**Motivation & Impact**

### Treatment:
Lithium therapy is commonly used, but requires careful monitoring due to toxicity.

- Long waiting time
- Inconvenient doctor visits
- Uncomfortable
- Expensive

### At Home Testing
(Saliva)<sup>1</sup>
- Non-invasive
- Requires less processing
- Portable
- Affordable

**Doctor testing**
(Blood)

**Li-Selective Membrane**
- Polymer: PVC
- Plasticizer: o-NPOE
- Ionic Site: Potassium tetrakis(4-chlorophenyl)borate
- Ionophore: Li-Ionophore VI

**Methods & Results**

**Nernst Equation**

\[ E = E_0 + \left( \frac{RT}{nF} \right) \log C \]

Electrochemical method used to detect different ions (lithium, in this case). Nernst equation predicts potentials with activities in equilibrium proportion.

Calibration in Saliva

![Graph showing calibration in saliva](image)

Selectivity Assessment

![Graph showing selectivity assessment](image)

**References**

- “Saliva Test Could Be Used for Lithium Monitoring among Patients with Mood Disorders.” News-Medical.net, 4 Oct. 2021, (1)

**Conclusion and Future Work**

The lithium electrons were successful as it can detect toxic levels of Lithium. In the future these electrodes will provide patients fast accurate detection of lithium in their systems.

**SHINE Impact**

SHINE connected me with PhD students, enriching my biomedical education. Despite challenges, it boosted resources and confidence.

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**Bipolar disease:**
A brain disorder characterized by mood changes and impaired functioning.

**Treatment:**
Lithium therapy is commonly used, but requires careful monitoring due to toxicity.

**Depression**

- 0.4 mM
- 0.6 mM
- 0.8 mM
- 1.0 mM

**Mania**

**Relapse**

**Chronic Toxicity**

**Acute Toxicity**

**Limit of Detection:** 0.299 mM

**Nernst Equation**

The fabricated sensors were calibrated in artificial saliva to validate sensors performance are selectivity toward lithium.