A fast method for the detection of somatic coliphages, used as indicators of water fecal pollution

Executive summary

A UB team with a wide experience working with bacteriophages as indicators of fecal pollution in water has developed a new approach for the evaluation of somatic coliphages. This is a group of phages from fecal origin infecting a specific strain of *Escherichia coli*. Somatic coliphages are already applied in some international water management policies (eg in US, Canada or Australia).

The method developed is based in the use of a host strain genetically modified that allows detection of up to 10 somatic coliphages in 2 hours. This is by far the fastest microbiological method detecting culturable microorganisms for the determination of fecal pollution in waters.

The team is searching for a company able to generate an easy to use packaging based on this method.

Introduction

Fecal pollution in water is one of the main causes of health problems around the world, and is associated with several thousand human mortalities per day by serving as a source of pathogen transmission. Classically bacterial indicators are used for determination of the levels of fecal pollution in waters.

Many studies confirm that bacterial indicators do not provide enough information about the occurrence of non-bacterial pathogens such as viruses and protozoa in water. Therefore other indicators are advisable. Bacteriophages have been proposed as viral fecal indicators and particularly somatic coliphages are numerous, easy and cheap to detect. The current method for detection of somatic coliphages is standardized in an ISO protocol (ISO 10705-2) and allows enumeration of the phages by visualization of lytic plaques of lysis in 18 hours.

Somatic coliphages have been introduced in some water management policies. However, the lack of an easy test for their determination limits the implementation of somatic coliphages in many laboratories, despite their good performance as fecal indicators.

Description

This invention uses the same host strain and media than the ISO protocol. The method consists on a genetically modified *E. coli* host strain.

This strain is grown in the liquid medium containing a substrate commercially available. When the strain grows in this medium without phages the color of the medium is yellow. When the strain grows in the medium in the presence of phages, the phages cause the lysis of the bacterial cells and the medium color changes to blue by degradation of the substrate.

In the presence of somatic coliphages, the phages cause the lysis of the strain and the medium turns blue within 2-3 hours incubated at 37ºC. Time for visible reaction is dependent on the phage concentration in the sample and could be shorter at high phage densities. The system allows detection of up to 10 phages/tube.

Advantages

- End-users can obtain the fastest method for detection of faecal pollution and get objective results almost in real-time (2-3 hours).
- Users using this method will need basic laboratory equipment only (just a 37ºC incubator).
- Can be used for presence/absence or adapted to quantification testing with a Most Probable Number approach.

Current stage of development

The strain has been constructed and tested using the standardized media with the substrate. Phages from a stock and phages from natural samples have been assayed in laboratory conditions. At this stage we are evaluating variations to reduce the limit of detection.

Goal

The group is looking for license, but other collaborations may be considered.

Intellectual Property

This project is protected by an international patent submitted on November 2013.

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Contact

Jordi Vallès
Email: jvalles@fbg.ub.es
Tel: +34 93 403 19 95