

# Continuous Glucose Levels

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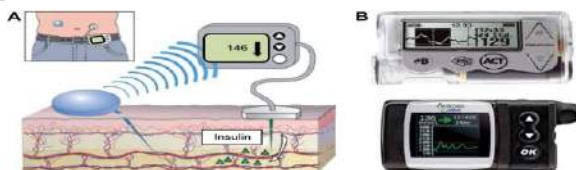
**Abstract**—Type one diabetes is a disease that is becoming more prevalent in society with each passing day, advancements must be made in this area to improve the value of life. One improvement that is being made are continuous glucose sensors to help monitor blood sugar real-time.

## I. INTRODUCTION

**D**IABETES mellitus is a significant problem and constantly growing disease in the United States. Type one diabetes (T1D) is one form of diabetes and some argue the most severe. In type one diabetes patients have a pancreas that does not work correctly. It does not produce enough insulin to keep the patients' blood glucose in the healthy levels. What if there was a way to continuously monitor these levels to stay at healthy levels all the time?

## II. METHODS

One method that scientists have used to help monitor glucose levels in type one diabetics is called SAP therapy. SAP therapy is sensory-augmented pump, which means it is a sensor that is integrated with a normal insulin pump to monitor blood sugar, a picture depicting this is shown below [1].

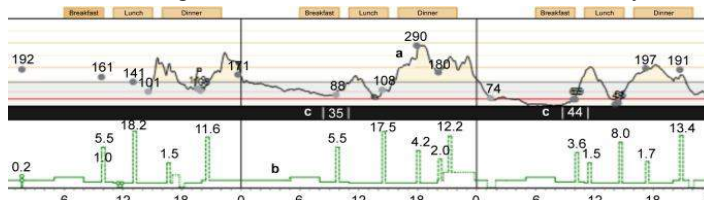


This therapy is used for patients who have trouble keeping their blood sugar at healthy levels, and need a way to keep their blood sugar more often and more efficiently. This method connects the sensor to monitoring devices where you can see what your glucose levels are at the touch of a button [1]. Another method that scientists have created to improve the lives of diabetics is the implanted glucose sensor. This sensor is implanted in the subcutaneous tissue to continuously monitor glucose levels. This sensor lasts in the body and works continuously for up to ninety days. This device is connected to a device wirelessly that can always give the person their glucose level in real-time. This device is implanted in subcutaneous tissue surgically [2].

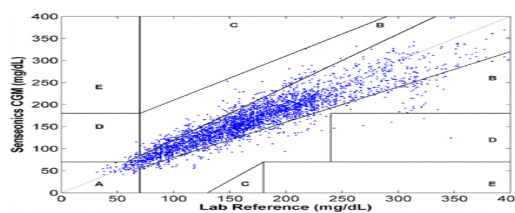
## III. RESULTS

For the first method, continuous glucose monitoring via SAP therapy, has produced many positive results. A JDRF study said the use of “continuous glucose monitoring averaged 6.0 or more days per week for 83% of patients 25 years of age or older, 30% of those 15 to 24 years of age” [2]. It is shown that subjects in the SAP group were more likely to meet age-specific A1C targets and had lower AUC values for hyperglycemia with no increased risk of hypoglycemia [3]. Glucose variability improved in the SAP group compared

to the MDI group. “Children wore CGM sensors more often and were more likely to reach age-specific A1C targets” [4]. Patients can monitor their glucose levels more closely with the continuous glucose monitor and it is with a program on the sensor that lets the patient see the normal rates each day to find a better algorithm to deliver insulin more efficiently as



shown above [1]. In the implanted sensors results show that 99.5% of the data points taken from 3585 sensors in patient's bodies' fall between the range of A to B which is the healthy range for glucose levels as shown in figure below [5].



## IV. DISCUSSION

Some advantages to using the SAP therapy would be the ability to check glucose rates whenever the patients wanted and the alerts given when levels are too high or low. Some barriers to this device would be low accuracy and uncomfortable insertion, which can be avoided by clean hands and precise calibration, and using appropriate insertion techniques and special creams.

Advantages to implantable glucose sensors are that it is a single system that provides continuous measurements with great accuracy over 3 months. The major problem with both of these devices today is that they are not closed loop systems but someday soon there will be.

## REFERENCES

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