

Seminar

A monolithic single-chip point-of-care platform for metabolomic prostate cancer detection

There is a global unmet need for rapid and cost-effective prognostic and diagnostic tools that can be used at the bedside or in the doctor's office to reduce the impact of serious disease. Many cancers are diagnosed late, leading to costly treatment and reduced life expectancy. With prostate cancer, the absence of a reliable test has inhibited the adoption of screening programs. We report a microelectronic point-of-care metabolite biomarker measurement platform and use it for prostate cancer detection. The platform, using an array of photodetectors configured to operate with targeted, multiplexed, colorimetric assays confined in monolithically integrated passive microfluidic channels, completes a combined assay of 4 metabolites in a drop of human plasma in under 2 min. A preliminary clinical study using L-amino acids, glutamate, choline, and sarcosine was used to train a cross-validated random forest algorithm. The system demonstrated sensitivity to prostate cancer of 94% with a specificity of 70% and an area under the curve of 0.78. The technology can implement many similar assay panels and hence has the potential to revolutionize low-cost, rapid, point-of-care testing.

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