

THAW

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- Implantable microsensors with RFID enabled/enhanced microprobes
- Krystle–Willis Knighton Director
- Julie Rutledge
- Teresea Murray
 - Need to ping data via RFID
- Elisa Castalonga
- Ramu
 - RFIDs that can store data working with zero power option for the micro sensor option

Implantable RFID enhanced micro probes

- Have power delivered to sensitive organs from other sources
- Inductive power charging to deliver power with no heat transfer
- (is this a solved problem that we could find new applications for?)

Tracking peoples' bodies

- Could we find a way to have RFID readers on a body tracking elderly movement to assess risk of fall
 - Helps maintain independence
 - Gait analysis/tracking in the elderly
 - In between assisted living and living without pain or fear of injury–this can help track it before a surgery or treatment become an option
 - Validate surgeries for insurance purposes–you would have the data–preventative measures
 - Autodriving and sensors
 - Gait analysis –wouldn't have to actually attach sensors–like autodriving cars

Nanoparticle treatments to combat osteoporosis

- Can we get them into the bone?
 - Can get them in the blood, but worry about having them in soft tissue
 - People are doing microstimulation using nanoparticles, issues with keeping them in the right location to stimulate with ultrasounds
 - Like kidney stone intervention–doesn't damage any issues; full strength is only at that one pinpoint; conceivably do an ultrasound and have the transducers going at different levels and get threshold activation
 - Osteoclasts and osteoblasts
 - Stimulate more bone growth by stimulating the osteoblasts
 - Issue may be a transport problem

- Giving them the raw materials via nanoparticles and activating via ultrasound, particularly in the hips would be a useful intervention for the elderly
- Barriers to Change (rutledge)
 - Barrier to change to doing something preventative
 - Change recommended may be psychological, physiological, pharmacological
 - Someone may not be willing to take medicine but may be willing to do a psychological treatment
 - Have collaboration with others who can use open science to pilot and build a true standardized tool with generalizability

Climate change, behavioral changes, and sensors

- How they are related via mental health via neurochemical levels and environmental sensing
- Monitoring have climate change and mental health and how it will change our chemistry
 - Short term impact: cost of healthy food; US is unique in that poor people are more obese; fruits and vegetables are expensive

Final idea:

- NIH or NSF (as long as no clinical trials)
- An objective way to measure potential adherence to recommended lifestyle changes (dietary changes) as a prelude to bariatric surgery
- Behavioral interventions on reducing obesity outcomes
 - Through fidelity, aka, experiential learning
 - An end product could be something to give to patients
- Health and nutrition: adherence vs prediction
 - Nutrition and food behaviors
- Need expertise in:
 - Sensor development (wearable sensors)
 - Behavioral science
 - Clinical collaboration
 - AI or Machine learning (potentially)
 - Statistical and modeling expertise

SWOT

- Modeling behaviors, physiological characteristics, and barriers to change in predicting lifestyle adherence pre-baratric surgery
- In cases where the adherence is predicted to be low, algorithm will identify the need for behavioral intervention, self-report, and physiological measures
 - Motivational interviewing

- Strengths:
 - We have the expertise to address the topic: nutrition, behavioral, sensors, and medical
 - Quantitative and qualitative data & people who can run that
 - Size of university for effective collaboration
 - Have people in the group funded by the NIH currently and past projects
 - All from the same institution, positively viewed by the NIH
- Weaknesses:
 - No evidence of past collaboration
 - Lack of preliminary data
 - Wearables
 - Surveys
 - Demographics, physical profiles, potential archival data
 - Data analyst separate from group to increase anonymity
- Opportunities
 - It is an easily recognized problem
 - Aligns with NIH interests
 - We can model the algorithm to predict other healthcare outcomes using a “plug-and-play” approach which expands funding opportunities to NSF
 - Feasible
 - Easily identifiable parts for the composition of a team
 - Opportunity for people to lead smaller development projects
 - Extend the grant to smaller and future grants after the starter
 - Collaborate on wearable sensors
- Threats
 - Many covariates in diagnosing the full underlying problem
 - Do not have an exact aim, could be large, could be pinpointed
 - Unfocused vs. hyperfocused
 - Multiple things to be developed, hard to get a large funding source at once
 - May need to get a series of grants and combine them, if possible

Notes by Lauren Dinnat and Shane McKnight