IPRO 331

Non-invasive Blood Glucose Monitoring Systems

Sponsor-IIT Collaboratory for Interprofessional Studies

Objective

IPRO 331's objective was to create a design for a non-invasive blood-glucose monitoring system based on the following: simple concept, user-friendliness (especially for children), a design that does not hamper the user's lifestyle, cost effectiveness and portability.

Basic Organization and Tasks

IPRO 331 was broken up into three groups: Web Management, Aesthetics and Design.
Design- determined a method of how glucose level can be monitored non-invasively
Aesthetics- determined the design of the prototype and how it fits in with the user's daily life
Web Management- organized and managed the overall process of creating the web site

Accomplishments

IPRO 331 came up with a unique design and concept that, integration of the multiple aspects of the design, determined the reaction used in measuring the glucose, and the visual prototype was created. The design includes an ultrasound to permeate the adipose tissue thus allowing the interstitial fluid (ISF) to be drawn up. A piston-cylinder device located inside of the cuff will be used to draw up the ISF to be reacted. A glucose-oxidase reaction will be performed and the products will be tested with an electrode. The variance in current will be measured and the data will be analyzed in the CPU located inside of the cuff. The CPU will then display the blood glucose level on an LCD screen on the outside of the cuff. Future designs may include the addition of a removable storage device so the levels can be collected and stored over time.

Critical barriers and obstacles

IPRO 331 has encountered the following barriers; determining the affect of temperature on the glucose-oxidase reaction used in the design, how the device will affect dermal tissue, the lifetime of the membrane used, the scaling of the final product and the future marketability of the product.

Conclusion

IPRO 331 came up with a theoretical design, estimated cost, reaction data and ideas for the data transfer portion of the device.

Next steps

IPRO 331 will be looking for company sponsorship, to aid in the construction of a working a prototype. Initial testing of the prototype will follow. Obtaining a patent for the design and then clinical testing and marketing of the product will be the final steps.

Faculty & Advisors

Dr. Emmanuel Opara, M.D., IIT
Ms. Darcy Evon, IPRO Office
Dr. Ralph Muehleisen, CAE
Dr. Vincent Turrito, BME
Dr. Matt Corcoran, University of Chicago
Dr. Myron Gottlieb, CHE
Dr. Victor Perez-Luna, CHE

Student Members

Adeseye Adekeye, MBB
Kristina Chapman, AE/MATH, Project Leader
Bhargava Gannavarapu, MBB
Jayashree Nakkana, BME
Amanda Ritter, BIO
Maeran Uhm, MBB
Sheetal Bhat, BME
Michelle Chen, MBB
Ronak Lakhia, MBB
Priti Patwari, MBB
Jennifer Tullman, CHE
Norby Wang, MBB