Auburn University

Innovation Advancement & Commercialization

Rapid Point-of-Care Detection of Proteins and Biomarkers

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Reference: Protein Detection

Inventors

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Licensing Opportunities

- This technology is available for exclusive, non-exclusive, and field of use licensing
- Joint development opportunities include funded research or a joint venture

Reference

J. Am. Chem. Soc. 2012, **134**: 7066–7072. (link)

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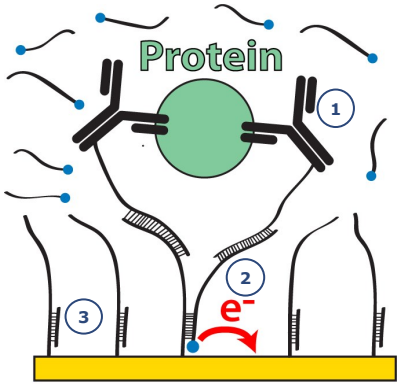
Overview

Auburn University is seeking a licensee or development partner for a technology for rapid detection and quantification of proteins. There is a continuing need in point-of-care (POC) and clinical settings for more rapid and accurate testing to detect protein biomarkers of disease. Current methods of protein detection in bodily fluids can be costly, inaccurate, and time consuming. Methods such as ELISA require significant sample processing. These steps add time and cost, and typically require samples to be sent to an outside lab. This Auburn technology (known as the Electrochemical Proximity Assay or ECPA) yields quick, quantitative results with no significant sample preparation. ECPA has potential applications in any area where protein levels need to be measured quickly, easily, or accurately, including POC clinical diagnostics.

Advantages

- Provides increased sensitivity and specificity for a wide variety of protein targets
- Produces rapid, quantitative results in five minutes or less, enabling point-of-care use
- Works in concentrations ("dynamic range") up to forty times greater than commercial ELISA kits; this enables analysis of raw, unprocessed samples, further supporting POC use
- Allows for detection of multiple targets simultaneously
- Utilizes established electrochemical platforms, which suggests scalability
- Latest advances almost completely eliminate background, further improving sensitivity and range

Description



Gold Electrode

This proximity ligation assay has a novel structure and detection method that improves sensitivity and simplifies production. A DNA strand is attached to an electrically conductive base (electrode). Two recognition molecules (either aptamers or antibody/DNA conjugates (1)) are then designed such that they are specific to the protein of interest and can form the assembly shown in the figure. In the presence of a target protein, the assembly forms, bringing another piece (DNA/electron donor conjugate (2)) close to the base. This causes an electrical signal to be generated, which provides a quantitative readout. When no protein is present in the sample, a short competitor (3) inhibits the random formation of the complex. This drastically reduces background signals and increases the dynamic range, allowing for a highly specific and accurate readout ideal for POC applications.

Generally speaking, this approach can be used to detect any protein that has two antibodies or two aptamers against it. There are numerous proteins for which markets or potential markets exist for rapid detection in POC diagnostics. Examples include heart attacks, strokes, rhabdomyolysis, and fertility monitoring. Some of these markets could benefit from the platform's ability to detect multiple proteins simultaneously.

Status

- Insulin quantitation validated in *unspiked, undiluted human serum* in the picomolar range
- Has been demonstrated in BSA solution to detect thrombin down to 50 picomolar (using aptamers) and insulin down to 20 femtomolar (using antibodies)
- Subject of U.S. patent 9,335,292 and additional applications
- Numerous candidate proteins have been identified