Electronic Supplementary Material (ESI) for Lab on a Chip.

Electronic Supplementary Material

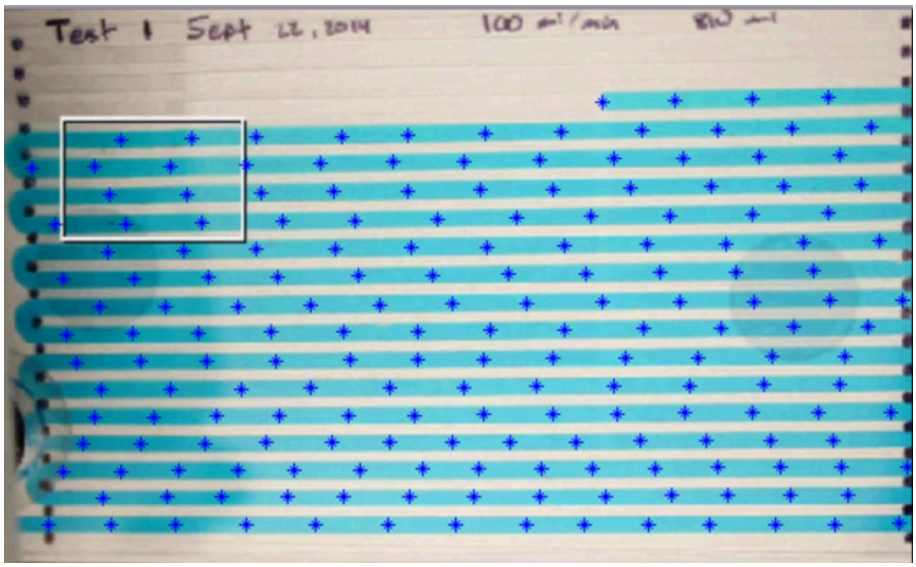

Fig. S1. Screenshot showing automated video analysis of a blister actuation validation experiment. A single-layer PET/DSA microfluidic structure with meandering channels was created to track flow rate of blue dye ejected from a prototype blister. Blue stars overlaid on the frame represent the location of the dye's leading edge through time as tracked by our custom video analysis software. Volumetric flow rate was calculated by tracking the rate of fluid movement within this characterized structure.

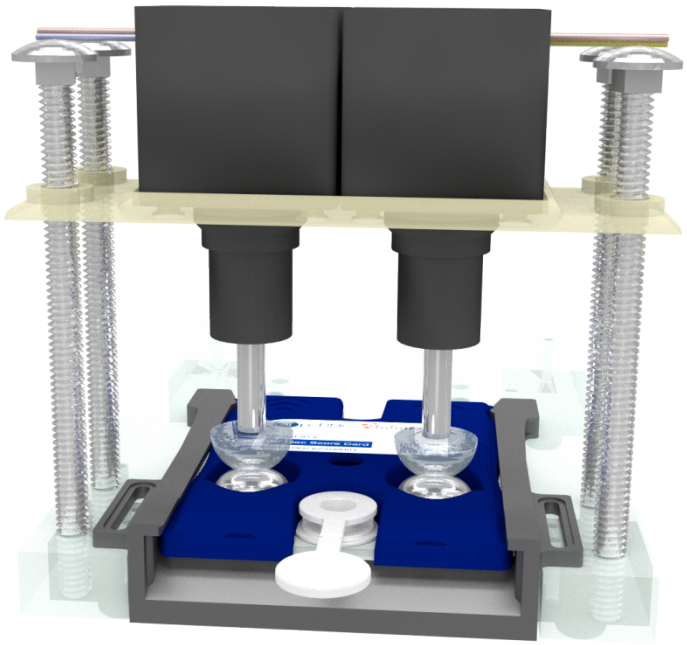

Fig. S2. CAD drawing of the standalone blister actuator module. This fluid delivery module consists of two linear actuators positioned over the p-BNC cartridge's blister packs and supported by a 3-D printed plastic mount and carriage bolts. A cartridge alignment feature fastened to an acrylic base supports and aligns the card during actuation. The blister actuator module was used to validate the geometry-adjusted blister actuation method.

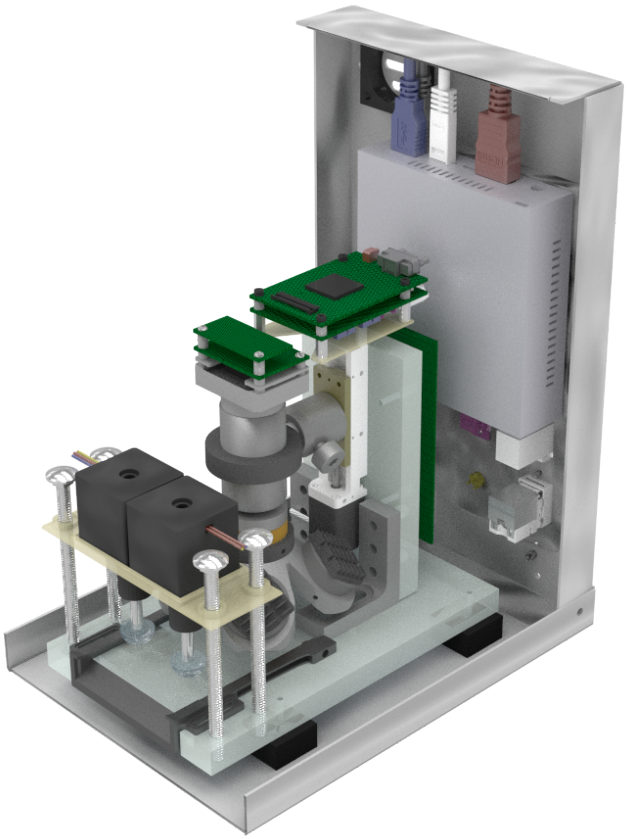

Fig. S3. CAD showing an alternate view of the portable analyzer prototype internal components with the touchscreen, protective enclosure, and frame removed.

Fig. S4. CAD showing a perspective view of the disposable cartridge for cardiac testing.

Supplementary Video 1. This short video shows fluid routing and flow directions in the p-BNC as viewed from underneath the cartridge. The bio-specimen (red dye) is driven by the compression of the right blister pack into the flow-through agarose bead micro-containers (black rectangular chip) for antigen capture (0:21 - 1:37). Self-contained waste chambers on either side of the chip are gradually filled as the blister contents are released. Detecting antibody reagents (green dye) are eluted from a reagent pad via the compression of the left blister (1:38 - 1:52). The remaining left blister contents are used to wash away unbound reagents (1:53 - 2:52).

Short description: The programmable bio-nano-chip is an ultra-flexible system for multiplexed and multiclass assays on a universal modular lab-on-a-chip platform for clinical and bioscience applications at the point-of-care.

Filename: p-BNC flow demo.wmv

Keywords: Programmable bio-nano-chip (p-BNC), microfluidic cartridge, lab-on-a-chip, point-of-care diagnostics, blister actuation, McDevitt research group