CHAPMAN UNIVERSITY | Office of Research

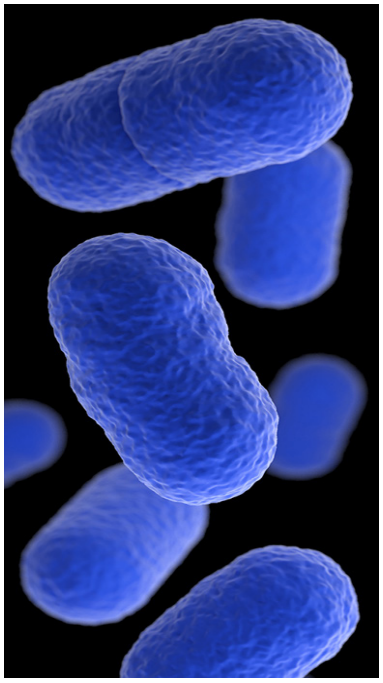
Rapid Selective Detection of Bacteria

Chapman Case #17-03

Market Need

Food borne illnesses such as listeriosis, caused by a bacterium called *Listeria monocytogenes*, can be very dangerous with a mortality rate as high as 40%. *Listeria monocytogenes* can also grow at 4°C at which many ready-to-eat perishables such as cheese, milk, meat, and vegetables are commonly stored. Therefore, fast and effective detection method for *L. monocytogenes* is needed to help minimize outbreaks of this type of bacteria.

Chapman Solution



Professor Kamaljit Kaur and her team at Chapman University have developed a new peptide-based biosensor platform that can rapidly and specifically detect listeria bacteria in contaminated foods and liquids. Traditional microbiological and biochemical assays used to detect and identify pathogenic bacteria are time-consuming and labor-intensive to use. The more recent polymerase chain reaction method enables high throughput analysis but is also time-consuming to use and is known to generate false-positive results. The immunological method uses antibodies for selective detection of pathogens and is specific, sensitive, and precise, but the use of antibodies makes it comparatively expensive.

Chapman's biosensor platform employs antimicrobial peptides (AMPs) for specific binding and detection of L. monocytogenes, using impedance spectroscopy, microcantilever or fluorescence microscopy techniques. The AMPs can be highly specific for pathogenic bacteria, are easy to synthesize, and have exceptional stability. *In addition to being capable of specifically detecting listeria bacteria rapidly (detection time between 45-50 mins from a 10-microliter sample with a low limit of detection), Chapman's biosensor system is also compact, portable, not labor-intensive, and comparatively inexpensive.*

Applications

- Portable detection of listeria bacteria in contaminated foods and liquids
- Can be developed into easily integrable quality control tool in water quality management
- The simple steps involved with this biosensor platform allow the detection to be automated

Key Publication

- Peptide-Based Biosensor Utilizing Fluorescent Gold Nanoclusters for Detection of Listeria Monocytogenes, ACS Applied Nano Materials, June 1, 2018.

Intellectual Property

- PCT filed: WO/2019/099467

Stage of Development

- Working prototype demonstrating fast and specific detection of listeria bacteria
- Available for licensing and further research collaborations

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