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Use of cell-based receptor assays to screen for endocrine disrupting chemicals and infer potential toxicity in California waters

Alvine C. Mehinto¹, Darcy VanDervort¹, Kevin Kroll², Steve Bay¹, Nancy Denslow², Keith Maruya¹

¹*Southern California Coastal Water Research Project Authority, Costa Mesa, CA, USA*

²*University of Florida, Gainesville. FL, USA.*

Abstract

In vitro cell assays are being considered as bioanalytical screening tools for water quality assessment. Recent studies have shown that they can be used to benchmark water of different qualities, suggesting they can provide valuable information in monitoring programs to identify sites requiring further chemical and toxicity analyses. In this study, commercially available cell assays previously optimized for water quality screening were applied to detect endocrine disrupting chemicals (e.g. estrogens and glucocorticoids) in various aqueous samples from California (USA). Results revealed that secondary treated wastewater effluents had the highest levels of endocrine activity while the majority of freshwater streams analyzed showed little to no bioactivity. To further evaluate the potential of bioscreening cell assays to predict toxicity, a study was conducted to characterize the relationship between in vitro and in vivo responses induced by estrogenic chemicals. Larvae and juveniles of the inland silverside, *Menidia beryllina* were exposed to two estrogenic chemicals and biological endpoints including growth and gene expression changes were evaluated. Our findings indicate that in vivo effects occur at concentrations higher than in vitro responses, thus highlighting the potential of cell assays as screening tools for both occurrence and adverse effects of chemicals in the environment.