A low-cost test for patients to self-monitor prothrombin time at home

Unmet Need

Heart failure affects over 6.4 million individuals in the US, with over 550,000 new cases emerging annually. A large fraction of these cases requires long-term use of ventricular assist devices that necessitate the use of blood thinners to prevent the blood clots that can form as a result. The chronic use of blood thinners can inevitably lead to bleeding events, so periodic blood-based testing is required to measure a patients’ prothrombin time/international normalized ratio (PT/INR). This is currently carried out every 1-4 weeks in an outpatient setting, which is burdensome and costly to the patient. Home devices to self-test PT/INR are available, but the devices and reagent cartridges are expensive and inconsistencies in device performance have been reported. There is a need for easier access to affordable and reliable at-home PT/INR self-testing devices.

Technology

Duke inventors have developed a handheld point-of-care test for patients to self-monitor prothrombin time at home. Specifically, this is a handheld impedimetric coagulometer with fully printed test cartridges for PT/INR measurement. The electrodes are aerosol jet printed onto a flexible substrate. A prototype has been developed and demonstrated on human and animal whole blood samples. The operating frequency was optimized and provided consistent clotting time to within 2%.

Advantages

- A handheld sensor with low-cost electronics
- Fully printed, low-cost test strips/cartridges
- Offers measurement accuracy of PT/INR to within a standard deviation of costly, stationary, computer-based testing systems
- Could improve outcomes for VAD patients and other patients on chronic blood thinners

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Links

- From the lab of Dr. Aaron Franklin

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Publications

- Fully printed prothrombin time sensor for point-of-care testing (Biosens Bioelectron, 2021)

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