SYSTEM INTEGRATION OF ELECTROLYTE-GATED ORGANIC TRANSISTOR-BASED BIOSENSORS FOR CLINICAL TESTING

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Background

The ultra-sensitive detection of markers in peripheral biofluids can lead to advances in early diagnostic technologies. Such technologies are minimally invasive and suitable for point-of-care and resource-limited settings. Conceptualizing cells' ability to sense at the physical limit by means of highly packed recognition elements, a millimetric sized field-effect-transistor has been recently demonstrated to detect a single molecule.

Objectives

The research project is about developing an entire smart, fast, and reliable electrolyte-gated organic transistor-based bioelectronic system for sensing at single-molecule level both proteins and DNA biomarkers.

Methodologies

Inside the research project, I have identified milestones to achieve:

- Fast and reliable biosensor development and engineering
- System model characterization
- Design of a matrix-based system compliant with ELISA standard of devices developed at previous stages
- Functional testing of the biosensing system designed

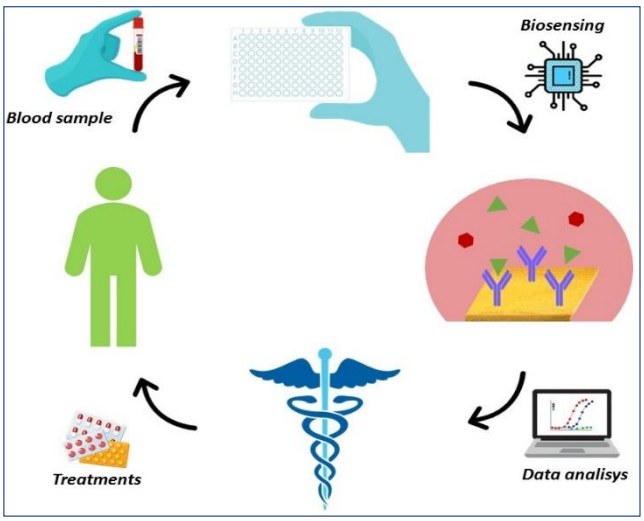

FIGURE 1. OPERATING CYCLE OF THE PROPOSED BIOSENSING SYSTEM. ASSAYING BIOMARKERS IN A BLOOD SAMPLE AT THE PHYSICAL LIMIT LEAD TO CHOOSE THE BEST TREATMENTS FOR THE PATIENT.

Expected Results and Impact

The bio-electronic system suggested is expected to meet the demand of curing diseases by supporting better prognosis and permitting the application of precise treatment methods. Early diagnostic in progressive diseases would, hence, become possible well before any symptom appears. Along the same line, it would make ultra-sensitive liquid biopsy a feasible medical procedure replacing the invasive and much more dangerous direct inspection of diseased tissues.