Measuring Blood Glucose Level by Acetone Concentration in Exhaled Air

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As indicated by the World Health Organization (WHO), the total number of people with diabetes worldwide is just over 422 million and is growing rapidly. Diabetic patients use blood glucose invasive monitoring device that according to the National Institute may cause discomfort and pain after repeated use and pose risks of potential infection and tissue damage resulting in poor patient compliance for daily assigned measurements. Blood glucose level monitoring is very important to prevent complications such as life-threatening hypoglycemia and diabetic ketoacidosis. The aim of this research is to use the relationship between blood glucose levels and the volatile organic compound (VOC) acetone concentration in exhaled air in designing the “Breathe” device which can be used as an alternative non-invasive measuring method and is considered an easier and suitable method for daily measurements without piercing the skin and causing pain and is more suitable for all age groups. Using MG-135 sensor to detect the acetone concentration in exhaled air in the unit part per million (ppm), random samples of exhaled air were taken to test our device, different concentrations of acetone in exhaled air that depend on the person’s health status are the input of the equation that gave us correct blood glucose level measurements in the unit (mg/dl) that reflects the positive correlation. The result show that the positive correlation between acetone concentration in exhaled air and blood glucose level could be used to replace the invasive piercing method to a non-invasive method to measure the blood glucose level.

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