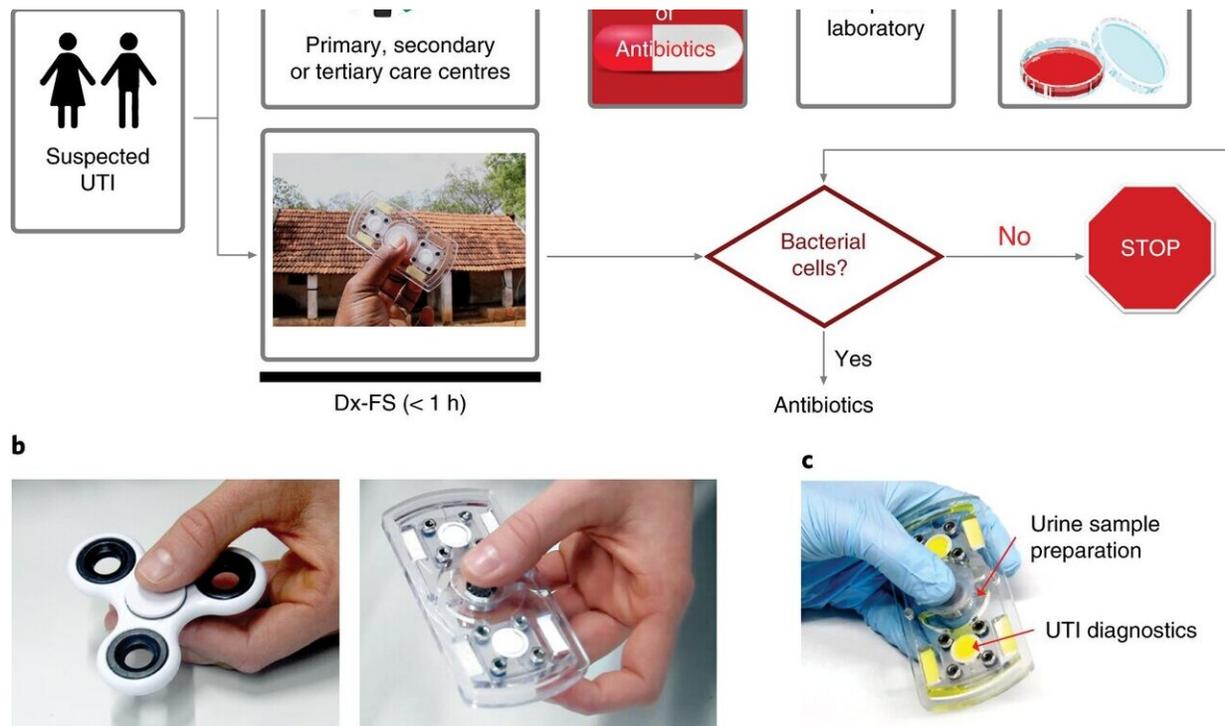


A fidget spinner-like device for speedy detection of UTIs in urine

May 19 2020, by Bob Yirka



The Dx-FS as a POCT device for low-resource settings. a, In developing countries such as India, healthcare is classified into three levels: primary, secondary and tertiary care. Although secondary and tertiary care centres are equipped with laboratories for UTI screening, the same does not exist in primary care centres^{34,35}. Patients seeking intervention with symptoms of UTI predominantly visit primary care centres, and medication is prescribed based on the symptoms rather than a clinical diagnosis. The flowchart shows the diagnosis of UTIs in rural areas by the conventional method that takes about a week, which includes healthcare visits, empirical antibiotic prescription, urine shipment to the laboratory, and urinalysis and culturing at the laboratory. A Dx-FS may process a

urine sample in less than 1 h and obtain equivalent results. b, Fidget spinner (left) and Dx-FS (right). c, Sample enrichment (urine sample preparation) and UTI diagnostics performed by a Dx-FS. d, Design of the Dx-FS with labelled parts. e, Images from a high-speed video showing the operation of a Dx-FS: the device was (i) hand-spun, (ii) spun for 1 min and (iii) stopped. The areas coloured in red denote the liquid flow during the process. f, Angular rotational frequency of the Dx-FS versus time. Credit: *Nature Biomedical Engineering* (2020). DOI: 10.1038/s41551-020-0557-2

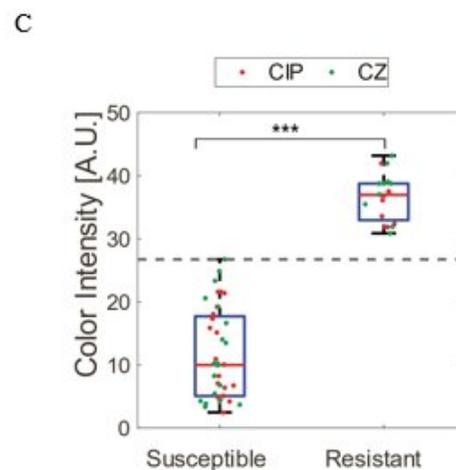
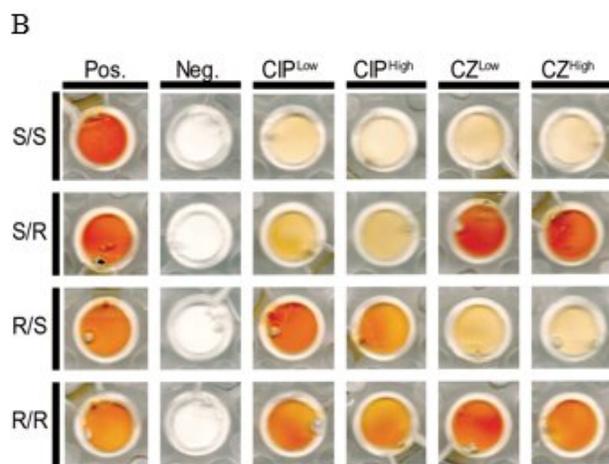
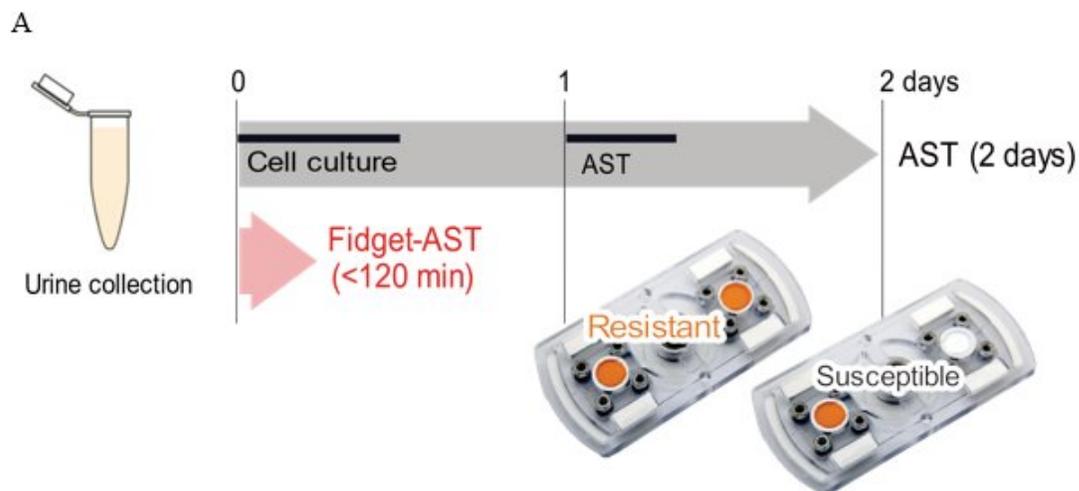
A team of researchers affiliated with multiple institutions in Korea and two in India has developed a fidget-spinner-like device that is able to detect UTIs in urine samples. In their paper published in the journal *Nature Biomedical Engineering*, the group describes how the device works and ways that it might be useful.

Urinary tract infections (UTIs) are a very common condition around the globe. They are much more often found in women and lead to millions of dollars in healthcare costs in addition to the pain and discomfort suffered by those afflicted. UTIs are also very common in [pregnant women](#) and can lead to a wide variety of problems for both the mother and baby. Currently, UTIs are diagnosed by doctors assessing patient-reported symptoms followed by pathogen detection in labs from submitted patient samples—a process that can take many hours or even days, depending on lab conditions. Because of such delays in detection, doctors very often prescribe antibiotics before a confirmation from a lab. This is a problem because over-prescription can lead to bacterial resistance. In this new effort, the researchers have created a device that can be used to diagnose UTIs in just 45 minutes—and it can be done at home without assistance from medical professionals.

The device looks very much like a commercial fidget spinner. Urine samples are placed inside of it and the device spins using hand action.

The spinning motion forces the urine through a [thin membrane](#), leaving any bacteria behind on the inside. If bacteria accumulate on the membrane, it will interact with a dye, revealing its presence. The process involves two spins of the device over the course of 45 minutes. The person performing the test can receive their diagnosis directly from the [device](#) by noting if the dye has been activated.

The researchers note that because it is fast, simple and easy to use, and requires no electricity, it could be deployed in developed countries as well as remote sites with limited access to health care.



Antimicrobial susceptibility test using Dx-FS. Fidget based antimicrobial susceptibility test (Fidget-AST) was carried out with 30 patient origin bacterial cells. (A) Schematic of the Fidget-AST procedure. An antibiotic drug is mixed with the sample for 20 min, followed by a Dx-FS microbial detection assay for 45 min. (B) Two antibiotic drugs, ciprofloxacin (CIP) and cefazolin (CZ) were tested in two dosages according to CLSI guideline. Four cases of both CIP and CZ susceptible, CIP or CZ susceptible/resistant, or both CIP and CZ resistant are shown. (C) Color intensity measures of 30 samples. Dotted line is the cutoff from ROC analysis. Credit: IBS

More information: Issac Michael et al. A fidget spinner for the point-of-care diagnosis of urinary tract infection, *Nature Biomedical Engineering* (2020). [DOI: 10.1038/s41551-020-0557-2](https://doi.org/10.1038/s41551-020-0557-2)

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