



Point-of-Care Technologies Research Network

Quick and accurate testing at the point of initial contact with the patient will improve health care and reduce costs. Point-of-care technologies can increase access to modern medicine and enable earlier diagnosis and treatment of disease.



Point-of-Care Technologies Research Network

The National Institute of Biomedical Imaging and Bioengineering (NIBIB)

created the national Point-of-Care Technologies Research Network (POCTRN) to drive the development of appropriate diagnostic technologies through collaborations that merge scientific and technological capabilities with clinical need. The Network is comprised of four centers, each with an individual research and health care delivery theme. Although each center works individually to accomplish its mission, the Network provides an opportunity for collaboration through multidisciplinary partnerships, coordination of developments, clinical evaluations, and educational activities to advance POC testing in varied health settings.

Point-of-Care Center for Emerging Neuro Technologies (POC-CENT)

University of Cincinnati

Fred R. Beyette, Jr., Ph.D.

<http://www.ece.uc.edu/POC-CENT>

It is estimated that 1 million brain cells die every minute during a stroke. Quick treatment is therefore crucial, and distinguishing between ischemic and hemorrhagic strokes helps determine the appropriate treatment. If a hemorrhagic stroke is quickly and correctly diagnosed, the chances of a good outcome are greater than 90 percent. If misdiagnosed,

that percentage drops to approximately 50. Therefore, time is crucial during a neurologic emergency. The POC-CENT is concentrating its efforts on the development of diagnostic technologies to provide stroke-related information to doctors faster than current technology allows. POC-CENT's current focus is on cerebral spinal fluid testing, which may allow more rapid diagnosis of aneurysmal subarachnoid hemorrhage (SAH) in cases where the hemorrhage is not visible on a CT scan. Future technologies may include the diagnosis of neurological emergencies through the evaluation of blood or urine to bring rapid POC treatment capability to a wide range of medical personnel.

Center for Point-of-Care Technologies for Sexually Transmitted Diseases (POCT STD)

Johns Hopkins University

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<http://hopkinsmedicine.org/medicine/std>

The worldwide burden of sexually transmitted diseases (STDs) is reported to be 340 million cases. Five of the top 10 reportable diseases in the United States are STDs, which bring with them a 3- to 5-fold increased risk for transmitting HIV. Yet, less than one-third of U.S. physicians routinely screen for STDs, and 1 in 2 sexually active people will contract an STD by the time they turn 25. Given these statistics, the need to develop more acceptable and readily available tests for diagnosing STDs is critical. The Center at Johns Hopkins University (JHU) is dedicated to developing new POC assays for STDs that can be used in office or clinical settings. POCT STD plans to compare assays performed by untrained versus trained persons and conduct acceptability testing of STD diagnostic assays. The Center is currently conducting acceptability testing of two assays: a self-administered HIV test and a trichomonas test. The former study is open to visitors to the JHU emergency room while the latter is being conducted among adolescent females at the University of Cincinnati. Focus groups for the assessment of clinicians' and patients' expectations for a POC test for STDs are under way. POCT STD plans to use existing collaborations and partnerships to test future POC assays.

Rapid Multipathogen Detection for POCT and National Disaster Readiness

University of California, Davis

Lawrence Livermore National Laboratory (LLNL)

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The Hurricane Katrina disaster called attention to the lack of POC technologies available in the field. This was particularly problematic during the first critical days following the disaster. The goal of the UC Davis-LLNL Center is to develop POC devices that accelerate diagnosis and treatment of life-threatening bloodstream infections for critical, emergency, and disaster care. These POC devices will prepare our nation

for future disasters by enabling Disaster Medical Assistance Teams to rapidly detect pathogens and provide the data for quick decision making in hospitals and in the field, leading to enhanced patient survival and positive outcomes. POC technologies under development include disposable, hand-held, bench top, and portable devices. The devices created must meet rigorous requirements with respect to accuracy and stability and be able to survive in harsh and changing environments without losing effectiveness. Currently, the Center is focusing on developing a compact, user-friendly POC pathogen detection system for hospital and field use. This system uses LAMP (loop-mediated isothermal amplification) for simultaneous detection of multiple pathogens (e.g., *Candida* sp., *E. coli*, *P. aeruginosa*, *S. aureus*, and *S. pneumoniae*) in human whole-blood samples in less than one hour.

Center to Advance POC Diagnostics for Global Health (GHDx)

PATH

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<http://www.path.org/dxcenter/>

The Center for Point-of-Care Diagnostics for Global Health is working to develop essential diagnostic tests for infectious diseases that can be used in low-resource settings among underserved populations. PATH (Program for Appropriate Technology in Health), an international, nonprofit organization that collaborates with diverse public- and private-sector partners, is collaborating with the University of Washington to manage the GHDx Center. POC devices under development by the GHDx Center will be designed to operate using the restricted resources of low-resource settings such as unreliable sources of power, nonexistent or contaminated running water, unsanitary conditions, poor distribution systems, and lack of trained health care workers. The GHDx Center is currently conducting research around understanding unmet clinical needs that could potentially be addressed by “multiplexed” POC assays (technologies that contain multiple assays in a single device), soliciting new innovative approaches that could bring nucleic acid testing closer to the POC, and developing training courses on infectious disease diagnostics for low-resource settings that bring together assay users with assay developers.

Making critical medical decisions requires timely and relevant diagnostic information, even in places that do not offer advanced medical equipment. The NIBIB created the Point-of-Care Technologies Research Network to develop technologies with clinical applications, using a network model that enhances complementary strengths and building multidisciplinary partnerships. The four POC Centers funded by NIBIB address emerging neurotechnology, sexually transmitted diseases, multipathogen detection for national disaster readiness, and global health.

For more information about the Point-of-Care Technologies Research Network, please contact:

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Rapid Multipathogen Detection for POCT and National Disaster Readiness

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