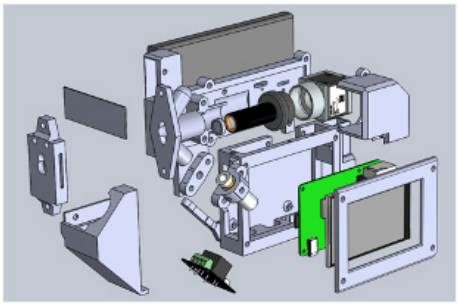
Portable device for imaging fluorescence microarray chips

Unmet Need

Diagnostic assessment of protein biomarkers plays an essential role in modern medical practice, and its availability has a considerable impact on clinical evaluation and decision-making for human health and disease. Fluorescence is the most widely used analytical technique in all microarray formats. It is extremely sensitive, rapid, nontoxic, and non-destructive. However, current microarray imaging detectors needed for fluorescent readout are bulky, expensive, slow, and not usable at the point of care (POC). This creates a critical need for new technology enabling low-cost, lightweight portable devices without sacrificing sensitivity or speed.

Technology

Duke researchers have developed a 3D-printed portable imaging detector that can image a fluorescent microscope slide with protein microarrays printed on them with better sensitivity, user-friendliness, portability, affordability, and speed compared to standard benchtop methods. The device’s oblique-angle laser fluorescence system requires fewer expensive optical components, simplifying the overall design. The computer within the device runs a custom user interface that scans slides, automatically image processes the sample, and returns sample data within a few seconds at a push of a button. Paired with the D4 microarray platform developed by the same Duke laboratory, the prototype device has been successfully tested for performance and sensitivity to protein biomarkers for the Ebola virus, COVID-19, and Hepatocellular Carcinoma (Liver cancer). It has been consistently able to match or beat sensitivity to biomarkers when compared to the existing microarray



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Meet the Inventors

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Publication(s)

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External Link(s)

• From the lab of Ashutosh Chilcoti
• Ultrasensitive, Rapid Diagnostic Detects Ebola Earlier Than Gold Standard Test (Duke BME news article)

scanning device. This novel protein microarray technology has great potential to be used in the clinic and research.

Advantages

- Cheaper, lighter handheld imaging device that can be used for POC diagnostics and paired with any fluorescence-based assay.
- Improved sensitivity and efficiency
- The prototype has been successfully tested