

INTEGRATED METHODS OF BIOLOGICAL ANALYSIS AND EFFECT-DIRECTED ANALYSIS (EDA) TO GUIDE SAFE REUSE OF WATER

Abstract

This project establishes an integrated workflow of biological analysis and effect-directed analysis (EDA) to guide the safe reuse of water. By combining optimized bioassays with non-targeted chemical analysis, the EDA approach enables the identification of candidate chemicals contributing to observed toxicity, even without synthetic standards. A suite of in vitro assays targeting key endpoints such as estrogenic response, oxidative stress, and genotoxicity was optimized and recommended for different sample types, providing a robust screening framework. The EDA workflow has been successfully established and applied to treated water assessment, with the next phase focusing on monitoring water from NEWater Factories to ensure safety and sustainability in water reuse practices..

The EDA workflow for water monitoring

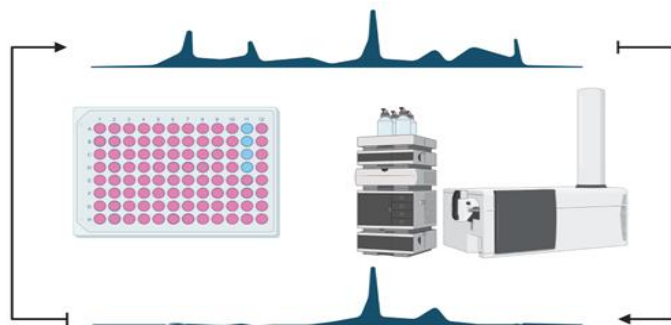
1. Sampling, extraction and concentration



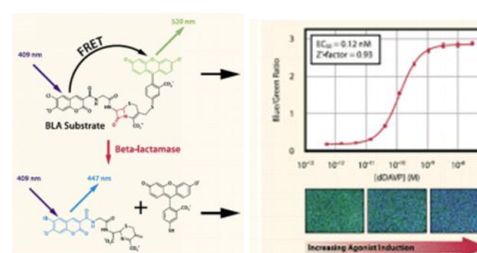
2. Toxicity assessment using bioassays



3. Fractionation, bioassay screening and non-targeted analysis to find candidate compounds/ compound groups



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Validate and optimize various bioassays for use in environmental sample testing (4 reporter cell lines, real-time mitochondrial stress test, imaging-based assays)

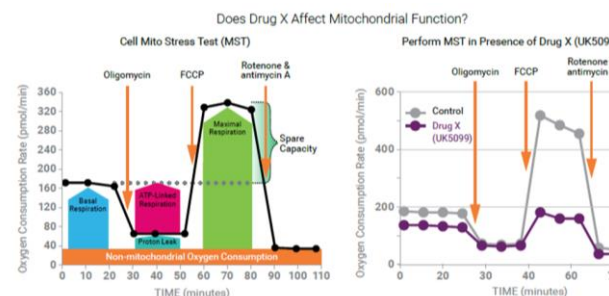


Figure 2. Left: Agilent Seahorse XF Cell Mito Stress Test assay design and output parameters; Right: MST after pretreatment of the cells with UK5099.

