A high-tech solution for detecting bacteria in water

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Water quality and safety can never be taken for granted. Every day, millions of tons of inadequately treated sewage, industrial and agricultural wastes are poured into the world's lakes, rivers, and oceans - the equivalent of the weight of the entire human population in the form of pollution. Many industries, from food to metal working, require huge quantities of water for their processes and water quality may seriously affect the quality of finished products.

Researchers on an EU-funded project have devised an innovative new way of potentially combating waterborne death and illness.

They have developed a high-tech device designed to detect bacteria in

water. The new system will be able to monitor, in real time, the quality of industrial process water and effluents using an 'opto-ultrasonic' device and lipid- based diagnostic kit.

This is the result of the AQUALITY initiative, a project launched in December 2011 and funded under the EU´s Seventh Framework Programme. The research ended in February and the device is currently undergoing field tests in Norway.

These field tests are of crucial importance for the industry, where water quality impacts directly on production performances, operational costs and sustainability.

The danger posed by pollutants is illustrated by the fact that fresh water contaminated with pathogens used in the preparation of food has been the source of foodborne disease. It is estimated to cause 76m illnesses and 325 000 serious illnesses resulting in hospitalisation and 5 000 deaths in the USA each year alone. The situation in Europe is similar - in the UK, for example, foodborne and waterborne illness affected one in every 1 000 in 2005, doubling the number of reported cases in 1995.

Identifying pollutants in water is, currently, mostly carried out manually through sampling and laboratory analysis (off-line analysis). But existing methods are time consuming and costly, meaning that the number of analyses have to be kept to an absolute minimum.

This is why industry called for both novel and cost-effective solutions and more rapid methods, online and at laboratory scale, for detecting major waterborne pathogens.

The online water monitoring device developed under the AQUALITY project is the first of its kind and is designed to replace routine sampling and lab testing of pathogens. The system will be able to detect a range of

bacteria strains in water, including salmonella, listeria monocytogenes and campylobacter.

The US Department of Agriculture estimates the medical costs and productivity losses associated with these three types of bacteria alone amounts to at least $6.9 billion annually.

AQUALITY involved a multi-member state consortium, coordinated by the Spanish company, ENSATEC.

Jose Manuel Ochoa Martinez, from the project, said the three-year research had produced tangible results, notably a new method for microbiological contamination analysis which will 'rapidly' detect the presence of bacteria strains in water and wastewater. Preliminary results, he noted, are 'really promising and in line with expectations.'

He added, 'The novelty of our approach is the use of engineered liposomes for detecting bacteria in water. This achievement represents a potentially huge competitive advantage for the enterprise proposing it and could open up a significant international market.'

Provided by CORDIS