

# Application of a Multisensor Device for Non Invasive Continuous Glucose Monitoring under Home-Use Conditions

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## **Objective:**

We reported earlier about the findings of the application of a novel Multisensor device under development for continuous non invasive glucose monitoring (NIGM). The Multisensor yields signals from the skin-surface sensors for dielectric, optical, temperature, blood perfusion and hydration measurements. Under controlled conditions the Multisensor yielded a R2 of 0.68 and a Mean Absolute Relative Difference (MARD) of 27.3% compared to capillary self monitoring of blood glucose reference blood glucose (SMBG) values. Here we report about the application of the Multisensor under home use conditions.

## **Method:**

Sixteen T1DM patients (age  $39\pm 12$  y; BMI  $23.8\pm 2.7$  kg/m<sup>2</sup>, duration of diabetes  $20\pm 13$  y; HbA1c  $6.8\pm 0.8\%$ ) wore the Multisensor, attached to the upper arm with an elasticated arm band, on average 9 h per day. 15 patients performed a total of 24 study days, one patient performed a total of only 20 study days over a period of 4 months under regular life conditions. A total of 380 study days were collected. Patients collected on average 11 SMBG measurements during each study day. The study was split into two blocks, of overall 160 non consecutive and 220 preferably consecutive days, respectively. The Multisensor and the SMBG measurements from the first block were used for selecting and training a linear regression model. The model was then prospectively applied on the second block of data.

## **Results:**

The model yielded a MARD of 39.7%, and a Mean Absolute Difference (MAD) of 44.8 mg/dL when comparing the Multisensor to the SMBG values. The data were collected during daily life and across climatic conditions, ranging from hot summer to colder autumn (average environmental temperature  $20\pm 10^\circ\text{C}$ ).

## **Conclusion:**

Application of the Multisensor in T1DM patients under daily life conditions using a purely statistical model, prospectively applied demonstrates that glucose variations can be tracked per se. To increase precision of the glucose variation estimation further developments are under way.