Speeding up E. coli detection: Laser sheds light on tracking source of microbial contamination on beach

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A simple, automated method of tracking *E. coli* uses a laser to detect and monitor the microbe in potentially contaminated bodies of water or waterways. The technique described this month in the *International Journal of Computational Biology and Drug Design* could reduce the incidence of waterborne disease outbreaks.

Microbial contamination of water is a worldwide environmental and health problem. Water related diseases are the leading causes of illness and death in the world. The impacts of water quality on public health and economy are highly significant as evidenced by waterborne disease outbreaks, boil water advisories, contamination of irrigation waters, and beach closures. Considerable government and private efforts have been made to improve and monitor water quality.

Beach managers need reliable methods to determine the origins of contaminants in order to reduce those sources and maintain a healthy beach. Sources of fecal contamination in recreational waters are often unknown and/or of non-point origins. Identifying and reducing the sources of fecal contamination for a particular beach is often hindered by the presence of multiple and diffuse sources, natural variability in bacterial indicator concentrations over space and time, and the dynamic currents, weather patterns, and natural processes that affect these concentrations.

The Indiana Department of Environmental Management (IDEM), for example, has provided substantial funding support to coastal communities through the BEACH Act to increase the frequency of beach monitoring. Whereas beach monitoring for fecal bacterial indicators such as *E. coli* is necessary, knowing the source of bacterial contamination is fundamentally important for preventing microbial pollution in water. Simple counts of fecal indicator bacteria do not provide vital information regarding the source of microbial contamination. It is thus necessary to develop scientific techniques for microbial source tracking. With knowledge gained from employment of appropriate methodologies, it would be possible to assess risk, choose effective remediation strategies, and bring polluted waters into compliance with regulatory policies.

Now, Bin Chen of Purdue University Calumet, and colleagues there and at the University of Minnesota, St Paul, have turned to a laser technique for potential use in microbial source tracking. Their technique uses laser imaging of bacterial colonies and high-resolution optical scattering image analysis to identify the host species of *E. coli* in a sample.

"The water quality of lakes, rivers and streams in many areas has long been monitored in the government and other agencies," the team says, "however, many of them still do not meet the goal of 'fishable and swimmable' because identifying the source of bacterial contamination is difficult." The new technology, demonstrated by Chen and colleagues, could address that shortfall allowing water contamination to be remediated.

More information: "Laser imaging for rapid Microbial Source Tracking" in *Int. J. Computational Biology and Drug Design*, 2010, 3, 177-186