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Auburn State University

Licensed AU technologies improve detection time and efficiency for home blood testing

Blood test data is required for 70% of clinical medical decisions. For patients with chronic conditions like heart disease or failing kidneys that means frequent trips to a doctor's office or lab. In-person appointments can be difficult to arrange, lead to delays in diagnosis and treatment, and expose patients to other illnesses.

Auburn University researcher, Chris Easley, the C. Harry Knowles Professor in the Department of Chemistry & Biochemistry, College of Sciences and Mathematics, in partnership with Philadelphia-based InnaMed are collaborating on a novel and reliable way for patients to perform blood tests at home. Regular in-home assessments allow health care providers to track patient health more closely and frequently, leading to early detection and treatment.

Blood testing methods with high accuracy, efficiency, and ease of use have long been of great interest among biotech firms seeking to take these advancements to the home healthcare market. However, a significant challenge with protein biomarker detection is that the bodily fluids used for detection are highly complex, making it difficult to detect the biomarker. There are ways to clean up biological samples to improve detection, but these take time and add cost, and the biomarker of interest can be lost during the process.

Easley's work in protein detection addresses that challenge using a group of technologies that can detect biomarkers faster and more accurately than most currently available home testing methods. His electrochemical detection platforms can even detect biomarkers in the highly complex environment of raw serum samples, minimizing sample processing, time and cost.

Easley describes his research as developing super sensitive, very small instruments capable of detecting and measuring many types of biomarkers.

"Electrochemistry can be used to make very small instruments," Easley said. "One of our inventions is a generalized assay that can work for small-, medium-, or large-sized molecules, giving us the possibility for rapid 'dip and read' methods that are attractive for point-of-care settings. However, for some clinically-relevant analytes at low concentrations, background interferences can be an issue, so we also invented a modified electrochemical instrument that removes background and increases sensitivity. These unique measurements not only help my laboratory with sensing on microfluidic devices, but they also are well-suited for InnaMed's realm of clinical readouts in human blood."

InnaMed, who has licensed Easley's technology, is a company focused on the development of easy-to-use, fast-and-accurate home blood testing and health monitoring systems for the individual patient, says co-founder and CEO, Eshwar Inapuri. InnaMed launched after graduating from the Y Combinator startup accelerator but struggled with technical challenges in product development. When InnaMed learned about Easley's research in electrochemical assay development, they acquired the technology for commercial development.

"The pharma industry has indicated a keen interest in commercial products that can do what Dr. Easley's work has made possible," Inapuri said.

Easley's developments have several advantages over other technologies not meant for remote point-of-care use as well as technologies that are intended for remote point-of-care use but are not easily adaptable to a variety of analytes or lack the specificity, sensitivity, or dynamic range, according to Innamed.

Alongside their work applying microfluidic methods to help understand diabetes and obesity, Easley's research team—which includes former department chair and now professor emeritus Curtis Shannon—also develops small-volume diagnostic assays that could be useful for a variety of diseases and conditions.

These technologies have the potential to impact a range of sectors, including healthcare, agriculture, government, military, food and drink industries, and others.

Looking ahead, Easley's laboratory has continued developments in this area, and recently received a $1,191,000 grant from the National Institutes of Health (NIH) to further develop the sensors in collaboration with Dr. Rashad Karimov's group in the Auburn University Department of Chemistry.