Progress Report

Week of 10/22/18

Alex Goodman

Work/Research Accomplished:

- Continued work on ISFET pH sensors and understanding technology
- Spoke to Professor Beebe, thought ISFET would be reliable technology to diagnose ACS in vivo - able to be miniaturized and is stable overtime
    - However, no commercial probes available to measure pH *in vivo*
    - Advised us to generate proof-of-concept with ISFET technology before we try to build our own device

Proof of concept:

1. Obtain ISFET Sensor from Hach
    a. https://www.hach.com/isfet-ph-stainless-steel-tube-micro-probe/product?id=764051643
        i. RJ-45 adaptor (Phone connector)
        ii. Product # PH47-SS
2. Obtain pH probe used in ACS study by Dr. Doro
3. Fabricate testing scheme to compare the performance of two technologies
    a. Phase 1:
        i. Compare differences in pH measurements across varying pH buffers
    b. Phase 2:
        i. Create *in vivo* similar environment
            1. Submerging a steak in known pH
            2. Leave both probes in over time
            3. Compare results / differences between the two probes
    c. Phase 3:
        i. Ask Doro to test pH measurements with the onset of compartment syndrome
            1. Basically, recreating the study we are going off of
    d. If all goes well, we will have sufficient evidence to prove that ISFET technology is a reliable replacement for “Meat and Cheese” probe used in original ACS study
4. While this testing is going on, we can work on a theoretical working design of our own ISFET sensor

Problems:

- Hach does not sell processor to handle signal from sensor
    - Need to find compatible pH meter
- May be problems with simply sticking the ISFET *in vivo*
- May be extremely problematic to receive approval for repetition of ACS study with novel ISFET sensor

Will Bacon
Work/Research Accomplished:

- Continued researching ISFET
- Coordinated with Alex and Mark to come up with the plan above (see Alex's section)

Problems:

n/a

Mark Austin
Work/Research Accomplished:

- More looking into ISFET sensors and potential manufacturers for them
- Could we purchase an ISFET sensor without the analyzer and use the raw voltage/current output for preliminary testing?
- Try to prove the concept on a larger scale initially before worrying about miniaturization
- Look more into post-acquisition work on the signal
    - Filtering noise, etc.

Problems/Concerns:

n/a

Kelsey Murphy
Work/Research Accomplished

- Continued research of ISFET probes
    - Science of how they work: Different kinds of semiconductors and surface insulators
    - Found parameters of multiple semiconductors to relate the reactions at their surfaces to pH
        - SiO_2 works well for our pH range → keep in mind for theoretical working design of physiological sensor
- Was out of town for 5 days for a conference, so I missed a couple meetings. I got myself caught up on what the rest of the team discussed by looking through Alex's notes.
- Contacted Dr. Doro to update him on our shift in direction

Problems

- Switching tack in the middle of the semester is never great, but I think we're headed in a better direction with this.