Rapid, Culture Free Detection of Microbial Quorum Sensing Molecules by Raman and Surface Enhanced Raman Spectroscopic Methods

Published date: May 10, 2017

Technology description

Novel methods for detecting Quorum Sensing Molecules (QSMs) as biomarkers of infectious disease using sensitive methodologies that work directly on clinical specimens.
This technology has the potential to provide early warning of infectious disease, allowing antimicrobial therapies to be quickly optimized. This innovation of rapid, culture-free microbiological diagnostics will provide timely clinical intelligence necessary to effectively combat potentially lethal infections in at risk patient populations.

Background

Most diagnostic methods are hampered by the need for a microbiological culture step, which causes a delay of at least 24-48 hours before the organism is identified. In patients with septic shock, significant immune compromise and meningitis, treatment delay may increase the potential for mortality. Cancer patients receiving cytotoxic antineoplastic therapies are at high risk for infection due to neutropenic status, which compromises innate immune inflammatory responses, and frequent occurrence of mucositis. 70% of these patients require emergent care. Empiric antimicrobial therapy should be initiated within an hour of triage, and each hour of delay is associated with an 18% increase in mortality. Thus, there exists an urgent need for rapid, culture-free diagnostics for infectious disease. Microbial biofilms growing on surfaces of host tissue and medical device materials play an important role in the establishment and maintenance of infections. Bacteria and fungi readily form biofilms, which are often highly resistant to antimicrobial therapy and may disperse to disseminate infection. The process of biofilm growth and dispersal is regulated by microbial soluble small molecule messengers termed Quorum Sensing Molecules (QSMs). Different types of bacterial and fungal pathogens use unique classes and structures of QSMs. Therefore, QSMs could be a basis for classification of infectious disease from a patient specimen.

Technology Description

Researchers at the University of New Mexico and the University of Colorado, Colorado Springs have developed novel methods for detecting Quorum Sensing Molecules (QSMs) as biomarkers of infectious disease using sensitive methodologies that work directly on clinical specimens. This technology has the potential to provide early warning of infectious disease, allowing antimicrobial therapies to be quickly optimized. This innovation of rapid, culture-free microbiological diagnostics will provide timely clinical intelligence necessary to effectively combat potentially lethal infections in at risk patient populations.

Publications

Laser-Fabricated Plasmonic Nanostructures for Surface-Enhanced Raman Spectroscopy of Bacteria Quorum Sensing Molecules

Application area

Rapid, culture-free detection of microbial Quorum Sensing Molecules
Potential to provide early warning of infectious disease, allowing antimicrobial therapies to be quickly optimized
Classification of infectious disease from a patient specimen
Provides timely clinical intelligence necessary to effectively combat potentially lethal infections in at risk patient populations

Institution

The University of New Mexico

Inventors

Anatoliy Pinchuk
Aaron Neumann

Ke Jiang

联系我们

叶先生

电 话：021-65679356

手 机：13414935137

邮 箱：yeyingsheng@zf-ym.com