

Bacterial Detection Device for Prevention of Catheter-Associated UTIs

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Technology description

Integrates into Existing Catheters to Detect and Warn of Bacteria Growth

This diagnostic urinary catheter accessory integrates into a urinary catheter to detect very small concentrations of bacterial metabolites and inform medical staff or patients of bacterial presence, enabling easy and early infection prevention. Catheter-associated urinary tract infections (CAUTIs) are the most common type of healthcare-acquired infections, accounting for over 40 percent of all such infections. The growth of bacteria within urinary catheters can spread to the urinary tract and cause CAUTIs, which are responsible for 13,000 annual deaths in the U.S. and \$500 million in healthcare costs annually. Typically, medical personnel cannot tell when a catheter becomes infectious until CAUTI symptoms manifest.

Researchers at the University of Florida have developed a device that fits into existing catheters and changes color when it detects bacterial metabolites at the earliest stages. The device monitors urine flowing through it to detect either changes in urine pH or the presence of nitrites, which are both indicators of the presence of bacteria in the urine. This device has a reversible and immediate pH sensor that allows for a faster and more effective response to the bacterial presence in the catheterized patient than currently available catheter pH and nitrites sensors.

Technology

Catheter-associated urinary tract infections (CAUTI) result when bacteria colonize the catheter and then spread into the urinary tract. The device's collection bag tubing is coated with two different substances that will react with enzymes the bacteria produce. A nanoparticle coating responds with a calorimetric change when it reacts to any present nitrite-producing bacteria. Likewise, a pH-sensitive hydrogel coating detects urease-producing bacteria that generate ammonia and turn the urine alkaline, thus raising the pH level. Both reactions cause the coating to change color, alerting that the catheter should be replaced.

Application area

Device integrates into existing catheters to detect changes in urine pH or the presence of nitrites in the urine, allowing better prevention of catheter-associated urinary tract infections in an enclosed sterile system.

Advantages

Detects both pH changes and nitrite accumulation with high sensitivity, causing an immediate color change that indicates when a catheter needs to be replaced

Changes color according to a range of distinct pH values, allowing for simple and more accurate determinations of changing urine pH levels

Uses a tapered, ribbed tip, ensuring compatibility with various catheter systems

Preserves the sterility of the closed system of the catheter and is disposable following catheter replacement

Detects bacterial presence in catheters early, reducing the rate of catheter-associated urinary tract infections

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