Medical Xpress

A new way to detect hidden urinary tract infections

October 26 2018

Researchers in infection biology have developed a new way to detect hidden urinary tract infections. The research was led by Professor Agneta Richter-Dahlfors, head of the Swedish Medical Nanoscience Center at Karolinska Institutet and published in *NPJ Biofilms and Microbiomes*.

Bacteria can persist in the urinary tract for prolonged periods of time, evading capture by the immune system and avoiding detection by modern lab methods. Often, they don't cause any discomfort until an infection flares up resulting in periodic and recurrent urinary tract infections.

Bacteria such as Escherichia coli are known to hide during an infection by encasing themselves in slime. When they grow like this, clusters of bacteria are called a biofilm and they are hard to detect and hard to treat with antibiotics. The research team at Karolinska Institutet decided to tackle the problem by looking for the slime that protects the bacteria, instead of the bacteria themselves.

"E. coli that cause urinary tract infections produce a complex protective matrix around themselves comprising largely of cellulose. We developed a chemical sensor that binds to cellulose and produces measurable output when it is bound," says lead researcher Professor Richter-Dahlfors.

The important part of this new sensor is that humans naturally do not produce any cellulose so if the sensor lights up there is a high probability

that you have an infection. The team wanted to be sure that their sensor would work in the hospital so as soon as they had a proof of concept they quickly moved over into patient samples. The team collected urine samples from Karolinska University Hospital and began testing if their probe would work.

"Urine is much more complex than typical laboratory media used to grow bacteria so we had to check if it would work. After some processing, we found that we were able to get a reliable signal in urine from different patients" said Professor Richter-Dahlfors.

The sensor not only alerts medical staff to the presence of bacteria, but it also gives information of how the bacteria are growing which is very important for treatment. Bacteria growing in biofilms are much more resistant to antibiotics and having this information can help determine the correct course of treatment. As the test is completely non-invasive, it is hoped that it could be used in the future to help diagnose stubborn urinary tract infections in patients.

More information: Haris Antypas et al. Rapid diagnostic assay for detection of cellulose in urine as biomarker for biofilm-related urinary tract infections, *npj Biofilms and Microbiomes* (2018). DOI: 10.1038/s41522-018-0069-y

Provided by Karolinska Institutet