

Report for 2001CA3841B: Is Urban Runoff a Source of Human Pathogenic Viruses to Recreational Beach Waters?

- Articles in Refereed Scientific Journals:
 - Sunny C. Jiang and Weiping Chu, Urban Runoff as a Source of Human Viral Contamination to Southern California Recreational Beach Waters, Water Research, submitted

Report Follows:

Is Urban Runoff a Source of Human Pathogenic Viruses to Recreational Beach Waters?

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Project Summary

To assess the impact of urban runoff on the coastal water quality, water samples were collected at 21 sites in 11 rivers and creeks along the Southern California coast for bacteriological and virological examinations during summer 2000. The water samples were tested for the presence of three types of human viruses (adeno, entero and hepatitis A viruses) using nested- and RT-PCR methods. In addition, they were tested for three types of fecal indicator bacteria (total coliform, fecal coliform and enterococcus) as well as the somatic and F-specific coliphage.

Human viruses were detected in sample volume as low as 105 ml of water. Hepatitis A viruses were the most frequently found, and were detected in 81% of water samples we collected at the urban rivers of Southern California. All of sites that tested positive for adenovirus (52%) were also positive for entero and hepatitis A viruses. The fecal indicator bacteria were found in all of the water samples examined. There was, however, not a clear relationship between fecal indicator concentrations and the presence of human viruses in the water. At the site where the quality of its water ranked second best in terms of the bacterial indicators, all three types of human viruses were detected.

To understand the seasonal dynamics of pollutant loads from the urban runoff, water samples were collected at the mouths of the Los Angeles River, the San Gabriel River, and the Santa Ana River during both the wet and dry seasons. Human viruses were most frequently found at the mouth of the Los Angeles River. In general, both fecal indicator bacteria and human viral densities of the water at the river mouths were associated with storm events. The first storm of the wet season most likely carried a heavy pathogen load and were expected to impact the coastal water quality more than subsequent storm events. Urban runoff is a major contributor to coastal water pollution.

Publications

Sunny C. Jiang and Weiping Chu, Urban Runoff as a Source of Human Viral Contamination to Southern California Recreational Beach Waters, *Water Research*, submitted

Professional Presentations

Sunny Jiang, Pacific Rim Shellfish Conference. San Diego, California. April 4-6, 2001

Sunny Jiang, Ballona Wetland Foundation Conference. Los Angeles, California. May 17-18, 2001

Sunny Jiang, 101st Annual meeting of American Society for Microbiology. Orlando, Florida. May 20-24, 2001

Sunny Jiang, 82nd Annual meeting of American Association for the advancement of Science, Pacific Division, Irvine, California, June 17-20, 2001

Sunny Jiang and Weiping Chu, American Society of Limnology and Oceanography Summer Meeting, Victoria, British Columbia, Canada, June 10-14, 2002

Student Training

Sam Choi, Graduate; Environmental Analysis and Design, UC Irvine.

Miyuki Fujita, Undergraduate, Applied Ecology, UC Irvine

Clifford Tse, Undergraduate, Applied Ecology, UC Irvine

Elaine Jacinto, Undergraduate, Applied Ecology, UC Irvine

Joanne Choe, Undergraduate, Applied Ecology, UC Irvine

Jennifer Cheng, Undergraduate, Applied Ecology, UC Irvine

Desiree Eakin, Undergraduate, Applied Ecology, UC Irvine

Amana Rafigue, Undergraduate, Applied Ecology, UC Irvine

Dalisa Tran, Undergraduate, Applied Ecology, UC Irvine

Kevan Savage, Undergraduate; Applied Ecology, UC Irvine.

Additional Funding

\$400,000. "Real time PCR detection of Human viruses and indicators in water". Water Environment Research Foundation. March 1, 2002 - February 30, 2004.

\$36,179. "Determining the relationship between fecal indicators and human pathogenic viruses in Newport Bay Watershed". August 15, 2001 - August 14, 2002. Contract with City of Newport Beach

Collaborative Efforts

County of Orange, California. Investigation of pollution source at a small watershed of Southern California.