IPRO 331

Non-invasive Blood Glucose Monitoring Systems

Objective

The goal of IPRO 331 was to develop a non-invasive methodology for continuous blood glucose monitoring. More specifically, it became our stated objective to create a device that would be a dramatically better alternative to current methods in terms of cost, invasiveness, reliability, ease of use and portability.

Basic Organization and Tasks

IPRO 331 delegated responsibility to small groups. These small groups took charge of a particular objective set by the group. The tasks the groups worked on were: methods for measuring blood glucose, methods for drawing interstitial fluid, cost, aesthetics, web design, project reports and presentation. The members of the groups and the group's assigned tasks were reworked about every three weeks. This allowed for a variety in group dynamics and a fluidity of ideas. In all, each group member played at least some role in every aspect of the project.

Accomplishments

Accomplishing our goal to a high degree, IPRO 331 developed a fairly complete design and conceptual methodology for the continuous monitoring of blood glucose non-invasively. Our design involved using a sophisticated method to draw up intestinal fluid from the body, without it being contaminated by sweat, and utilizing impedance spectroscopy to measure the glucose concentration of that fluid. First, a low pressure vacuum would draw sweat from the skin. This sweat would then be expelled by a piston. An ultrasound emitter would then permeate the skin and allow the vacuum to then draw up interstitial fluid. The impedance of this interstitial fluid would be measured at discreet frequencies known to be indicative of blood glucose concentration. The device would then display the blood glucose concentration on an LCD screen and expel the interstitial fluid. Lastly, self cleaning sensors would clean the chamber.

Critical barriers and obstacles

There are several potential barriers and obstacles to our methodology: the exact frequencies at which the impedance should be measured must still be determined, the exact vacuum pressures needed to draw up sweat and interstitial fluid respectively are not yet known and, the reliability must be determined by experiment after a working prototype has been built.

Conclusion

IPRO 331 created a theoretical methodology for our goal and supplemented it with cost analysis and design specifications. A patent disclosure is expected to be completed before December 2, 2004.

Next steps

IPRO 331 will be looking to complete its patent application with the help of the university, its sponsors, and the technology property group. Moreover, potential marketability, sponsorship, and reliability should be addressed in the future.

Faculty & Advisors

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