

595i Biomems ELISA for Rapid Assessment of Markers in Serum

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The objective of this work is to build a MEMS device that can use ELISA to do rapid assessment of multiple cardiac markers at the point of care. The rapid analysis of markers of myocardial injury is currently an unmet need in our healthcare system. Every year six million patients present themselves at U.S. hospitals with chest pains. The attending physician needs to rapidly assess whether the pain is being caused by acute myocardial infarction (AMI), unstable angina, or some other cause. Yet, at present, physicians often have to make critical treatment decisions before the tests are done. On average, it takes about 1.5 hours for a test for a common cardiac marker, creatine kinase to be reported back to the prescribing physician. Thus, while cardiac markers are very useful, physicians often need to make critical decisions before the tests are back. The objective of this work is to build a micro-electro mechanical (MEMS), enzyme-linked immunosorbent assay (ELISA) device for rapid assessment of blood markers for cardiac injuries. A small microfluidic device is developed that fits in a hand held reader and can measure the concentration of cardiac markers in under 10 minutes –i.e. fast enough to be clinically relevant. The device will be designed to do multiple marker testing so that false positives can be suppressed. The device is tested for its ability to measure the concentration of a key cardiac marker, cardiac fatty acid binding protein (cFABP), and its strengths and limitations are assessed. That work will lead to a device that can do multiple marker testing and can also be generalized to other non-cardiac markers.