

Rapid, flexible water analysis creates industry stir

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Credit: CYTO-WATER

The EU-funded CYTO-WATER project has developed an innovative onsite analytical system capable of rapidly detecting different microorganisms in water.

The analytical process, which takes no more than two hours, was validated for the detection of the [microorganisms](#) Legionella and Escherichia coli but can easily be adapted to detect other microorganisms. Rapid detection means that decisive action can be taken; a crucial element in ensuring that any potential disease outbreak is contained.

"Infectious diseases caused by microorganisms are the most common and widespread health risk associated with [water](#), drinking and bathing,"

says the technical director of the project, Dr. Vicente Catalan, from Labaqua in Spain.

"Reducing the risk of waterborne diseases will improve the reputation and competitiveness of businesses such as water distribution companies, hotels, food and beverage industries and chemical plants."

Rapid results

The new platform works by automatically concentrating a water sample, labelling each microorganism under investigation automatically as well. Using a fluorescence image cytometer, each specific labelled microorganism in the sample is detected and counted. "This imaging cytometer is like a kind of microscope without a lens that identifies the presence of a microorganism based on the fluorescence being emitted," explains Dr. Catalan.

One of the main advantages of the system is that it can be implemented onsite, avoiding the need for sending samples to the lab and having to wait days for the results. In the case of Legionella, traditional methods based on culture isolation can take up to 12 days, whereas the CYTO-WATER (Integrated and portable image cytometer for rapid response to Legionella and Escherichia coli in industrial and environmental waters) platform provides conclusive results in just two hours. "This is a disruptive advantage in the rapid diagnosis of quality threats to environmental and industrial waters," says Dr. Catalan.

Another advantage is that each of the three modules involved in sampling, labelling and counting pathogens can be sold individually, opening up a potentially far wider market. The automatic labelling module for example could be adapted to the workflow of laboratories of different sectors such as hospitals and universities.

"CYTO-WATER is a universal platform with applications for any waterborne microorganism," underlines Dr. Catalan. There is huge potential here, from monitoring *Pseudomonas* and *Mycobacterium* in hospital facilities to spoilage and pathogen detection in food and beverage plants."

High specifications

To get to this point, the CYTO-WATER project team had to successfully overcome a number of key technical challenges. For example, water samples must be concentrated in order to improve the detection of pathogens, and the imaging cytometer has to be sensitive and robust enough to meet stringent regulatory standards. Different modules of the platform were adapted and validated individually to make sure they met with market specifications. "Another challenge was integrating the technologies involved in the concentration, labelling and detection of pathogens within a miniaturised analytical system," adds Dr. Catalan.

Operational performance under real conditions was then evaluated. An environmental and economic comparison with traditional spot sampling indicated that CYTO-WATER was more environmentally efficient for *Legionella* detection, and is less costly due to the need for less personnel and transportation.

Following official completion of the project in May 2018, new business and exploitation plans are being drawn up to consider how manufacturing costs can be further refined. Commercial analyses will also be conducted to determine the level of customer demand for the platform and its individual modules.

"The results we achieved in detecting *Legionella* and *E. coli* demonstrate the technical capabilities of the system," says Dr. Catalan. "However,

market studies for other applications still need to be conducted, to fully assess the business potential."

Provided by CORDIS

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