

Project information

Project title

ARCRISK - Time trends and modeling

Year

2012/2013

Project leader

Torkjel Sandanger, UiT/NILU

Participants

- Department of Community Medicine, University of Tromsø, Vivian Berg (PhD student), Jon Ø Odland (prof), Evert Nieboer (prof)
- NILU , Knut Breivik og Torkjel M Sandanger
- UNN, Ole Martin Fuskevåg

Flagship

Hazardous substances, Theme: Human health and society

Funding Source

Fram Centre, Helse Nord

Summary of Results

Results: Summed median POP concentrations (lipid-adjusted, > 60% detection) in 1986, 1994, 2001 and 2007 amounted to 88%, 49%, 47% and 34%, respectively, of those in 1979. Declines were observed in all compound groups with the exception of CHLs. Overall, monotonic decreases were observed from 1979 in wet weight concentrations of HCHs, HCB, c-chlordane, DDTs and most penta- and hexa- chlorinated PCBs. Declining trends of many POPs were exponential, especially for p,p'-DDT.

Conclusions: Longitudinal declines in legacy POPs were observed in sera of men from Northern-Norway during 1979-2007, and likely reflect concurrent reduced environmental exposures. In contrast to the frequent cross-sectional observations of POP concentrations increasing with age, our findings confirm longitudinal decreases of POP concentrations in individuals in this aging population. Our adaptation of age-period-cohort (APC) effects to the biomonitoring of POPs is novel and reveals that passing of calendar time has a major influence, although additional birth cohort patterns were indicated. Predicted and observed concentrations and time trends for four PCBs were in good agreement. The APC analysis and emission-based modeling emphasize that time trends in the human burden of POPs are linked to historic emissions and environmental exposures.

Published Results/Planned Publications

Submitted paper to Environmental Health Perspectives:

Persistent organic pollutants in males from 1979 to 2007:

- Intra-individual changes, age-period-cohort effects and model predictions

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Communicated Results

1) The International Polar Year 2012 Conference - From Knowledge to Action, Montreal, Canada Apr 23rd 2012

Session: Human Health and Well-being, including Food Security

Title: Longitudinal Study of Persistent Organic Pollutants in Men from Northern Norway (1979-2008): Elucidating Trend Concepts Relevant for Predicting Future Exposures

2) 4th Norwegian Environmental Toxicology Symposium – Emerging challenges and threats in the Arctic, Tromsø, Norway Oct 18th 2012

Session: Modelling in environmental toxicology

Title: Longitudinal study of persistent organic pollutants in men from Northern Norway (1979-2008): individual changes and model predictions

3) The Fram Webinar: Hazardous substances – effects on ecosystems and human health Nov 22th 2012

Title: Decreasing POP concentrations in human males from 1979 to today

Interdisciplinary Cooperation

This project is based on inter-disciplinary research and could not be done without it. Environmental chemistry, epidemiology, statistics, theoretical modeling.

Budget in accordance to results

The Fram Centre Funding has allowed for determination of a broad range of contaminants, modeling of concentrations on an individual and population basis. This has resulted in unique data sets and the possibility to make better prediction for the future.

The large modeling tasks are ongoing where individual concentrations are estimated on the basis of age, dietary intake, number of children and breast feeding time.

Could results from the project be subject for any commercial utilization

No

Conclusions

The connection between modeling and intra individual data has resulted in collaboration with Canada on similar types of models for newborns. Through these new connections we will be able to much more reliably predict human doses as a factor of time and age. In future risk assessment projects this enable us too incorporate exposure much more accurately.