

Developing a Comprehensive Meal Detection Algorithm and Meal Content
Analysis for Patients with Type I Diabetes Using Continued Glucose
Monitoring Data
(Technical Report)

Access to Diabetes Treatment: Survival of Low-Income T1D Patients
(STS Research Paper)

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by

Pallavi Swarup

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Preface

In 2015, 30.3 million people were diagnosed with diabetes, of whom 5 percent were diagnosed with type 1 diabetes (T1D), an autoimmune disorder in which beta cells in the pancreas are destroyed, impairing insulin production. T1D patients require daily insulin, insulin pumps, glucose level monitoring, and close medical care.

Nutrition is essential for T1D. Physicians need patients' meal records, but such records often lack correct time stamps or omit meals. A system that retrospectively reviews a patient's continued glucose monitoring (CGM) data and reconstructs the meal record would offer more complete data. The research team aimed to develop such a system that retrospectively identifies meal times and types. Meal times are determined from peaks along the first and second derivative curves of the CGM trace. From the glucose minimal model, the appearance of glucose in the bloodstream is quantitatively characterized. Model parameters were compared with the meal's content; computational techniques investigated trends and correlations between them. Future researchers may improve the accuracy of such meal record reconstruction. The comprehensive framework can also be converted into a real-time tool to be implemented within artificial pancreas systems.

How do diabetics in low-income communities manage their condition despite rising treatment costs? Some diabetics resort to dangerous short-term measures. Drug manufacturers, pharmacy benefit managers, pharmacies, and insurance companies influence the price of insulin; higher profit margins reduce access to insulin among low-income people, who have a relatively higher incidence of diabetes.