Blood cell studies, 22002, Pharmacology - General, 22005, Pharmacology - Clinical pharmacology, 25000, Pediatrics, 34508, Immunology - Immunopathology, tissue immunology, 36002, Medical and clinical microbiology - Bacteriology, Clinical Immunology, Infection, Pediatrics, Pharmacology, diphtheria Diphtheria (MeSH) bacterial disease prevention and control, tetanus Tetanus (MeSH) bacterial disease prevention and control, humoral immune response, maternal pregnancy, Human Medicine, Medical Sciences, serum blood and lymphatics, vaccination clinical techniques)
Pages: 391-397
Publication date: 2012
Main Research Area: Technical/natural sciences

Publication information
Journal: J A M A: The Journal of the American Medical Association
Volume: 307
Issue number: 4
ISSN (Print): 0098-7484
Ratings:
BFI (2015): BFI-level 2
BFI (2014): BFI-level 2
BFI (2013): BFI-level 2
ISI indexed (2013): ISI indexed yes
BFI (2012): BFI-level 2
Scopus rating (2012): 5.943 10.1
ISI indexed (2012): ISI indexed yes
BFI (2011): BFI-level 2
Scopus rating (2011): 5.902 10.146
ISI indexed (2011): ISI indexed yes
BFI (2010): BFI-level 2