
Early Detection System for Catheter Infections



A research team led by the University of Bath has developed an early warning system for urinary catheter infections, a problem which can cause severe risk to patients' health and costs the NHS an estimated £120 million per year.

Urinary catheters are used in people who have difficulty passing urine naturally and are often used during or after surgery, for patients with enlarged prostates or in some cases to manage incontinence.

100 million urinary catheters are used annually across the globe, but associated infections can be experienced by up to half of patients using catheters long-term and can lead to kidney failure, septicaemia and death.

The research team led by the University of Bath and including scientists from the University of Brighton, has developed a chemical coating that can be applied to the catheter tip, which releases a coloured dye when the urine becomes alkaline due to a bacterial infection.

The prototype system gives a 12 hour warning of infections before they cause blockages, alerting healthcare professionals before an infection takes hold. This avoids the need for treating patients with antibiotics as a precaution, which can increase the worldwide problem of antibiotic resistance.

Dr Toby Jenkins, from the University of Bath's Department of Chemistry, led the team. He explained: "Catheter infections are such a common problem that currently anyone using a catheter for more than seven days is given a course of antibiotics to prevent infection.

"The coating we've developed will give a 12 hour warning before an infection causes a blockage, meaning that only patients with an infection need to be treated with antibiotics.

"This system could therefore not only save lives but also reduce the threat of antibiotic resistance."

Experiments by the researchers, using a glass bladder infection model, and published in the journal [Biosensors and Bioelectronics](#), show that the dye is released around 12 hours before catheter blockage by the infective bacteria (*Proteus mirabilis*). The system therefore gives an early warning to change the catheter and treat the infection before it causes serious damage.

Scarlet Milo, Annett Charitable Trust PhD scholar at Bath and first author of the paper, added: "When an infection develops, the bacteria converts a chemical called urea in the urine into ammonia, raising the pH of the urine.

"The coating we've developed consists of two layers which can be used with existing catheters: the top layer is a pH sensitive polymer which dissolves if the pH rises above 8, indicating infection.

"This exposes the bottom layer of the coating, which is a gel containing a non-toxic dye which is released into the urine drainage bag, turning it bright yellow."

The researchers are now looking to work with an industry partner to develop the prototype further.

Source: [University of Bath](#)

Image Credit: University of Bath

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