

**DETERMINATION OF ENDOCRINE DISRUPTORS IN WATER
USING LIQUID CHROMATOGRAPHY TANDEM MASS SPECTROMETRY**

Matthew Rosenow *

ABSTRACT: Recent reports continue to show the alarming effects that endocrine disrupting compounds (EDCs) have on the environment. Compounds that have the potential to disrupt normal endocrine function include pharmaceuticals, personal care products, steroids and pesticides. Concentrations of these contaminants at picograms to nanograms / Liter (pg-ng/L) in environmental waters have been shown to disrupt normal developmental growth and reproductive functions for aquatic wildlife. At the Arizona Department of Health Services Public Health Laboratory, we are focused on the development of methods for the analysis of emerging contaminants in Arizona water samples using liquid chromatography tandem mass spectrometry (LC-MS/MS). The triple quadrupole feature of LC-MS/MS provides the means for complex analytical analysis. This ability allows us to detect and quantify compounds of interest with high selectivity and sensitivity. To demonstrate our capability for analytical analysis, an initial set of 35 EDCs was selected. This representative set encompasses a broad range of compounds and were chosen due to their environmental impact concerns. For each compound, optimal ionization conditions were determined and mass spectrometry was monitored using multiple reaction monitoring (MRM). The two most intense precursor/product ion transitions were selected and used for subsequent quantitative analysis on water samples collected from sources around the Phoenix area. Within the representative set, steroid sex hormones are of particular interest and are the subject of ongoing and future research projects involving wastewater treatment plants. Estradiol (E2), ethynyl estradiol (EE2), progesterone and testosterone were used to demonstrate differences in ionization conditions. These four steroids were subject to ionization using electrospray ionization (ESI) and atmospheric pressure chemical ionization (APCI), both under positive and negative polarization. For each ionization condition, two solvent systems, methanol and acetonitrile, were screened to determine the optimal organic phase. Formic acid and ammonium acetate were added to both the aqueous and organic phase and screened to determine their effect on chromatography and ionization. Sensitivity for each ionization condition was judged by injecting 2.5-10 pg on column multiple times and comparing the intensity of the resultant peaks with a signal-to-noise (S/N) ratio greater than 3.

* Public Health Scientist, Arizona Department of Health Services, State Laboratory, 250 N. 17th Avenue, Phoenix, AZ 85007, USA, Phone: 602-400-1008, Fax: 602-364-0281, Email: rosenom@azdhs.gov