

## **Do Iodine Contrast Media Compounds used for Medical Imaging Contribute to the Formation of Iodinated Disinfection By-Products in Drinking Water?**

Susan D. Richardson<sup>1</sup>, Stephen E. Duirk<sup>1</sup>, Cristal Lindell<sup>1</sup>, and Thomas A. Ternes<sup>2</sup>

<sup>1</sup> U.S. EPA, National Exposure Research Laboratory, Athens, GA

<sup>2</sup> Federal Institute of Hydrology, Koblenz, Germany

Iodinated disinfection byproducts (DBPs) have recently gained attention due to their cyto- and genotoxicity and increased formation in drinking water treated with chloramine (1), which has become an increasingly popular disinfectant in the United States. One of these—iodoacetic acid—is more genotoxic than the DBPs that are currently regulated (1). The primary source of iodine in the structures of these iodo-DBPs is believed to be naturally occurring iodide in the source waters (lakes, rivers, etc.). However, in a recent occurrence study, significant concentrations of iodo-DBPs were detected in a few cases where iodide was below detection or very low in concentration in the source waters (1). As a result, other potential sources of iodine are being explored, including iodinated X-ray contrast agents used for medical imaging (e.g., magnetic resonance imaging, or MRIs). These X-ray contrast agents are resistant to wastewater treatment and have been recently found widespread environmental contaminants in Europe (2). When some of the U.S. source waters were analyzed for these contrast agents, three X-ray contrast agents (iopamidol, iopromide, and iohexol) were found at significant levels in several of these waters. Liquid chromatography (LC)/mass spectrometry (MS)/MS was used for their measurement. As a result, we are currently investigating the reaction of these contrast agents with chlorine and chloramine under drinking water conditions in the laboratory to determine whether iodo-DBPs (iodo-trihalomethanes and iodo-acids) can be formed from them. Preliminary results involving the reaction of chlorine and chloramine (at 2 different pHs) with iopamidol and local source waters have shown the formation of all 6 iodo-trihalomethanes and one iodo-acid (iodoacetic acid). Proposed DBP formation pathways, as well as iodo-DBP speciation will be discussed.

1. Richardson, S. D.; Fasano, F.; Ellington, J. J.; Crumley, F. G.; Buettner, K. M.; Evans, J. J.; Blount, B. C.; Silva, L. K.; Waite, T. J.; Luther, G. W.; McKague, A. B.; Miltner, R. J.; Wagner, E. D.; Plewa, M. J., Occurrence and Mammalian Cell Toxicity of Iodinated Disinfection Byproducts in Drinking Water. *Environ. Sci. Technol.* **2008**, ASAP.

2. Ternes, T. A.; Hirsch, R., Occurrence and behavior of X-ray contrast media in sewage facilities and the aquatic environment. *Environ. Sci. Technol.* **2000**, 34, (13), 2741-2748.