

# I PRO 331: Non-Invasive Blood Glucose Monitoring

## What is Diabetes?

- Diabetes is a disease in which the body ineffectively uses blood glucose for energy.
  - Type I
    - Endocrine
    - Previously known as juvenile onset
  - Type II
    - Metabolic
    - Previously known as adult onset

## Current Methods

- Lancet/Syringe
- Glucose pump
- GlucoWatch



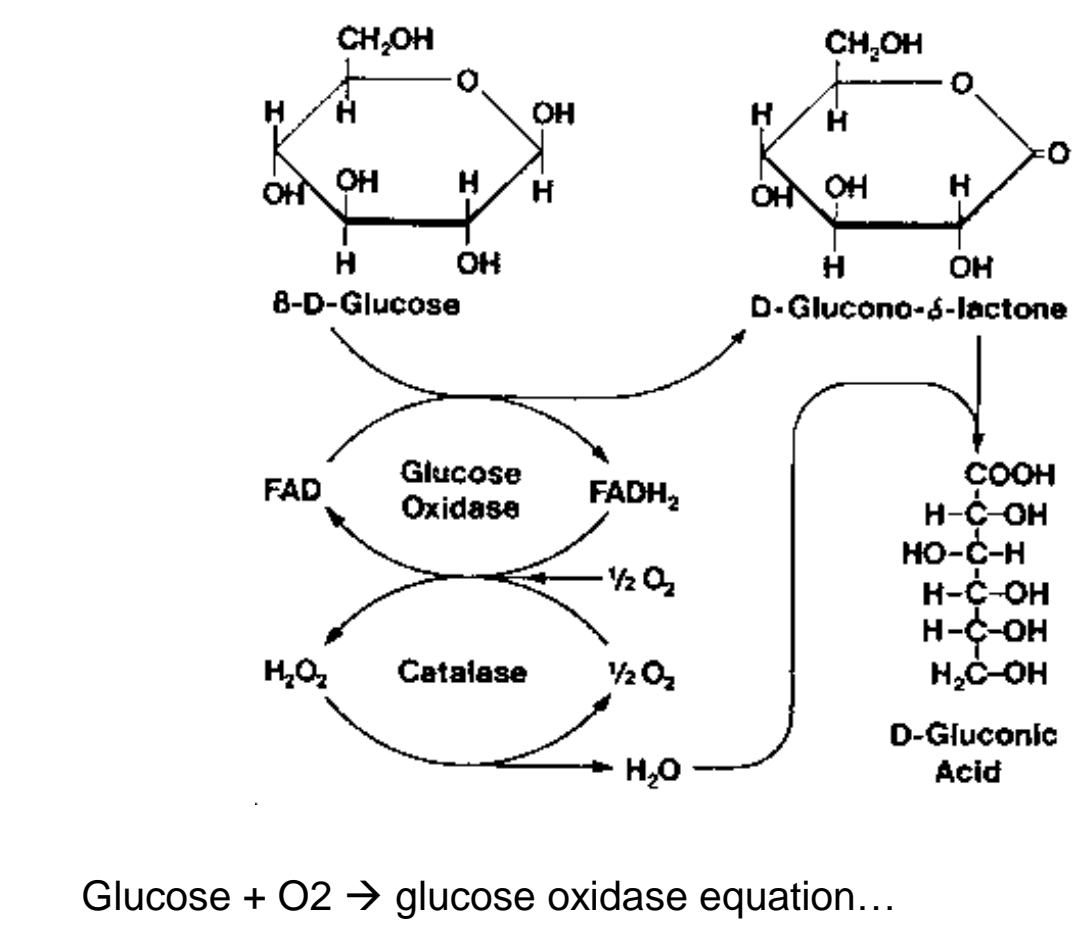
## Pros/Cons

Method	Advantage	Disadvantage
Lancet/Syringe	Accurate/Quick	Invasive Painful
Glucose Pump	Accurate/Self-monitoring	Invasive, can malfunction
GlucoWatch	Non-invasive convenient	Inaccurate Unreliable

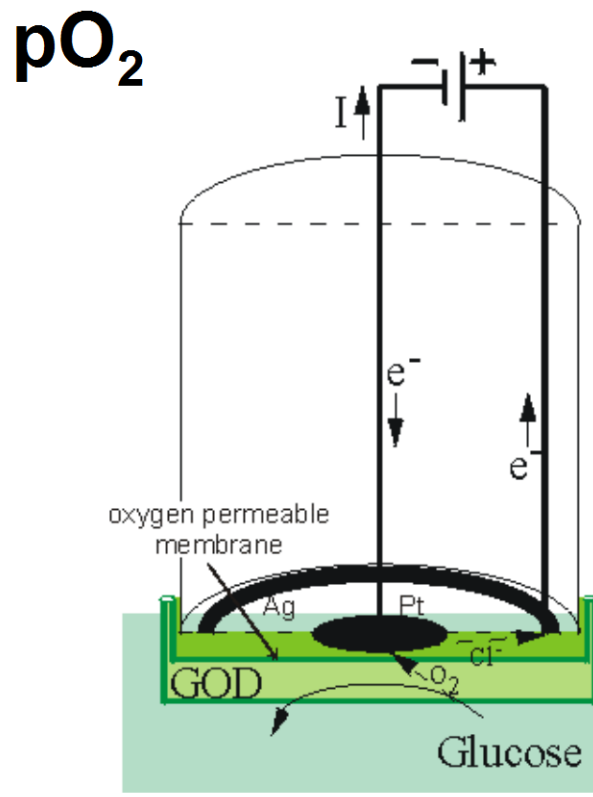
## Objectives for the Semester

- Create a design for a non-invasive blood-glucose monitoring system:
  - Simple in concept
  - User-friendly (especially for children)
  - Does not hamper a person's daily lifestyle
  - Cost-effective
  - Portable

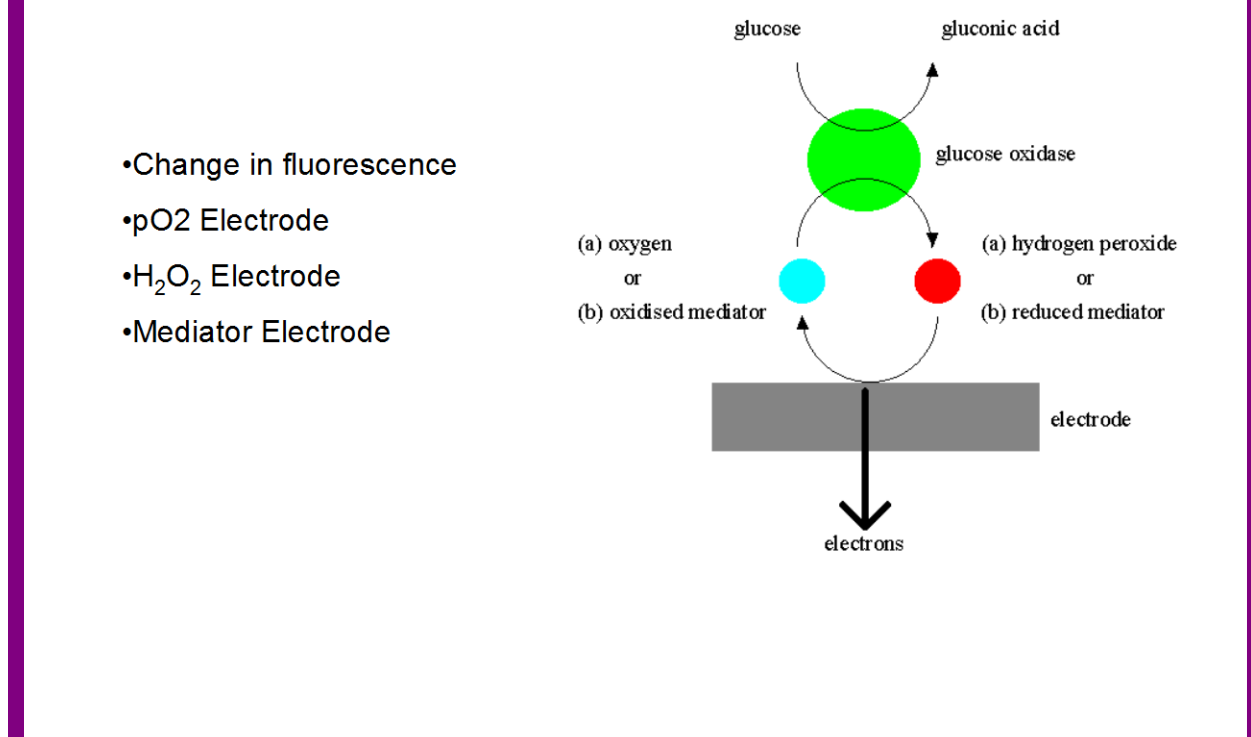
## Glucose Oxidase Reaction



## Diagram of pO<sub>2</sub> Electrode



## Methods of Measurement



## Data Transfer

- Direct – Automated measurement and periodic downloading
- Method of blood glucose measurement involves:
  - Transcutaneous biosensors (blood glucose conc. is an extrapolation)
  - Data Port
  - Computer
  - Diabetes Management Software
- Same method used by companies like Abbott and Bayer

## Total Estimated Cost

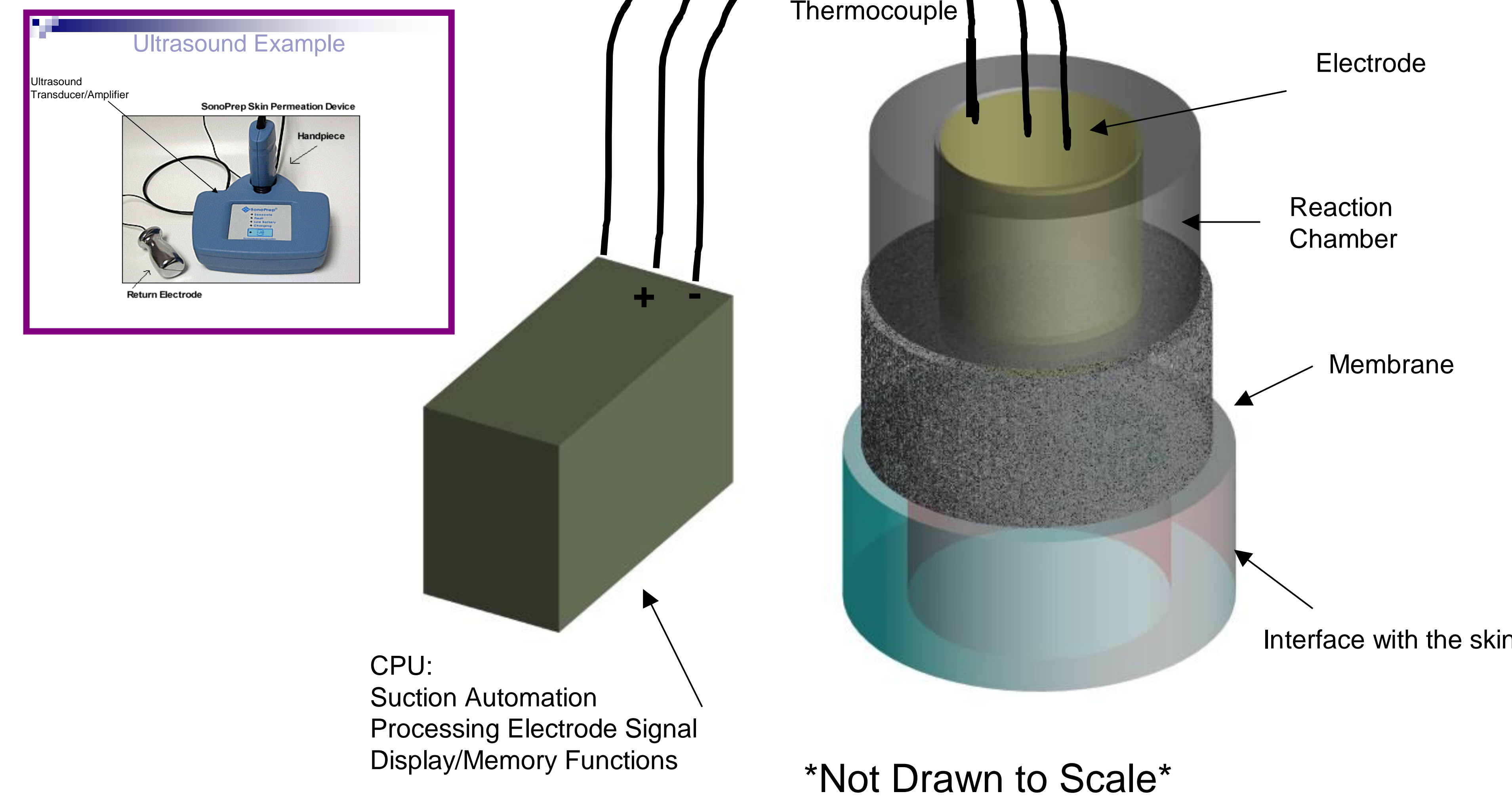
- Ultrasound- \$25-\$100
- Suction-\$25
- Electrode-\$50-\$75
- Data Transfer-\$25-\$50
- Aesthetics-\$10-20
- Total- \$150-\$270

## Group Members

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## Components

- Ultrasound:** To permeate the skin and allow interstitial fluid to become accessible
- Vacuum Suction:** To draw up the interstitial fluid
- Reaction Chamber:** Performs Glucose Oxidase Reaction to measure blood glucose levels; controlled by a membrane, uses a mediator
- Data Transfer:** Electronically transfer data from the reaction chamber to the CPU