SWISS NATIONAL SCIENCE FOUNDATION

www.snf.ch
Wildhainweg 3, P.O. Box 8232, CH-3001 Berne

Division for Targeted Research
National Research Programmes
nfp@snf.ch

NRP Endocrine Disruptors

Final Summary

Original project title **Occurrence and Fate of Endocrine Disrupting Chemicals in the Air (ENDAIR)**
Project leader **Andreas C. Gerecke**
Project number **4050-104378 / 1**

Endocrine Disrupting Chemicals in the Air (ENDAIR)

Endocrine disrupting chemicals cause negative health effects in humans and wildlife as they interfere with the hormone system. However, the exposure to endocrine disrupting chemicals present in the air is largely unknown, yet. Within the NRP50 project ENDAIR, we investigated links between the emission of endocrine disrupting chemicals by human activities and their environmental concentrations.

Research questions

The first objective was the elucidation of sources and degradation processes of brominated flame retardants. Brominated flame retardants are a topic of high concern due their chemical and toxicological properties. We measured concentrations of brominated flame retardants in settled house dust in home and office settings and studied their photodegradation.

The second objective was to assess the occurrence of known and unknown endocrine disrupting chemicals in air and respirable airborne particulate matter (PM10). Our approach was to combine biological assays and chemical analysis. We studied the emission of endocrine disrupting chemicals by heavy duty diesel engines and the potential of diesel particulate filters to reduce these emissions.

Results

Brominated flame retardants were detected in all analyzed dust samples from home and office environments. Concentrations varied between 10 micrograms per kilo settled dust and 100 mg per kilo settled dust. These concentrations were similar to data reported in other European stud-

ies. Based on all these data, we conclude that intake of settled house dust is an important route of exposure for brominated flame retardants, especially for small toddlers.

A special focus was put on the photodegradation of decabromodiphenyl ether, a key process for this widely used brominated flame retardant. Contrary to previously published data, we were able to show that photodegradation on surfaces is very fast. However, irradiation of decabromodiphenyl ether on surfaces leads to the interim formation of more toxic compounds. These compounds exhibit dioxin-like toxicity and possess a higher bioaccumulation potential.

To elucidate important sources of endocrine disrupting chemicals, we studied their emission by heavy duty diesel engines and the effect of diesel particulate filters on these emissions within. To this end, we combined biological methods with chemical analysis. Comparison of chemical and biological analysis revealed that additional yet unknown endocrine disrupting chemicals are present in diesel exhaust. But most importantly, our experiments show that diesel particulate filters do not only reduce the emission of fine particulate matter, they also reduce the emission of endocrine disrupting chemicals.