Chronic complications versus glycaemic variability, time in range and HbA1c in people with type 1 diabetes: sub study of the RESCUE-trial

Author Block A. El Malahi1, M. Van Elsen1, S. Charleer2, F. De Ridder1,3, K. Ledeganck3, B. Keymeulen4, L. Crenier5, R. Radermecker6, B. Lapauw7, C. Vercammen8, F. Nobels9, C. Mathieu2, P. Gillard2, C. De Block1,3;
1Endocrinology-Diabetology, University Hospital Antwerp, Edegem, Belgium, 2Endocrinology, University Hospitals Leuven - KU Leuven, Leuven, Belgium, 3Laboratory of experimental medicine and paediatrics, University of Antwerp, Antwerp, Belgium, 4Diabetology, University Hospital Brussels, Brussels, Belgium, 5Endocrinology, Université Libre de Bruxelles – Hôpital Erasme, Brussels, Belgium, 6Diabetes, Nutrition and Metabolic disorders, CHU Liège, Liège, Belgium, 7Endocrinology, Ghent University Hospital, Ghent, Belgium, 8Endocrinology, Imelda Hospital, Bonheiden, Belgium, 9Endocrinology, OLV Hospital Aalst, Aalst, Belgium.

Abstract:

Background and aims: So far, HbA1c is the only metric of glucose control showing a strong association with chronic complications. However, it does not reflect short-term glycemic variability nor provides guidance in decreasing risk of hypoglycemia. More widespread use of continuous glucose monitoring (CGM) has changed the way people with type 1 diabetes (T1D) manage their glycemia by providing information about glycemic variability and time spent in different glucose ranges.

Materials and methods: Parameters that could have a link with diabetes complications were analyzed of 515 adults with T1D who entered the Belgian reimbursement system for real-time CGM (rtCGM): HbA1c, standard deviation (SD), coefficient of variation (%CV), time in range (TIR, 70-180 mg/dL), age, diabetes duration, BMI, and gender. Association between glucometrics from the first 2 weeks of rtCGM use and presence of the following diabetes complications at start were investigated with multiple logistic regression: composite microvascular complications (defined as presence of at least 1 of the following: peripheral or autonomic neuropathy, retinopathy, nephropathy), macrovascular complications, and hospitalization for hypoglycemia and ketoacidosis.

Results: Diabetes duration (OR=1.12, P<0.001) and TIR (OR=0.97, P=0.005) were independently correlated with composite microvascular complications. For nephropathy, diabetes duration (OR=1.08, P<0.001) and HbA1c (OR=1.65, P=0.012) were independently associated. For retinopathy it were diabetes duration (OR=1.14, P<0.001) and TIR (OR=0.96, P<0.001). For peripheral and autonomic neuropathy it were diabetes duration (OR=1.09, P<0.001; OR=1.08, P<0.001) and SD (OR=1.03, P=0.026; OR=1.035, P=0.015). Age (OR=1.08, P=0.003) and HbA1c (OR=1.80, P=0.044) were independently correlated with macrovascular complications. Only TIR (OR=0.97, P=0.021) was independently associated with hospitalization for hypoglycemia or ketoacidosis.

Conclusion: Shorter TIR was associated with the presence of composite microvascular complications, and with retinopathy in particular. A higher SD was linked to peripheral and
autonomic neuropathy. For hospitalization due to hypoglycemia or ketoacidosis, TIR was the most important factor.