WATER@MICHIGAN –SUMMARY & BIOGRAPHY
MICHELE SWANSON

PRESENTATION SUMMARY

The Flint Legionnaires' disease outbreaks: Questions Raised

Subtheme: *From Rust to Blue*

As scientists and citizens, we hope to share our knowledge of the Flint Legionnaires' outbreaks to develop water quality monitoring processes and public policies that reduce public risk of Legionnaires' disease and other infections.

As microbiologists, my group is keen to understand whether:

- *serogroup 6 L. pneumophila contribute to pneumonia of unknown origin in Southeast Michigan, since the urinary antigen test is specific for serogroup 1*
- *serogroup 6 L. pneumophila survive as well as serogroup 1 bacteria do in water aerosols, the route of bacterial transmission to humans.*
- *in 2014-15, the treated Flint River water altered the ability of L. pneumophila to survive in water or aerosols or to cause disease in the human lung.*

Current efforts in our laboratory are focused on two areas that could guide risk assessment:

- genome sequence analysis to learn whether exposure to the treated Flint River water enriched for particular genetic loci that alter *L. pneumophila* resilience or virulence, a collaboration with Dr. Evan Snitkin's group
- developing laboratory-scale aerosolization assays to compare the resilience of *L. pneumophila* strains of different originis and exposures, as well as serotypes and genotypes, a collaboration with Dr. Herek Clack's group.

In the future, we are also poised to collaborate on the development of a culture-independent diagnostic test for serogroup 6 *L. pneumophila,* which is not detected by the standard urinary antigen test for Legionnaires' disease.

BIOGRAPHICAL INFORMATION

Michele Swanson, Professor, School of Medicine

Contact Info (email/phone): mswanson@umich.edu

Identification of the mechanisms the equip the aquatic bacterium *Legionella pneumophila* to persist in water and infect white blood cells, using molecular genetics, cell biology, and molecular biology.

WATER@MICHIGAN –SUMMARY & BIOGRAPHY
MICHELE SWANSON

Working with the multi-disciplinary and –institutional *Flint Area Community Health and Environment Partnership* with funding from the Michigan Department of Health and Human Services, our team's analysis of the 2014-15 Flint Legionnaires' disease outbreaks identified an association between poor water quality across the city and the risk of Legionnaires' disease. In parallel, our group's residential surveillance study identified in premise plumbing a type of *L. pneumophila* that is not detected by the standard diagnostic test, yet is associated with disease elsewhere and is indistinguishable from clinical strains in laboratory tests of virulence.

- Zahran, S., S. P. McElmurry, P. E. Kilgore, D. Mushinski, J. Press, N. G. Love, R. C. Sadler, M. S. Swanson: Assessment of the Legionnaires' Disease outbreak in Flint, Michigan. *PNAS* 115(8):E1730-E1739, 2018. http://www.pnas.org/content/early/2018/01/31/1718679115
- Byrne B. G., S. McColm, S. P. McElmurry, P. E. Kilgore, J. Sobeck, R. Sadler, N. G. Love, and M. S. Swanson: Prevalence of infection-competent serogroup 6 *Legionella pneumophila* within premise plumbing in Southeast Michigan. *mBio* 9(1): e00016-18, 2018. *http://mbio.asm.org/content/9/1/e00016-18.full*