

BASIC INFORMATION ON SUB-PROJECT

NAME OF PROGRAMME/FUND	Scholarship Fund - Sciex NMS ^{ch}
RESEARCH FIELD AND OTHER RESEARCH FIELDS INVOLVED (if applicable)	Chemistry, Environmental Sciences
TITLE OF THE SUB-PROJECT	Xenogluccorticoids - exposure and effects
REGION OF THE CZECH REPUBLIC (according to the location of the home institution)	South Moravian Region
GRANT AMOUNT SPENT	60197,46 CHF
INTERMEDIATE BODY	Swissuniversities
HOME INSTITUTION	Masaryk University, Faculty of Science, Research Centre for Toxic Compounds in the Environment (RECETOX)
HOST INSTITUTION	Eawag Environmental Toxicology
NAME OF THE FELLOW	Petra Macíková

ABSTRACT OF THE SUB-PROJECT

In the environment, there are complex mixtures of natural and synthetic compounds that can enter and negatively affect aquatic ecosystems. Some of these compounds are called endocrine disrupters because they can disrupt hormonal signaling in organisms. Glucocorticoids are among the hormones that regulate key physiological processes such as immune response, energy metabolism, stress response etc. Disturbed glucocorticoid action has been associated with several adverse effects and diseases including teratogenicity, obesity, type 2 diabetes or inflammatory and autoimmune diseases. Disruption of glucocorticoid signaling by chemical compounds can occur via direct interaction with the glucocorticoid receptor (GR) or via indirect impact on other functional molecules and regulatory enzymes. This project aims at (i) screening of the potential of environmental samples (municipal and hospital wastewaters) to bind to the GR, (ii) identification of compounds responsible for GR-like or antagonistic activity in tested environmental samples, and (iii) screening of the potential of pure glucocorticoid-like chemicals and samples to indirectly influence the glucocorticoid action. The methods used in this research will be (i) in vitro reporter gene assay screening for direct activation or inhibition of GR, (ii) effect/bioassay directed analysis of samples with GR-like activity using LCMS/MS leading to identification of active compounds, and (iii) MolDarT assay (including development of specific primers for real-time PCR assessment of gene expression) for investigation of indirect impacts on glucocorticoid signaling. Beside the increase of personal experience and knowledge of the fellow, further expected outcomes of the project will be presentations at conferences and research paper(s).

MAIN RESULTS

Scientific results of the project have been published in international peer-reviewed journals (1, 2) and as a part of the fellow's dissertation thesis (3), and presented at international conferences (4–8).

1. Macikova P., Groh K. J., Ammann A. A., Schirmer K. and Suter M. J. F. (2014). Endocrine disrupting compounds affecting corticosteroid signaling pathways in Czech and Swiss waters: potential impact on fish. *Environmental Science & Technology*, 48(21): 12902–12911. (IF=5.481)
2. Ammann A. A., Macikova P., Groh K. J., Schirmer K. and Suter M. J. F. (2014). LC-MS/MS determination of potential endocrine disruptors of cortico signalling in rivers and wastewaters. *Analytical and Bioanalytical Chemistry*, 406(29): 7653–7665. (IF=3.578)
3. Macikova P. (2014). Bioassays for studies of specific toxicity in mixtures of environmental contaminants. Masaryk University, Brno, Czech Republic.
4. Macikova P., Groh K. J., Ammann A. A., Schirmer K. and Suter M. J. F. (2014). Combination of Fish Plasma Model with GR-CALUX bioassay and chemical analysis to assess environmental risks of glucocorticoid-like compounds. European Society of Toxicology In Vitro (ESTIV) 2014 International Conference, June 10-13, Egmond aan Zee, The Netherlands (poster).
5. Macikova P., Ammann A. A., Groh K. J., Schirmer K., Suter M. J. F. (2013). Glucocorticoid-like compounds detected in wastewater and river water samples from the Czech Republic and Switzerland. In SETAC Europe 23rd Annual Meeting, 12-16 May 2013, Glasgow, UK (platform presentation).
6. Ammann A. A., Macikova P., Groh K. J., Schirmer K., Suter M. J. F. (2013). Determination of glucocorticoid- and mineralocorticoid-active compounds in waste and river waters by LC-MS/MS. ASMS 61st Conference on Mass Spectrometry & Allied Topics, 9-13 June 2013, Minneapolis, Minnesota, US (poster).
7. Macikova P., Otto C., Ammann A. A., Groh K. J., Schirmer K., Suter M. J. F. (2012). Assessment of the effects of glucocorticoid receptor-active compounds by GR-CALUX assay. 1st European Conference on the Replacement, Reduction and Refinement of Animal Experiments in Ecotoxicology (Euroecotox conference). Dübendorf, Switzerland 28-29/06/2012 (poster).
8. Macikova P., Otto C., Groh K. J., Ammann A. A., Schirmer K., Suter M. J. F. (2012). Contamination of riverine ecosystem by glucocorticoid-active compounds: effects on molecular level. 3rd SETAC CEE Annual Meeting, Krakow, Poland 17-19/09/2012 (poster).

DATE OF REALISATION OF THE FELLOWSHIP

1.10.2011 - 30.9.2012

MORE INFORMATION ON THE
PROGRAMME

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