

Project Plan Fall 2004

IPRO 331: Non-invasive Blood Glucose Monitoring

Professor: Professor EC Opara

Team Members:

Adeseye Adekeye
Sangeeta Bookseller
Brogran Dexter
Jude Kieltyka
Chad Nishizuka
Daisy Rathod
Shivani Shah
Anupama Topgi
Jon Young

Consultants: Ray DeBoth

OBJECTIVES: The overall objective of this IPRO project is to help in the development of a non-invasive blood glucose monitoring technique for patients afflicted with diabetes.

BACKGROUND:

As precise and reliable blood sugar measurements are absolutely vital to the health and well being of patients with diabetes, it is very important that such measurements can be taken as non-obtrusively as possible. Unfortunately, most widely used monitoring techniques are very invasive; often requiring multiple needle pricks a day. Accordingly, a reliable, easy to use, non-invasive technique is of great need.

It is our goal, to develop a technique for the measurement of blood sugar without the necessity of puncturing veins. This technique will be evaluated specifically with regard to aesthetics, ease of use, cost and reliability. In the process of development, we will review the basic biological mechanisms of the endocrine pancreas, glucose chemistry and metabolism, biomaterials, physicochemical and biophysical processes, design and implementation, economics, and psychosocial factors. This project will be excellent means of gaining experience in the biotechnological world for us as students.

METHODOLOGY:

- Investigation of current non-invasive blood glucose measuring techniques especially those techniques utilizing IR spectroscopy, impedance spectroscopy, and chemical analysis of interstitial fluid.
- Exploring the work of the previous IPRO as a possible stepping stone towards our own solution.
- Choosing a particular technique as a major focus.

- Developing a procedure for utilizing that technique to measure blood glucose levels.
- Addressing the quality of this technique in terms of cost, ease of use, aesthetics, portability, reliability, and resolution.
- Developing a procedure, and or design or prototype for the unit or method.
- Developing a detailed presentation of the project as a whole including a website and poster/presentation.

EXPECTED RESULTS:

As a team, we expect to work effectively investigating non-invasive blood glucose monitoring techniques and to develop our own unique method, addressing the need for new technologies in the field.

SCHEDULE OF TASKS/TIMELINE:

- 1. Approach- 2 weeks**
- 2. Method to achieving – 6 weeks**
- 3. Prototype Data – following weeks**
- 4. Design Presentation – following weeks**

ASSIGNMENTS:

The IPRO team was initially divided into three main focus groups as a starting point for our development of a focus and direction for this IPRO. During the first two days of class meetings we mapped out three areas which would be effective to cover in order to make a move for the development of a technique. The three different areas and groups are as covered below:

Group 1- Focusing on any improvements from last semesters IPRO development and any other techniques outside of this:

- Adeseye Adekeye
- Shivani Shah
- Jude Kieltyka

Group 2-Impedance Spectroscopy

- Anupama Topgi
- Jon Young
- Brogan Dexter

Group 3-Infrared Monitoring (both Near and Far)

- Sangeeta Bookseller
- Daisy Rathod
- Chad Nishizuka

Assignments for the particulars of this IPRO:

-Team Leader ~ Jude Kieltyka

- Project Plan ~ Daisy Rathod

-Oral Presentation ~ Brogan Dexter, Chad Nishizuka, Jude Kieltyka, Sangeeta Bookseller

-Midterm Progress Report ~ Anupama Topgi, other members

-Website Production ~ Brogan Dexter, Jon Young

-Team Minutes (Scribe) ~ Daisy Rathod

-Team Poster~ Shivani Shah, Adeseye Adekeye, Chad Nishizuka

-Final Report/Abstract~ Shivani Shah, Adeseye Adekeye