TISSUE PROJECTION ELECTROPHORETIC SEPARATION OF PROTEIN

Tech ID: 29261 / UC Case 2018-126-0

PATENT STATUS

<table>
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<th>Type</th>
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<td>United States Of America</td>
<td>Published Application</td>
<td>20210048410</td>
<td>02/18/2021</td>
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BRIEF DESCRIPTION

A range of related immunoblotting methods have enabled the identification and semi-quantitative characterization of e.g., DNA (Southern blot), RNA (northern blot), proteins (Western blot), and protein-protein interactions (far-western blot); by coupling biomolecule separations and assays. However, there are a wide number of alternative splicing events, post-translational modifications, and co-translational modifications (e.g., phosphorylation, glycosylation, and protein cleavage) that give rise to proteoforms and protein complexes with distinct function and subsequent cell behavior that cannot be analyzed with conventional methods such as immunohistochemistry (IHC). Analytical variability (lack of isoform- or complex-specific antibody probes), biological variability (small cell subpopulations diluted in bulk analysis), and lack of multiplexing (measurement of multiple proteins from the same tissues) can all render proteoforms and protein complexes undetectable by current technologies.

UC Berkeley researchers have created electrophoretic separation platform that is capable of measuring proteoforms and protein complexes lacking specific antibodies alongside spatial information, at the cellular level. This platform maintains the architecture of 2D tissue slices while projecting a protein separation in the 3rd dimension. The platform mitigates artifacts induced by tissue dissociation processes, as the intact tissue is lysed and subject to a protein separation. The platform is also compatible with differential detergent fractionation methods for further separation of proteins (e.g. separation by localization within the cell, by cell type, by protein complex formation, or by cellular vs. matrix proteins), opening the door for a novel, refined classification taxonomy using enhanced biomarker signatures for diagnostics and treatment selection in oncology among a wide range of additional future applications.

SUGGESTED USES

» Diagnostic applications
» Detection of proteoforms and protein complexes in a sample
» Electrophoretic separation applications
» Tissue projection electrophoretic separation of proteins from a tissue sample

ADVANTAGES

» Capable of multiplex detection of analytes
» Mitigates artifacts induced by tissue dissociation processes
» Compatible with differential detergent fractionation methods for further separation of proteins
ADDITIONAL TECHNOLOGIES BY THESE INVENTORS

- Simultaneous Detection Of Protein Isoforms And Nucleic Acids From Low Starting Cell Numbers
- Protein Renaturation Microfluidic Devices
- Automated Two-Dimensional Electrophoresis In Microfluidic Chamber
- Microfluidic Chip For Rapid Multi-Analyte Detection
- Single-Cell Isoelectric Focusing and pH Gradient Arrays
- Dynamic Microfluidic Assays
- Protein-Coated Microparticles For Protein Standardization In Single-Cell Assays
- Automated Microfluidic Device for Analyte Detection