

PRESS RELEASE

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Type 1 Diabetes: AI unlocks new clues for personalized care

LIH study discovers multiple blood sugar profiles paving the way for tailored treatments

Researchers led by Dr Guy Fagherazzi and Dr Gloria Aguayo at the Luxembourg Institute of Health (LIH) have achieved a significant advance in understanding type 1 diabetes (T1D) using powerful artificial intelligence (AI) techniques. Their study, published in a top medical journal, identifies seven distinct blood sugar (glycaemic) patterns within T1D for the first time. This discovery highlights the complexity of the disease and opens doors for personalized treatment approaches in a major milestone that could improve outcomes for people living with T1D worldwide.

Type 1 diabetes affects millions worldwide, presenting a significant challenge for personalized care due to its heterogeneity. Traditional methods for assessing blood sugar control, whether from continuous glucose monitoring devices or standard lab tests, typically analyse data points one by one. This limited approach hinders the integration of complex glycaemic phenotypes into personalized care strategies.

Recently published research by the Luxembourg Institute of Health (LIH) offers a breakthrough. Led by Dr Guy Fagherazzi, Director of the Department of Precision Health and Dr Gloria Aguayo, Senior Researcher in the Deep Digital Phenotyping Lab at LIH, and conducted in collaboration with the SFDT1 study investigators, it used advanced artificial intelligence (AI) methodologies to unveil a new era of understanding in type 1 diabetes (T1D). Their discoveries are innovative in deciphering the intricate glycaemic phenotypes of this complex disease.

"For the first time, we have identified seven distinct glycaemic phenotypes within a well-phenotyped cohort of 618 individuals with type 1 diabetes," explains Dr Fagherazzi. "Our innovative AI method, allowed us to visualize these phenotypes in a two-dimensional mapping, providing a deeper understanding of the disease's complexity."

Unique to this study is not only the identification of glycaemic phenotypes but also their associations with socioeconomic factors, cardiovascular risk markers, diabetes treatment, and diabetes-related complications. This comprehensive approach paves the way for more personalized care strategies tailored to each patient's unique profile. Moreover, the team developed an online tool that projects patients onto the data visualization of their findings, offering healthcare professionals a practical resource to apply these insights in real-world settings.

Dr Fagherazzi emphasizes, *"Our study's findings will have significant implications for clinical practice, enabling healthcare providers to design more precise and effective interventions that consider the heterogeneity of glycaemic profiles in type 1 diabetes."*

The study's methodology leveraged data collected from digital diabetes technologies, such as continuous glucose monitoring devices, highlighting the growing importance of digital health in advancing medical research and patient care. This pioneering research underscores LIH's

commitment to innovation in healthcare and its dedication to improving outcomes for individuals living with type 1 diabetes.

The research was published in *Diabetologia* (the journal of the European Association for the Study of Diabetes [EASD]), under the full title: “*Heterogeneity of glycaemic phenotypes in type 1 diabetes*” (<https://doi.org/10.1007/s00125-024-06179-4>).

Funding and collaborations

The study was co-authored by Guy Fagherazzi and Gloria A. Aguayo from the Deep Digital Phenotyping Research Unit, Department of Precision Health, Luxembourg Institute of Health, and done in collaboration with Lu Zhang from Bioinformatics Platform, Luxembourg Institute of Health. The full list of authors can be found [here](#).

About the Luxembourg Institute of Health (LIH)

The Luxembourg Institute of Health (LIH) is a public biomedical research organisation focused on precision health and invested in becoming a leading reference in Europe for the translation of scientific excellence into meaningful benefits for patients.

The LIH places the patient at the heart of all its activities, driven by a collective obligation towards society to use knowledge and technology arising from research on patient derived data to have a direct impact on people’s health. Its dedicated teams of multidisciplinary researchers strive for excellence, generating relevant knowledge linked to immune related diseases and cancer.

The institute embraces collaborations, disruptive technology and process innovation as unique opportunities to improve the application of diagnostics and therapeutics with the long-term goal of preventing disease.

About SFDT1

SFDT1 is a longitudinal prospective cohort study on type 1 diabetes conducted in France. SFDT1 is promoted by the Fondation Francophone pour la Recherche sur le Diabète (FFRD) at the initiative of the French Speaking Diabetes Society (Société Francophone du Diabète - SFD). SFDT1 is made possible thanks to the support and donation of JDRF, Abbott, Lilly, Air Liquide, Sanofi, Novo Nordisk, Insulet, Dexcom, Medtronic, Ypsomed, Lifescan, and Sur les Pas de So . More information about SFDT1 on <https://sfdt1.fr/> (French).

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