

Project information

Keywords

Hazardous substances

Project title

Transformation properties and environmental risk associated with pharmaceutical residues in the Arctic

Year

2015

Project leader

Roland Kallenborn

Participants

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Flagship

Hazardous Substances

Funding Source

Flagship "Hazardous substances" = 200 kNOK

UNIS (Pollutants on Svalbard) = 50 kNOK

Summary of Results

During the initial phase of the project a new method for QUEChERS based multicomponent analysis of relevant pharmaceuticals was developed as a part of a still ongoing Masters project at NMBU/UNIS (Siri Havstein Aspnes). The method validation, 2.5 L sewage water from the outlet of Longyearbyen (Svalbard) was collected in June 2015). The water samples were extracted with an already established high volume solid phase method on HLB columns (WATERS, Milford, CA) after filtration (Whatman, GF/C 24 mm, 1.2 µm pore). Aliquots of 2 sewage water samples and one blank sample are currently analysed for the following substances at NMBU, NORUD and evt. NILU: Metronidazole, Ciprofloxacin, Ketoprofen, Trimetoprim, Prednisolone, Sulfamethoxazole, Tetracycline, Penicillin G; 13C3 caffeine is used as internal standard. In addition, the following substances are purchased as standards for the extension of the method after a QUEChERS approach is established during winter 2015/2016: Ethinyl Estradiol, Atorvastatin, Acetylsalicylic acid, Simvastatin, Metoprolol, Lersatan, Amlodipine, Zopiclone as well as 13C-Ibuprofen as additional internal standard.

The method currently under development is based on the study by Cerqueira et al. (*Cerqueira M.B.R., Guiherme J.R., Caldas S.S., Martins M.L., Zanella R., Primel E.G. (2014) Evaluation of QuEChERS method for the extraction of pharmaceuticals and personal care products from drinking water treatment sludge with determination by UPLC-ESI-MS/MS. Chemosphere 1007:74-82.*) The method will be available for application in early spring 2016.

Plans for 2015: Representative samples from three Arctic locations (Effluent, influent and biota) will be collected from three Norwegian Arctic settlements/towns: Tromsø, Longyearbyen, Kirkenes. The QuEChERS based method will be applied and distribution profiles will be determined. The method will be refined and implemented into the analytical programs of NORUD, NILU and NMBU. A first environmental toxicological study will be performed in close collaboration with our Russian partners from SRCES RAS). Preferably, the study will be performed as MSc project in close collaboration with all partners involved.

For the Management

Currently the focus of the initial year is laid on chemical analysis. We expect that the entire project group will be involved during the application and sample collection phase in 2016.

Published Results/Planned Publications

no published results

Communicated Results

no communication results

Interdisciplinary Cooperation

Collaboration between environmental analytical chemists, environmental toxicologists as well as regulatory authorities already established.

In addition, the Local sanitation experts in the respective sampling location will be actively involved during field work.

Budget in accordance to results

The economic frame is still in accordance with the expected budget.

Could results from the project be subject for any commercial utilization

No

If Yes

not applicable

Conclusions

The project is planned as a pilot study specifically aiming at validating methods for characterization of biochemical transformation processes and assessment of environmental effects. A QuEChERS based multi compound analysis method is currently under development and will be applied in sample materials (Sewage, effluent, biota) from three Arctic locations. The field work is planned for 2016.