

NRP Endocrine Disruptors

Final Summary

Original project title Brominated flame retardants and their transformation products: Occurrence in the environment and human exposure to these endocrine active components (FLARE)
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Project number 4050-66536

Exposure to brominated flame retardants

Brominated flame retardants may display effects of endocrine disruptors. Here, exposure to these chemicals as well as their transformation products will be investigated in the environment, in animals and in humans.

Research questions

Flame retardants are additives for materials such as plastics, textiles and timber. Brominated flame retardants are currently produced in quantities of several 100,000 tons, annually. There are several recent scientific studies that show endocrine disruptive activity of brominated flame retardants. Some brominated flame retardants exhibit the typical characteristics of persistent organic pollutants (POP), they accumulate in the food chain and are distributed all over the world by long-range transport. The objective of our project was the investigation of environmental levels as well as animal and human exposure to several classes of brominated flame retardants, including their environmental transformation products.

Results

Brominated flame retardants are present in the Swiss environment. PBDE – flame retardants used to treat polyurethane foams and plastics – were found in fish from lakes and rivers, in sewage sludge and even in foxes roaming in the city of Zürich. There was, however, no indication for a link between PBDE concentrations in brown trout and the levels of vitellogenin – a biological marker used to check for effects on the endocrine system of this fish. Comparing sewage sludge from the 1990's and today showed that the concentrations of the flame retardant DecaBDE increased by a factor of five within the last ten years, reflecting the growing popularity of these

plastic additives. We could show that DecaBDE – a flame retardant considered to be safe by the current EU-risk assessment – is not stable but is transformed in sewage sludge to substances that are suspected to show higher biological activity than the original product. We were also able to show that HBCD – another widely used flame retardant – is present in fish from Swiss lakes and that the structure of this high production volume chemical is more complex than previously perceived.

Perspectives

An important activity of the project FLARE was the communication of our results at the OECD Clearinghouse meeting on brominated flame retardants to delegates from various national agencies and industry. In April 2004, we started a new project to investigate the role of endocrine disruptors in air (ENDAIR), a field which is barely explored. Another project, dealing with the environmental fate of brominated flame retardants and gonad malformations occurring in whitefish at Thunersee is currently being planned.