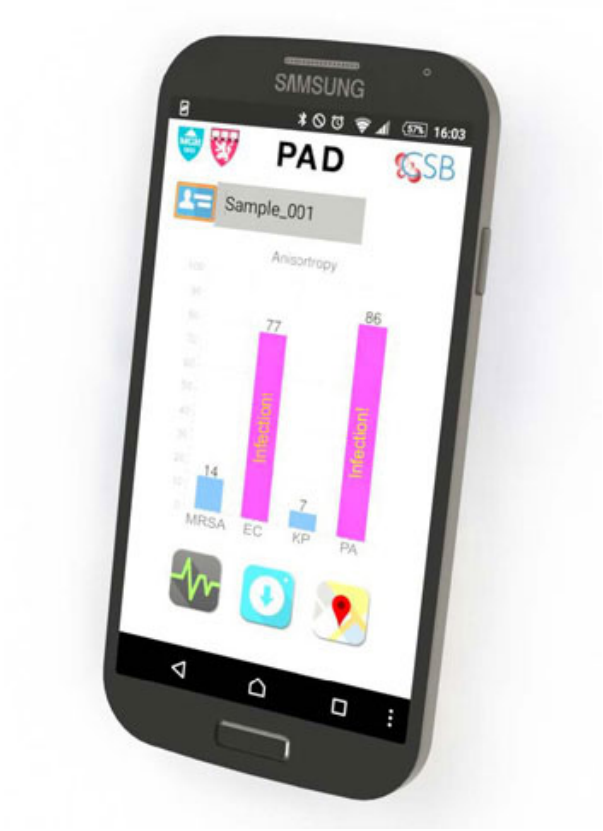
Portable Device Identifies Genes of Nosocomial Infections



At Massachusetts General Hospital researchers have been working on a point-of-care device for diagnosing bacterial infections in hospitalized patients. Currently healthcare-associated infections are identified following the appearance of symptoms, and frequently require slow the incubation of bacterial colonies before using traditional genetic testing techniques.

The system developed at MGH first uses extracted bacterial RNA to amplify it and perform the polymerase chain reaction procedure. The results are loaded into a small plastic vial that has optical sensors built-in. The sensors are able to identify the optical signature of specific RNA sequences that are correlated to the presence of certain bacteria in a process called Polarization Anisotropy Diagnostics.

The system can interface with a tablet or smartphone to display the results and one day may result in a single unified device that performs all the steps from sample ingestion to output.

From MGH:

> *In this proof-of-principle study, the team used a prototype PAD system containing four optical cubes to test clinical samples from nine patients and compared the results with those acquired by conventional microbiology cultures. Testing for the presence of five important bacterial species – E. coli,Klebsiella, Acinetobacter, Pseudomonas, and Staph aureus – and for factors indicating the virulence and antibiotic resistance of specific strains produced identical results with both procedures. But while PAD provided results in less than two hours, the bacterial culture process took three to five days. The team has now designed probes for more than 35 bacterial species and virulence factors, and the overall cost of running the PAD assay should not exceed $2.00.*

> *"This prototype still needs several improvements, including building a self-contained system housing all functions, further reducing the current assay time to less than one hour and expanding the panel of probes to even more pathogens and resistance factors," says Hakho Lee, PhD, of MGH Center for Systems Biology (CSB), co-senior author of the report and an associate professor of Radiology at HMS. "But we can see three immediate applications for a system that can provide such rapid and accurate results — quickly diagnosing a patient's infection, determining whether antibiotic-resistant bacteria are present in a group of patients, and detecting bacterial contamination of medical devices or patient environments."*

Study in *Science Advances*: Rapid identification of health care–associated infections with an integrated fluorescence anisotropy system…

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