REPORTER GENE CONSTRUCT SENSITIVE TO QUEUOSINE LEVELS

Researchers from the Department of Molecular Evolution at the Center of Astrobiology (CAB), INTA-CSIC, have developed a method for measuring queuosine levels.

Discovery of a new method for detecting queuosine, a new target for preventing bacterial infections and biofilms

Applications

DETECTION KIT FOR CLINICAL AND BIOTECHNOLOGICAL RESEARCH:

- **For the study of complex diseases** in healthcare centers, hospitals, and research centers.
- **Reporter system for antibiotic resistance research.** High-throughput screenings of compounds/genes that inhibit queuosine.
- **Measurement of molecules in the nanomolar range.**

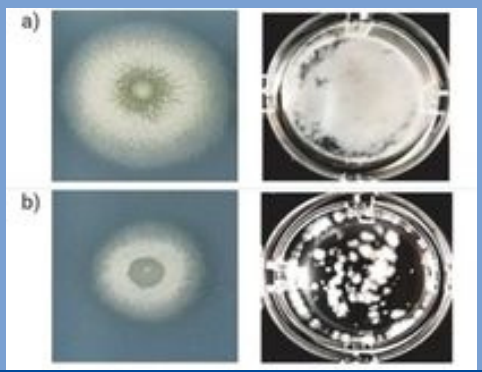

Figure 1. Q+ (a) and Q- (b) bacteria culture (*).

Description

The method proposed is suitable for the quantification of queuosine levels. This is a nucleoside present in bacterial and eukaryotic transfer RNA, which is **linked to biofilm formation, virulence, and complex human diseases**. The method involves the creation of an artificial genetic construct containing a gene for a fluorescent protein and a regulatory region that controls its expression depending on the levels of queuosine or its precursors in a sample. Apart from bacterial infections, queuosine has been associated to various pathologies related to microbial dysbiosis, such as chronic intestinal diseases. Moreover, multiple studies have addressed its potential role as an antitumoural molecule.

In addition to its therapeutic application, the discovery of this mechanism provides a better understanding of the process of bacterial community formation, virulence control, and adaptation to extreme conditions.

Advantages

- It allows the measurement of queuosine or its precursors in a **straightforward, cost-effective, and secure** manner.
- It may serve as a **simple and scalable detection tool** for antimicrobial surveillance.
- It provides high sensitivity, operating at **very low concentrations** (in the nanomolar range), which is crucial for early detection.
- It could be used to prevent and combat problems related to biofilms and infections caused by a **wide range of bacterial species.**

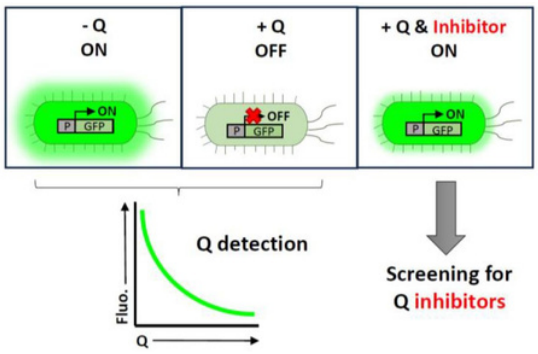

Figure 2. Schematic diagram of the technology operation.

(*) Nucleic Acids Research, Volume 51, Issue 18, 13 October 2023, Pages 9821–9837 https://doi.org/10.1093/nar/gkad667).

Stage of development

This technology has already been protected under a **Patent application.** Its current TRL is **TRL 4**. The development of the kit should not take longer than a few months.

The represented institution is looking for a collaboration that leads to a commercial exploitation of the presented invention and subsequently the potential transfer of the technology. However, the form, terms, and conditions of the collaboration can be openly discussed.

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