Study shows coastal water, not sediment, predicts mercury contamination

February 18 2014

A Dartmouth-University of Connecticut study of the northeast United States shows that methylmercury concentrations in estuary waters—not in sediment as commonly thought—are the best way to predict mercury contamination in the marine food chain.

The findings raise questions about current mercury cleanup practices, and shed new light on the different ways in which the toxic metal bioaccumulates in aquatic species, from bottom-dwelling worms to forage fish to larger fish consumed by humans. Results of the study will appear Feb. 18 in the journal *PLOS ONE*. A PDF of the study is available on request.

"Our paper shows methylmercury's impact on food webs is not simply based on sediment contamination but is far more complex and appears based on the flux of methylmercury from sediments to the water column or even methylmercury transported via water from other parts of the watershed," says Professor Celia Chen, principal investigator and a project leader of Dartmouth's Toxic Metals Superfund Research Program.

Mercury released into the air through industrial pollution is turned into its most toxic form, methylmercury, in coastal sediment, streams and oceans. The Dartmouth-UConn team studied 10 estuaries from New Jersey's Hackensack Meadowlands to the Gulf of Maine. They found that methylmercury concentrations in the water, not the sediment, predicted methylmercury concentrations in killifish and Atlantic

silversides, and that concentrations were higher in these forage fish than in bottom-feeding worms. Concentrations in sediment only predicted contamination levels in the worms.

The findings suggest that mercury assessment and remediation, which currently focus on sediment contamination, should instead focus on measuring methylmercury in water column particles, which may be contaminated by the local pollution source or reflect sources outside of the specific estuary. "Our results across a broad range of sites demonstrate that the pathways of methylmercury to lower level estuarine organisms are distinctly different between organisms in the sediment and forage fish," Chen says. "Thus, even in systems with contaminated sediments, transfer of methylmercury into estuarine food webs may be driven more by the amount of methylmercury available in the water column."

Provided by Dartmouth College