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Inventors

Joshua LaBaer

Vel Murugan

Merica Vorachitti

Rahul Pannala

Douglas Faigel

Contact

Jovan Heusser
jovan.heusser@skysonginnovations.com

qPCR Based Test to Detect and Quantify Infectious Carbapenem Resistant Enterobacteriaceae (CRE)

Carbapenem-resistant Enterobacteriaceae (CRE), such as Klebsiella and E. coli, are a family of bacteria that have become resistant to commonly used antibiotics. CRE infections are more common in hospitals, nursing homes and other healthcare facilities and are especially dangerous because their antibiotic resistance makes them difficult to treat. In medical procedures that utilize reprocessed and hard-to-clean equipment, such as duodenoscopes, it is particularly important to test for CRE to prevent contamination and possible transmission. Current tests cannot discriminate between live and dead CRE, resulting in false positives and expensive cleaning and sterilization procedures. Thus, development of a reliable, realtime monitoring method to detect live pathogens on endoscopes will have direct and immediate clinical applicability.

Researchers at the Biodesign Institute of Arizona State University in collaboration with colleagues at the Mayo Clinic have developed a rapid qPCR based diagnostic test to discriminate and quantitate live CREs. This method can be used to quantitate the amount of live bacteria present in any patient derived clinical samples or reprocessed medical equipment. As a diagnostic assay, this assay could significantly decrease the cost and time to report microbial burden or microbial limits test to identify live pathogen load in clinical samples. This method also allows a rapid assessment of the presence of antibiotic resistance genes or gene mutations.

This test has an advantage over other techniques that quantitate total bacterial load without discriminating viability of the pathogens in that it enables early, sensitive and specific laboratory confirmation of live CREs.

Potential Applications

- Testing of medical equipment to discriminate and quantitate live CRE on medical equipment
 - o Duodenoscope & other endoscopes
 - o Catheters, ventilators, IVs, etc.

- Testing of patients for CREs to determine if the medical equipment should be subject to extensive expensive cleaning processes after the procedure

Benefits and Advantages

- Can distinguish between live and dead CRE
- The ability to detect live and dead CREs by qPCR could decrease resource utilization and improve efficiency by targeting contaminated medical equipment for additional sterilization
- Beneficial to facilities that do not have ready access to reference laboratories or chemical sterilization facilities
- Rapid – provides a result within a few hours (2-3) of sample acquisition
- Allows a rapid assessment of the presence of antibiotic resistance genes or gene mutations
- Reduced cost per test

For more information about the inventor(s) and their research, please see [Dr. LaBaer's departmental webpage](#)