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MEETING PROCEEDINGS

Peculiarities of the Continuous Glucose Monitoring Data Stream and Their Impact on Developing Closed-Loop Control Technology

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Abstract

Therapeutic advances in type 1 diabetes (T1DM) are currently focused on developing a closed-loop control system using a continuous glucose monitor (CGM), subcutaneous insulin delivery, and a control algorithm. Because a CGM assesses blood glucose indirectly (and therefore often inaccurately), it limits the effectiveness of the controller. In order to improve the quality of CGM data, a series of analyses are suggested. These analyses evaluate and compensate for CGM errors, assess risks associated with glucose variability, predict glucose fluctuation, and forecast hypo- and hyperglycemia. These analyses are illustrated with data collected using the MiniMed CGMS® (Medtronic, Northridge, CA) and Freestyle Navigator™ (Abbott Diabetes Care, Alameda, CA). It is important to remember that traditional statistics *do not work* with CGM data because consecutive CGM readings are highly interdependent.

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Abbreviations: (BG) blood glucose, (CG-EGA) continuous glucose error-grid analysis, (CGM) continuous glucose monitor, (CGMS) continuous glucose monitoring system, (IG) interstitial glucose, (i.v.) intravenous, (MAD) mean absolute deviation, (MPC) model-predictive control, (PID) proportional–integral–derivative, (s.c.) subcutaneous, (T1DM) type 1 diabetes

Keywords: CGM, continuous glucose monitoring, hypoglycemia, prediction methods, time series

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