THE WELLNESS WIZARDS

UC Davis Biomedical Engineering – Q@AS

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OUR TEAM AND JOURNEY

OUR TEAM

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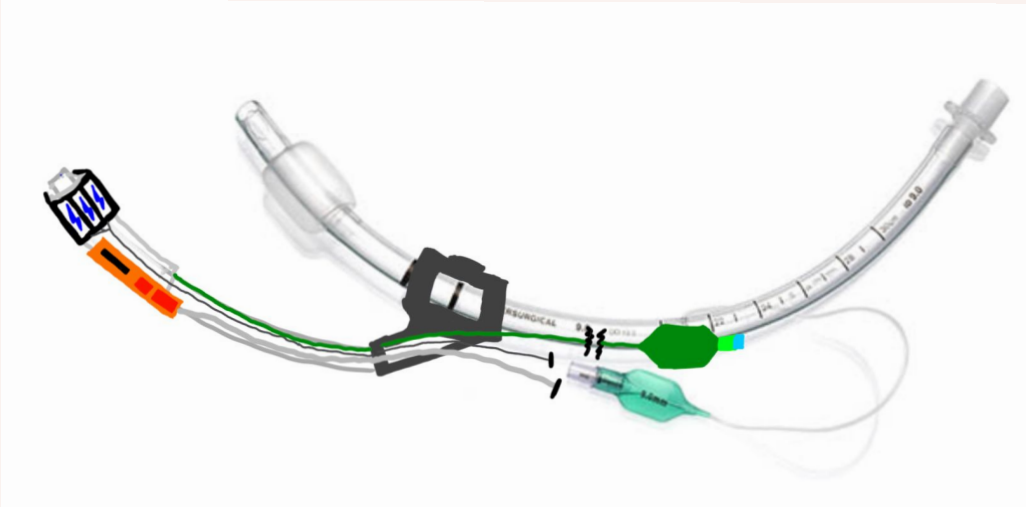
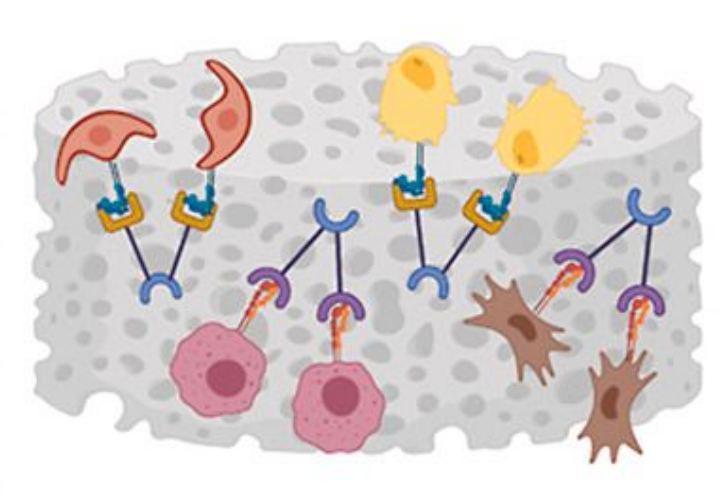
OUR CLINICAL JOURNEY

CLINICAL NEEDS SOLUTIONS



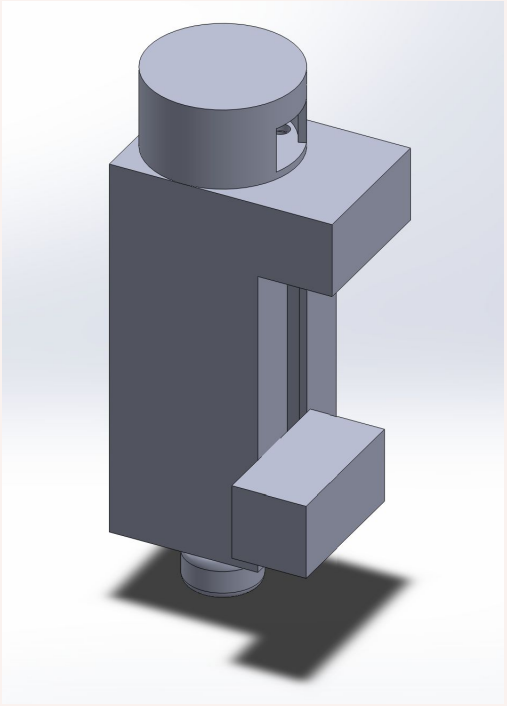
ECG and pulse oximeter
integrated endoesophageal tube



Ligand–Loaded Demineralized
Bone Matrix for Enhancing
Artificial Bone Grafts

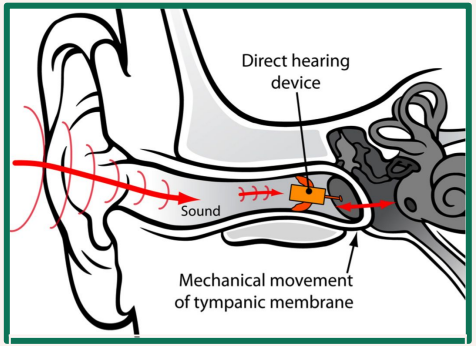
CLINICAL NEEDS SOLUTIONS

Robotic Laparoscope to improve laparoscopic surgeries



Bone alignment and tendon stretching for ORIF wrist surgeries

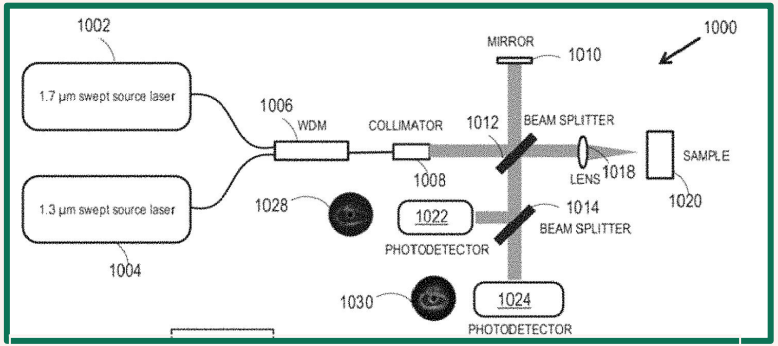
OUR PAST MVPS



Direct Drive Hearing Aid

<u>Pro:</u>
– Avoids feedback and occlusion

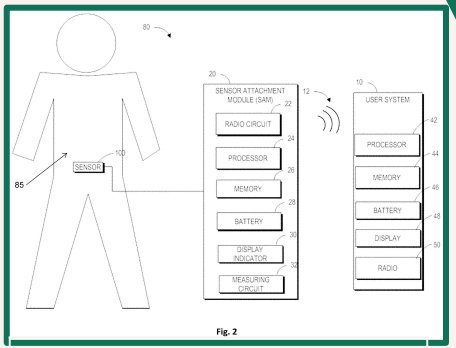
<u>Con:</u>
– Complicated and physician–dependant use



High Resolution OCT Imaging Device

<u>Pros:</u>
– Sharper intravascular imaging to diagnose atherosclerosis
– Fewer invasive procedures

<u>Cons:</u>
– Uncertainties whether this device would improve treatment



Fetal Movement Sensor

<u>Pros:</u>
– Wearable, noninvasive device that monitor both fetal and mother's health

<u>Cons:</u>
– Efficacy concerns
– Challenging to get approved by insurance

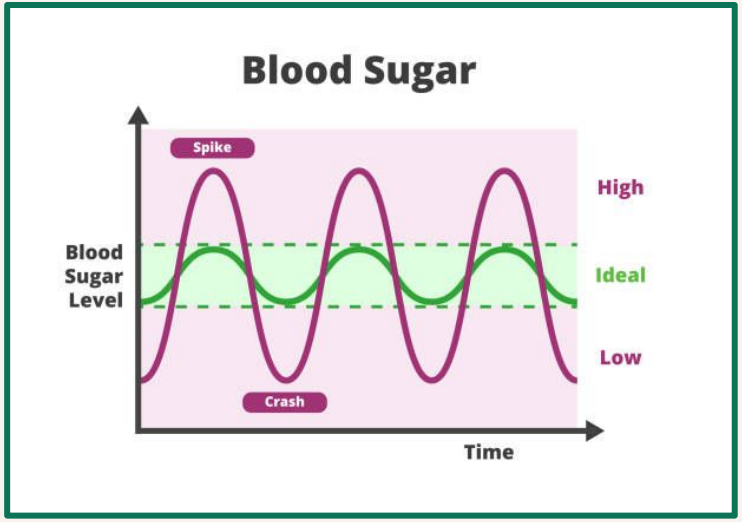
Interviews: Each week we interviewed patients, medical providers, and industry professionals to gather information on the feasibility and impact of our MVP.

02

PROBLEM AND CHOSEN MVP

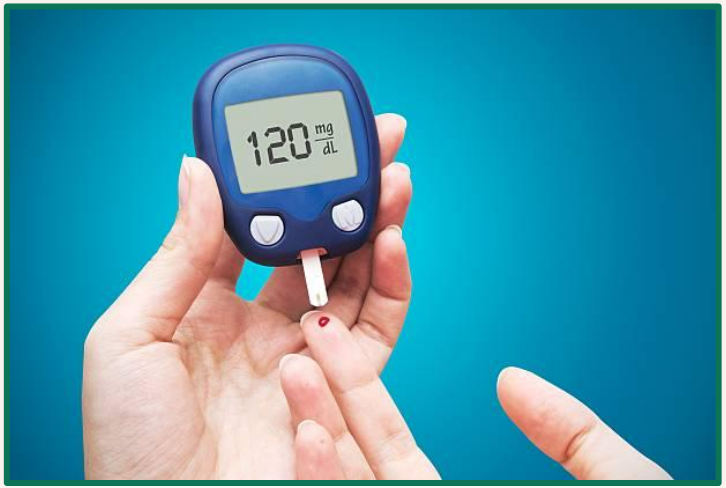
PROBLEM DESCRIPTION

There is a need for a ***non-invasive*** method of monitoring glucose that is both ***continuous*** and ***accurate***.



- Current accurate methods of measuring glucose are invasive
- State-of-the-art continuous glucose monitors (CGMs) are invasive and inaccurate

STATE-OF-THE-ART GLUCOSE MONITORS



MVP – MICROFLUIDIC GLUCOSE MONITOR

The Glucose Wizard!

MVP - UNIQUE SELLING POINTS

1. Non-Invasive sampling: A de novo method of reading blood sugar levels. Eliminates the need for finger pricks and invasive CGMs

2. High Sensitivity: Extremely wide detection range spanning 5 orders of magnitude with a detection limit as low as 10 nanomolar

3. Flexible and Durable: Fabricated on an ultra-flexible substrate, allowing for mechanical robustness and conformability to highly dynamic areas

4. Addresses a large market: Targets Type 2 diabetes patients, a prevalent global health issue with significant market potential. The device can also be utilized as a wellness device for losing weight and improving health

MVP – THE PATENT

US11813057B2
United States

Download PDF | Find Prior Art | Similar

Inventor: Chongwu Zhou, Mohammed R. Amer, Ahmad N. Abbas, Qingzhou Liu, Mervat Alharbi

Current Assignee : Jeddah, University of , University of California , University of Southern California USC

Worldwide applications

2019 • US

Application US16/699,314 events

2019-11-29	• Application filed by Jeddah, University of, University of California, University of Southern California USC
2019-11-29	• Priority to US16/699,314
2021-06-03	• Publication of US20210161435A1
2023-02-23	• Publication of US20230060118A9
2023-07-25	• Assigned to THE REGENTS OF THE UNIVERSITY OF CALIFORNIA
2023-07-25	• Assigned to UNIVERSITY OF SOUTHERN CALIFORNIA
2023-09-01	• Assigned to University of Jeddah
2023-11-14	• Application granted
2023-11-14	• Publication of US11813057B2
Status	• Active
2041-04-08	• Adjusted expiration

What is claimed is:

1. A biosensor comprising:

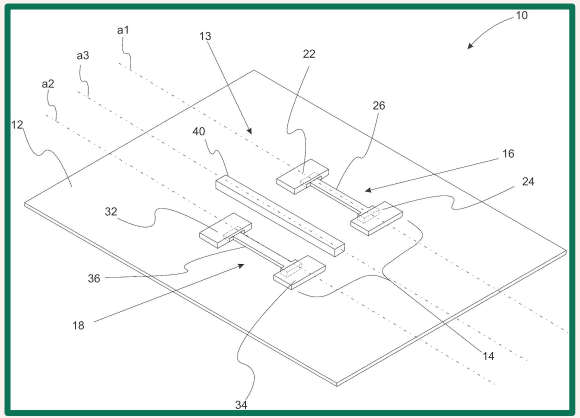
a flexible substrate; and

at least one field effect transistor assembly comprising a pair of flexible field effect transistors deposited onto the flexible substrate, each pair of flexible field effect transistors including:

a first electrode assembly including a first source electrode, a first drain electrode, and a first metal oxide channel, the first metal oxide channel contacting the first source electrode and the first drain electrode;

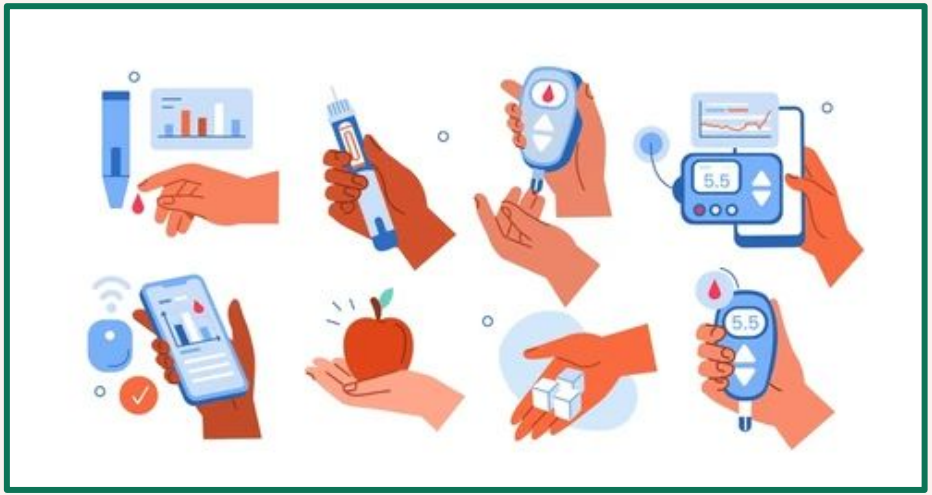
a second electrode assembly including a second source electrode, a second drain electrode, and a second metal oxide channel, the second metal oxide channel contacting the second source electrode and the second drain electrode; and

a malleable gate electrode deposited onto the flexible substrate, the malleable gate electrode interposed between the first electrode assembly and the second electrode assembly.



- Patent was filed in November 2023
- Patent is solely for the novel technology relating to glucose biosensing through sweat
- Logistics of commercial product is still under investigation, such as biocompatible substrate and adhesive

VALUE PROPOSITIONS

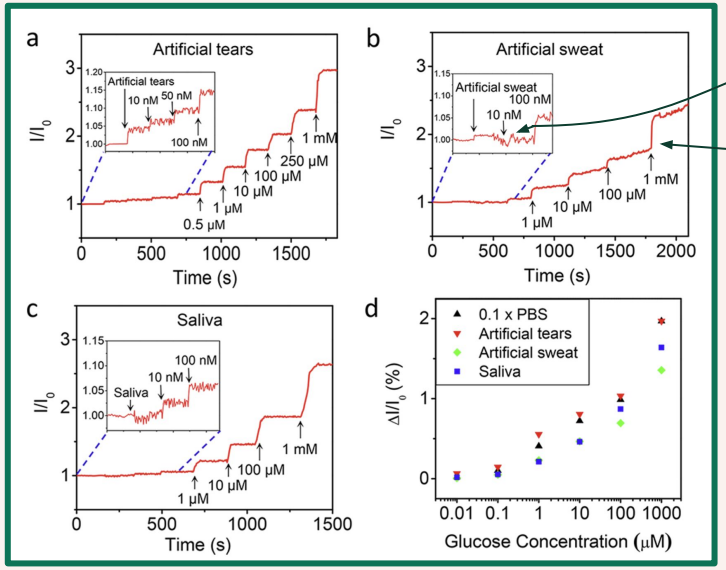


– Non–invasive and continuous device
– Detects changes in glucose in real–time

– Can be used for health and wellness
– Non–diabetic and pre–diabetic patients

DATA ACCURACY

Sensitivity:



- Can detect changes >10 nM glucose
- Difference in voltage seen in graph
- Multiple different inputs

03

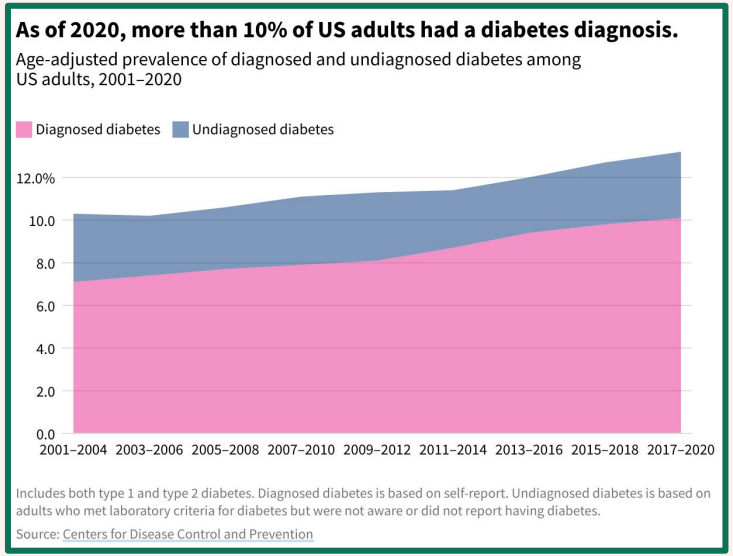
MARKET ANALYSIS

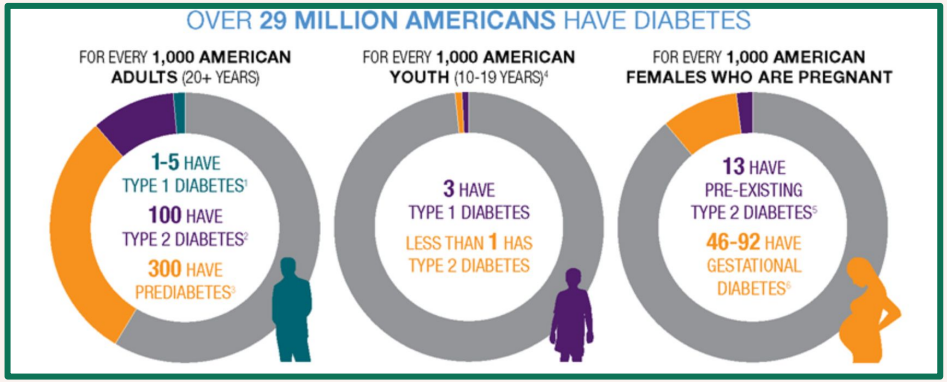
In the United States,

1.2 MILLION

people are diagnosed
with diabetes annually

DIABETES PREVALENCE

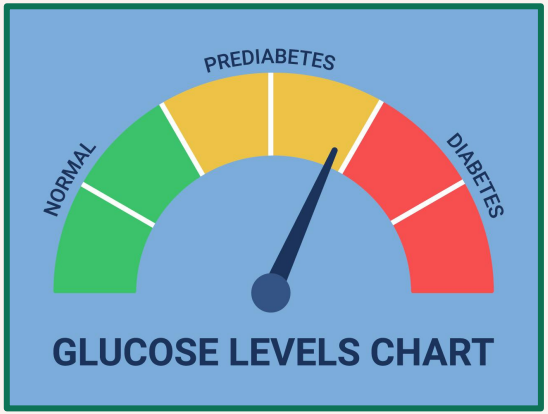




OUR TARGET MARKET

Type 2 Diabetes

Prediabetes



04

USER WORKFLOW

USER WORKFLOW - PURCHASING

Off the Shelf

OR

Online Vendors

USER WORKFLOW - SETUP

Download the app

Pair via Bluetooth

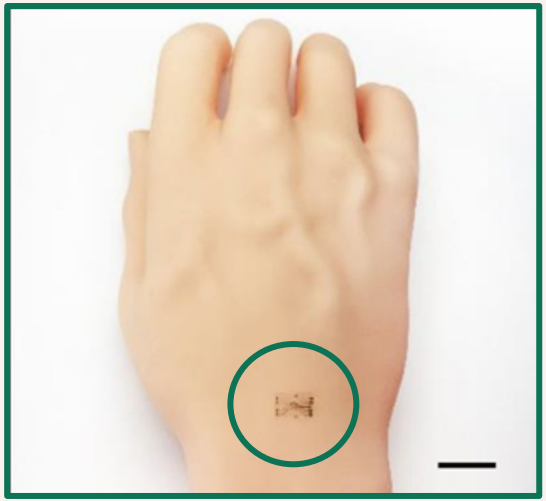
App Concept from Dexcom, Inc.

https://www.dexcom.com/en-EE/mobile-app

USER WORKFLOW - APPLICATION

Wipe application area with included alcohol wipe

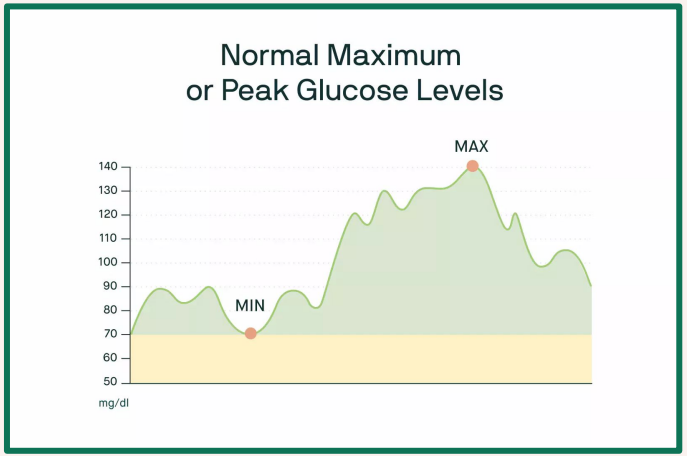
Peel adhesive backing from device



Place on application area

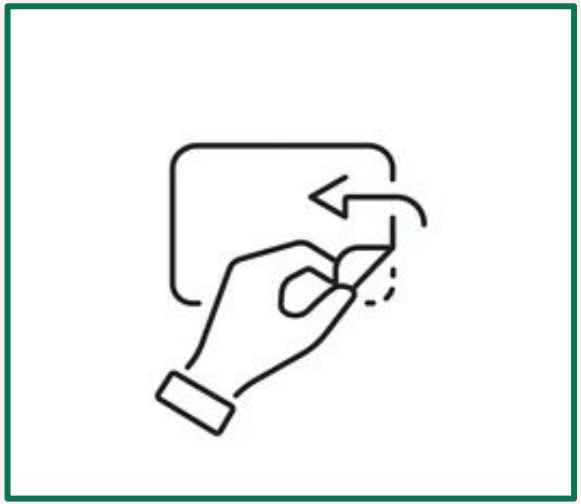
USER WORKFLOW - MONITORING

Eat, Exercise, etc.

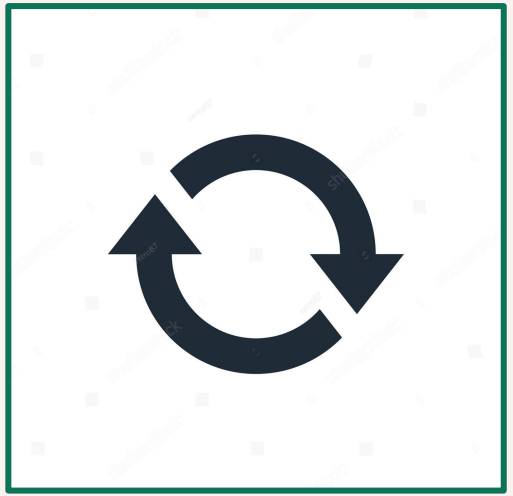


See how they affect your body's metabolism!

USER WORKFLOW - REMOVAL

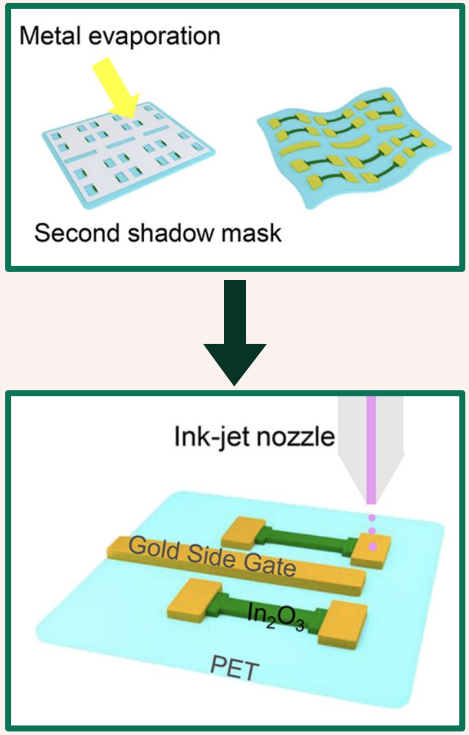


Device is peeled off after approximately 2 weeks



User workflow is repeated

MANUFACTURING - PRACTICALITY

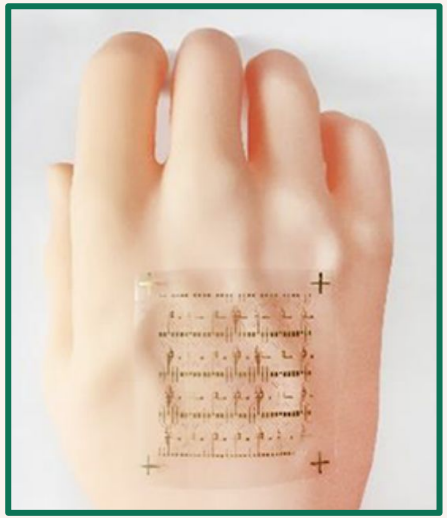


- ***Simple***, two-step fabrication process
- ***Scalable*** fabrication and made with ***standardized materials***
- Use of ***existing technologies*** like inkjet printing
- Potential for ***high-volume production***
- ***Integration potential*** with existing smart devices

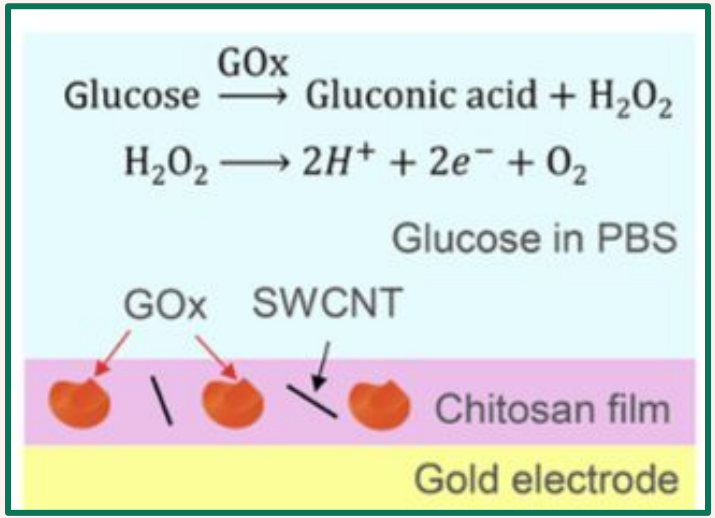
05

REGULATORY PATHWAY

PRECLINICAL EVALUATION



Biocompatibility



Chemical Composition

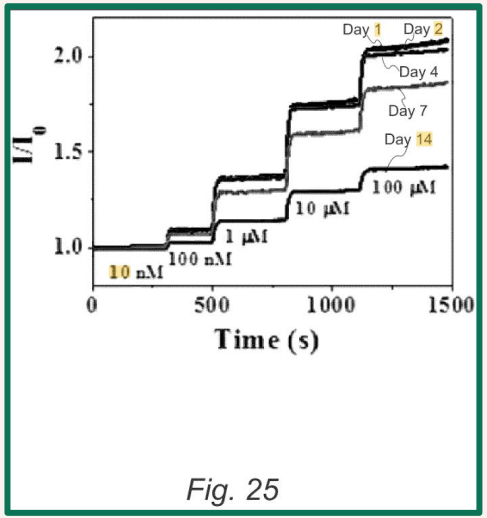
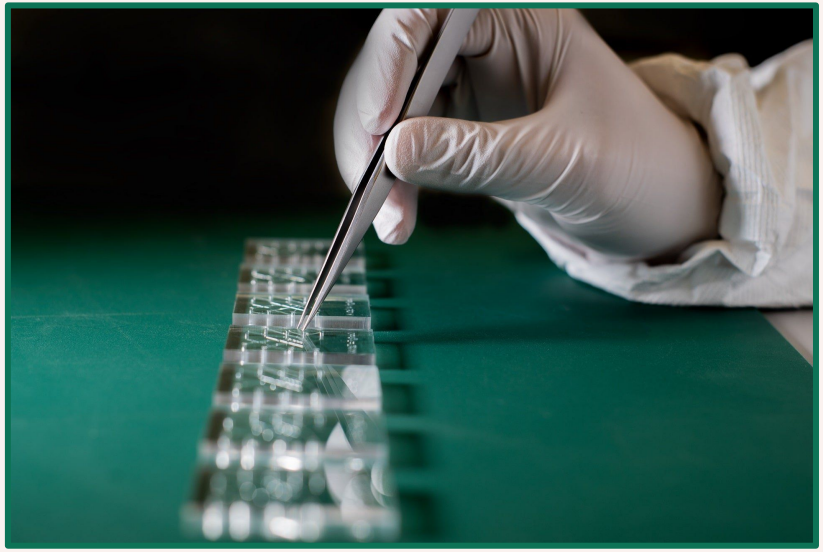


Fig. 25

Safety & Efficacy

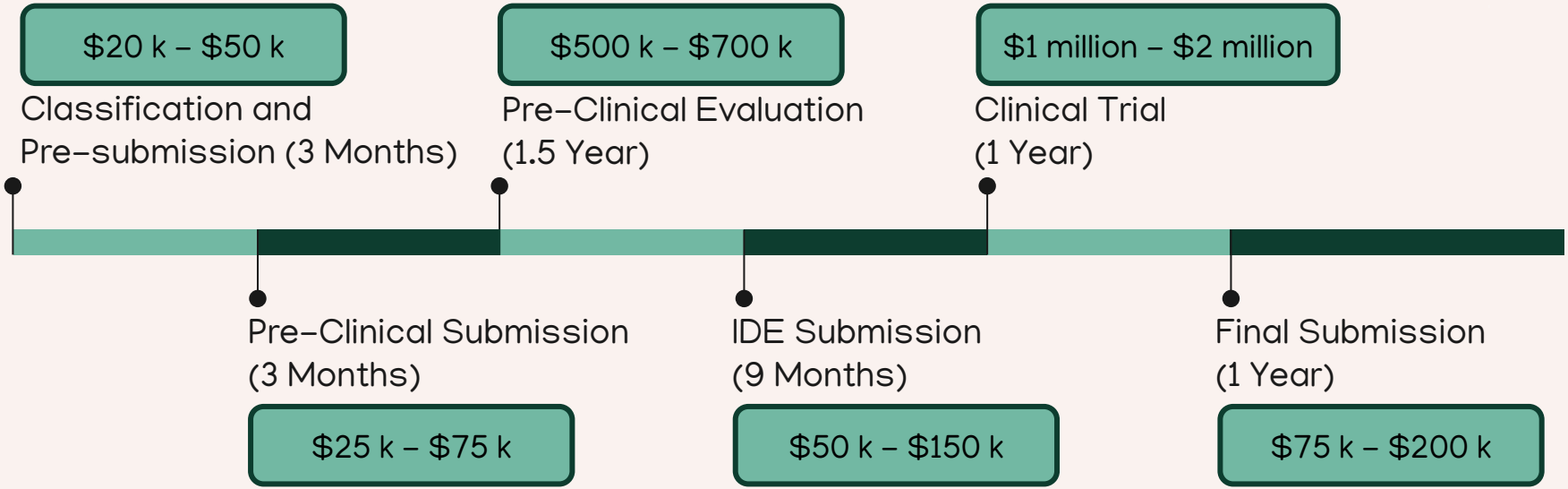
PRECLINICAL EVALUATION



Manufacturing and Packaging Process

Shelf Life

FDA PATHWAY



Total: $1.7 – $3.2 million over 5 years

06

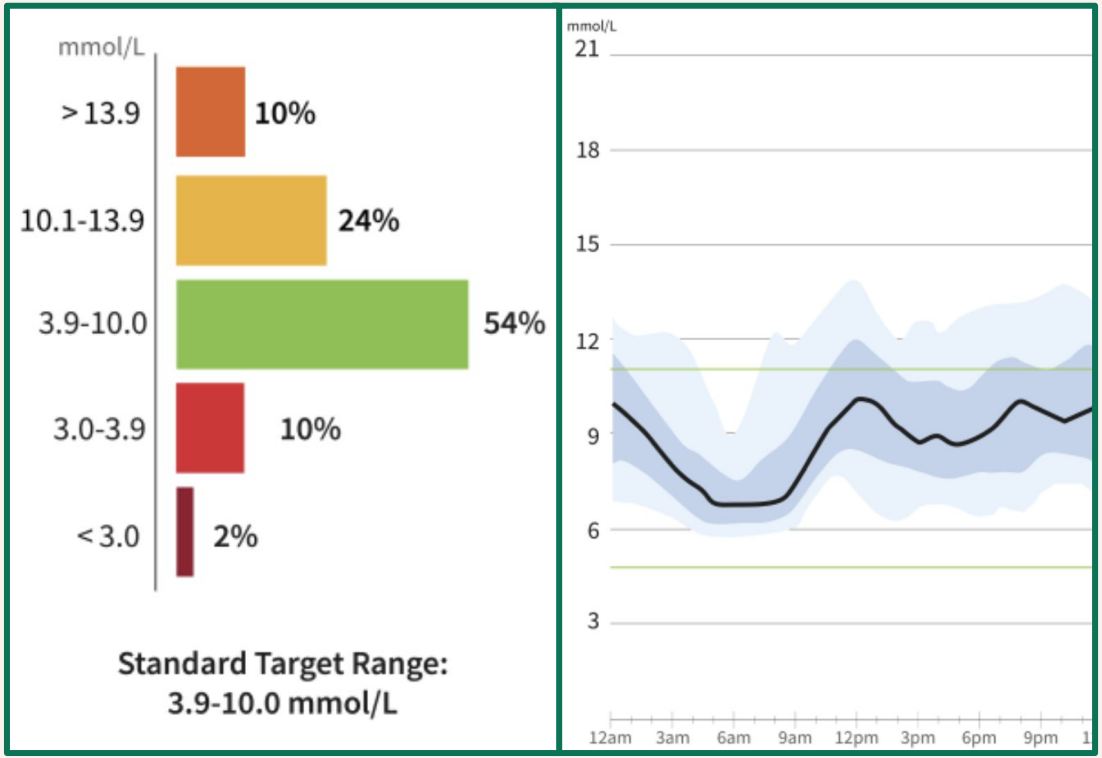
COMMERCIALIZATION PROCESS

APP DEVELOPMENT

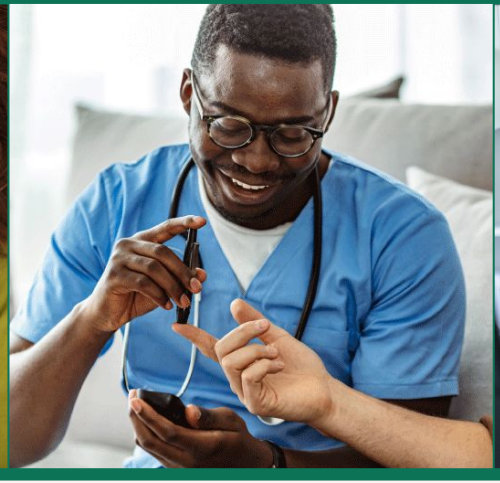
Our app is an important part of our device. It is the main way people interact with our device.

- Live data, visual graphs
- Generates alerts based on pre-set thresholds
- Store historical data for analysis, trends
- Intuitive interface

The development will cost $10,000 – $50,000 for a professional fully functional app.



BUY-IN SUPPORT



Patients

Medical Providers

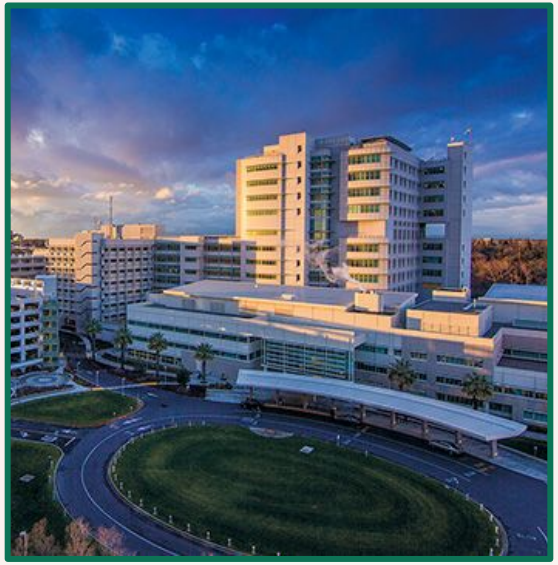
Insurance Companies

FDA

LOCAL PARTNERSHIPS

Dr. Hyoyoung Jeong

Wearable Bio-electronics for Health Monitoring, Diagnostics, and Therapeutics



UCD Medical Center

Department of Internal Medicine: Endocrinology, Diabetes and Metabolism

Steven Lucero

TEAM Laboratory Manager, Prototyping and Design Lab

MATERIAL COST PER DEVICE

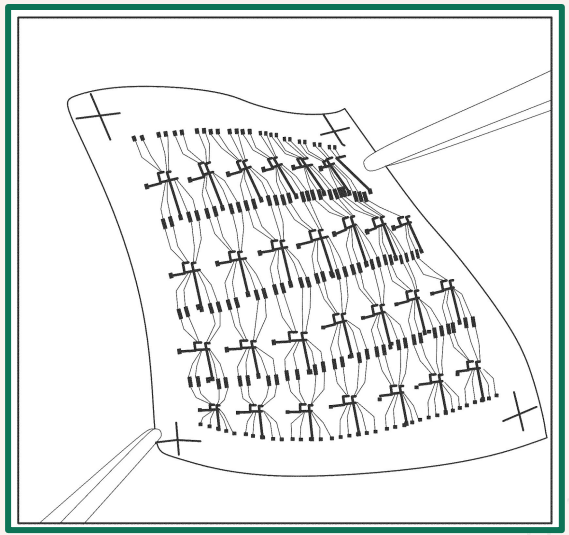
Material:	Purpose:	Cost per device:
Polyethylene terephthalate (PET)	Substrate	$0.10 – $0.50
Indium Oxide (In2O3)	Nanoribbons	$0.50 – $1.00
Gold	Electrodes	$1.00 – $2.00
Chitosan	Suspension	$0.10 – $0.30
Glucose Oxidase	Enzyme	$0.50 – $1.00
Carbon Nanotubes	Microfluidics	$0.10 – $0.30

Total Cost per Device: $2.30 – $5.10

COMMERCIALIZATION COST

Phase:	Estimated Cost:	Timeline:
Marketing Preparation – Branding and strategy development – Regulatory-approved marketing materials	$45,000–$125,000	3–6 months
Product Launch and Initial Marketing – Product launch events – Digital marketing campaign – Key Opinion Leader (KOL) engagement	$125,000–$450,000	6–12 months
Sustained Marketing (1 Year) – Advertising in medical journals and platforms – Customer feedback and marketing campaigns	$40,000–$150,000 annually	Ongoing

THANK YOU



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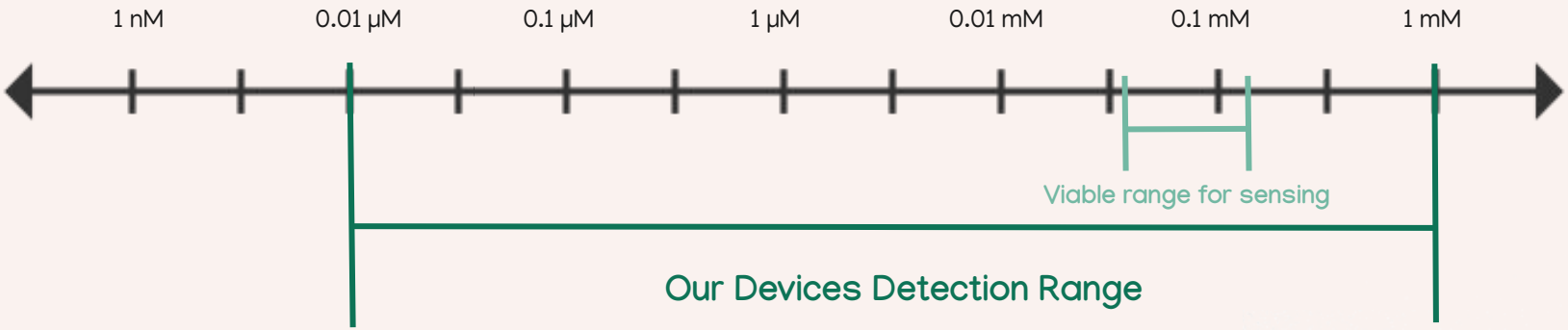
DETECTION VIABILITY

According to a research article, “The concentration of ***glucose*** in human sweat is from ***0.06–0.2 mM*** and corresponds to ***3.3–17.3 mM*** in BG”



https://pmc.ncbi.nlm.nih.gov/articles/PMC8781973/