

1 Publishable summary



NextDx – towards fast and easy-to-use diagnostic systems with lab-equivalent performance

Today's near-patient diagnostic devices for protein biomarkers are hindered by their lower sensitivity, precision and reliability compared to robotic instrumentation in centralized laboratories. Formed in December 2012, the NextDx project team has generated and integrated novel technologies to a prototype system and demonstrated the rapid and sensitive detection of the biomarker cardiac Troponin I.

Companies and institutes in protein diagnostics and micro-nano-bio research, including Philips, imec, Hytest, PolyAn, Bremen University and Eindhoven University of Technology, collaborated in the NextDx project to enable highly sensitive blood tests for instant diagnostics near the patient. These have the potential to provide care-givers with relevant information for making on-the-spot decisions in a single patient interaction, with the possibility of streamlining healthcare processes and enabling new care models.



Blood tests provide pivotal medical information and are used in 70% of all medical diagnoses. In the vast majority of cases today, the accuracy and reliability of a central laboratory within the hospital is required for conclusive diagnosis. Patients will greatly benefit from high-quality near-patient protein testing that is sufficiently swift, robust and convenient to be used in community care centers, at doctor's offices and even by patients at home.

The challenges to realize the promise of rapid and sensitive detection of biomarker molecules in biological samples are to

- Increase the specific signal and decrease the background signals inherently generated in real-life biological samples
- Conceive a system that has a high performance and is still fully integrated (sample in – result out), miniaturized and cost-effective

These challenges were successfully addressed within the NextDx project. Within three years, the team generated

- a novel polymer device microtechnology
- bio-molecular interfacing technologies
- a bio-physical discrimination technology

And integrated these into prototype systems for high-resolution protein biomarker detection suitable for development to a miniaturized diagnostic system with high ease-of-use. Highly sensitive detection of a representative cardiac biomarker, namely cardiac Troponin I, was demonstrated on the prototype analyzer in a small volume of blood plasma within 10 minutes. These results provide confidence for further development of the prototype to a diagnostic system with a high level of functionality and applicability in near-patient diagnostics.

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