

Deploying Point of Care Technologies in Limited Resource Settings: Lessons from Cancer, Infection, and Nutrition

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Abstract

A central challenge in global diagnostics is not simply analytical sensitivity—it is reliable deployment. Point-of-care (POC) technologies must function within constraints of limited infrastructure, variable training, fragile supply chains, and complex clinical workflows. In this talk, I will focus on outcomes and implementation lessons from our efforts to deploy biophotonic and molecular diagnostics across oncology, infectious disease, and nutrition.

Kaposi sarcoma (KS) serves as a representative case study. In partnership with clinical teams in East Africa, we developed and field-validated a quantitative LAMP-based molecular assay for KSHV DNA that demonstrated high agreement with reference pathology across multiple clinical sites and time points. Complementary advances—including simplified, equipment-free DNA extraction, biopsy partitioning workflows that preserve histopathology, and AI-assisted interpretation of lesion images, molecular signals, and immunohistochemistry—were driven by practical barriers encountered in routine care. These efforts highlight how workflow redesign, signal interpretation, and quality control often determine real-world performance as much as the underlying optical or molecular technology.

Time permitting, I will also discuss how we extend these lessons to broader POC deployments, including rapid food-system monitoring for aflatoxin exposure and decentralized testing strategies for nutrition, infection and cancer screening. Across applications, common challenges emerge: power reliability, device calibration and maintenance, consumables logistics, contamination control, user training, data integration with health systems, and regulatory and commercialization pathways.

These activities are organized within PORTENT, Cornell's NIH Point-of-Care Technologies Research Network (POCTRN) center (<https://pochealth.cornell.edu/>). PORTENT's mission is to accelerate the development, clinical validation, translation, and equitable deployment of

point-of-care technologies for nutrition, infection, and cancer—especially for underserved populations. By combining engineering innovation, clinical networks across global and U.S. health systems, implementation science, and early commercialization strategy, PORTENT helps teams move beyond prototype performance to real-world impact.