Liquid Crystal Devices for Detecting and Quantifying Endotoxin

Published date: Feb. 1, 2012

Technology description

Description

Sepsis is a life-threatening systemic inflammatory response syndrome. Approximately 3 in 1,000 people in North America develop sepsis each year, with a mortality rate of 30 to 50 percent.
Gram-negative bacteria account for about 60 percent of sepsis cases. One particular outer membrane component of Gram-negative bacteria, lipopolysaccharide (LPS, also known as endotoxin), is responsible for initiating the septic process. The detection and quantification of endotoxin thus is critically important in a range of health-related contexts.
Most current methods for detecting or quantifying endotoxin are based on the Limulus Amoebocyte Lysate (LAL) assay first developed in the 1960s. However, these LAL-based methods are complex and expensive and require the use of skilled technicians and biological reagents. A simple and low cost, yet rapid, sensitive and selective assay for detecting and quantifying LPS is needed.
UW–Madison researchers have developed methods and devices for detecting and quantifying endotoxin using micrometer-sized droplets of liquid crystal dispersed in aqueous solution. The researchers found that LPS triggers anchoring configuration transitions on contact with liquid crystals by changing the energies of topological point defects generated within the liquid crystal microdomains.
In a preferred embodiment, a sensor contains liquid crystal droplets that have a bipolar alignment with two point defects. When the device is exposed to a solution that contains LPS, the alignment of the liquid crystals quickly changes from bipolar (LPS negative) to radial (LPS positive) with one point defect. This change in alignment can be detected easily using polarized light or other means.

Institution

University of Wisconsin

联系我们

叶先生

电 话：021-65679356

手 机：13414935137

邮 箱：yeyingsheng@zf-ym.com