Mechanical Engineering SEMINAR

Development of an immunochromatographic strip for more sensitive detection of fecal-indicator organism in drinking water

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Contamination of drinking water with pathogenic organisms is one of the most significant health risks to humans. In developing countries diarrhea, it is most common among the water-related diseases and caused by gastrointestinal infections that kill around 2.2 million people globally each year, mostly children in developing countries, including Bangladesh. Field detection at the household level is one relatively unexplored way to address the issue. Two of the simplest and fastest methods were recently tested in Bangladesh tubewell and pond water. The first, a strip-based immunochromatographic assay , on the reaction of antibody and antigen in which a cellulose membrane is used as the carrier and a colloidal gold-labeled antigen or antibody is used as the tracer. The method is similar to home pregnancy tests and results were read within 20 minutes on the basis of formation of colored band on strip. The second, a sulfite reduction test is based on production of hydrogen sulfide (H_2S) by certain group of bacteria that are associated with fecal contamination. After collection and addition of growth medium containing 15 tubewells and 17 ponds, the sample is incubated. The test is considered positive if the water color turns black within 24-48 h, an indication of Fe-sulfide formation. All tubewell and pond samples were also analyzed for the fecal indicator *E. coli* by the widely-used Colilert method, which requires incubation for 24 h in an oven. Both field tests had no problem identifying ponds, but were not sensitive enough for detecting 100-1000 lower levels of contamination in tubewells. Specificity (false positive) of the field-based methods may be an issue too. It has been suggested that enteric anaerobes, such as the *Bacteroides* spp., might be better alternative indicators than *E. coli* because they account for a majority (>30%) of enteric bacterial flora. Moreover, *Bacteroides* spp. survive for a shorter period in the environment compared *E. coli* and are therefore, more likely to indicate recent (fresh) or extensive fecal contamination. This presentation will conclude by outlining the research that could lead to an antibody-based test strip which can detect *Bacteroides* spp in drinking water that would be both more sensitive and more specific indicator of fecal contamination.

Rasel Khan completed his PhD in 2008 at Okayama University, Japan in the area of specialization Molecular microbiology. He earned his MS from the University of Dhaka in Bangladesh, and is currently a Research Fellow at the Graduate School of Medicine, Dentistry, and Pharmaceutical Sciences in Okayama University, Japan.

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11:00 – 12:00pm Room 233 Mudd
12:00pm Lunch in ME Lobby