Technische Universität Berlin

Innovationszentrum
„Wasser in Ballungsräumen“

Geschäftsstelle

Einladung zum Vortrag

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Technische Universität Berlin
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Bioanalytical tools for water quality assessment

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The last decades have seen an increase in research activities in the evaluation of organic chemicals that may pollute the aquatic environment and our drinking waters. While the majority of existing research has focused on identification and quantification of individual chemicals by chemical analysis techniques, effect-based methods have emerged in recent years to complement exposure-based measures of chemical contaminations that are obtained by chemical analysis. These new effects-based methods include *in vitro* bioassays, and there are an ever-increasing number of bioanalytical tools that hold great promise for applications to water quality assessment.

Bioanalytical tools are cell-based bioassays that target specific mechanisms of toxicity and give a measure of the toxicity of mixtures of known and unknown chemicals, such as pesticides, industrial chemicals, pharmaceuticals and their transformation products. Bioanalytical tools provide measures of the cumulative effects of chemicals that exhibit the same mode of toxic action, for which the selected bioassays are indicative plus they can give a measure of the cytotoxicity of all chemicals acting together in a water sample. Improved detection of the presence of chemicals in water enhances risk assessment and informs water management options, among them water recycling from impaired sources such as sewage, coal seam gas water, or stormwater harvesting and reuse.

In this presentation the design of a modular battery of bioassays will be presented and some illustrative examples from recent applications in South East Queensland, Australia. The bioassays were selected from the three main categories of modes of action, namely non-specific, receptor-mediated specific and reactive toxicity. This bioanalytical test battery was used for monitoring organic micropollutants and disinfection by-products across an indirect potable reuse scheme testing sites across the complete water cycle from sewage to drinking water to assess the efficacy of different treatment barriers, including source control, wastewater treatment plant, microfiltration, reverse osmosis, advance oxidation, natural environment in a reservoir and drinking water treatment plant.

Professor Beate Escher is Deputy Director of the National Research Centre for Environmental Toxicology (Entox) in Brisbane, Australia, which is a joint venture between the University of Queensland and Queensland Health. Beate Escher received her PhD in Environmental Chemistry from the Swiss Federal Institute of Technology in Zürich, ETHZ, Switzerland. In 2002 she completed her habilitation in Environmental Toxicology and Chemistry ETHZ. She held a previous appointment as group leader at the Swiss Federal Institute of Aquatic Science, Eawag, in Dübendorf, Switzerland and was lecturer at ETHZ. Her research interests focus mode-of-action based environmental risk assessment, including methods for initial hazard screening and risk assessment of pharmaceuticals and pesticides, environmental transformation products, and mixtures. More practically oriented aspects of her work include passive sampling and effect-based methods for water quality assessment.