Future-Ready T1D Solutions: Bridging genetics and autoantibody testing

Helena Murray[1], Kenneth Martin[1], Ali Can[1], Claire Doherty[1], Charity Binda[1], Huw Stacey[1], Adrian Szajewski[1], Tiffany Doherty[1], Cecilia Fortugno[1], Ben Spurrier[2], Richard Oram[2], John Lamont[2], and Peter FitzGerald[1]

[1]Randox Laboratories Limited, Crumlin, County Antrim, BT29 4QY, UK.

[2] Clinical and Biomedical Sciences University of Exeter Medical School, Exeter, EX1 2LU UK.

Type 1 Diabetes (T1D) affects more than eight million people worldwide, with numbers projected to rise significantly to over 17 million by 2040. It is caused by an immune-associated destruction of insulin-producing pancreatic β cells in genetically predisposed individuals, leading to insulin deficiency and requirement for exogenous insulin supplement. Typically considered a disease of childhood and adolescence it can however occur at any age. Symptoms include polyuria, polydipsia, and weight loss. Acute complications involve diabetic ketoacidosis, which requires urgent management. Individuals with T1D are also at a higher risk for other autoimmune diseases and psychosocial issues. Correct diagnosis in young people (<20 years) is usually straightforward because it accounts for most cases (>85%) of diabetes in that population. Conversely, identification of T1D in adulthood (>30 years) is challenging due to a much higher prevalence of Type 2 Diabetes (T2D) and rising obesity rates. Clinical diagnosis is often based on poorly discriminatory clinical characteristics and as a result misdiagnosis is common. As such there is a clear unmet clinical need to improve the diagnostic accuracy of this life-threatening condition. As the genetic component of T1D is very pronounced, well characterized and remains unchanged throughout life it offers a means to identify individuals with higher genetic risk by combining analysis of both HLA and non-HLA-associated risk alleles thereby leading to disease prediction prior to symptom onset and aid disease classification. Furthermore, a clinical diagnosis of Stage 1 pre-T1D which can be asymptomatic and precede dysglycemia, can be substantiated by seroconversion of two or more islet autoantibodies (GAD, IA2, IAA, ZnT8) and may allow timely deployment of immune modulating therapies aimed at preserving islet function. Randox has the solution to provide both these testing options through proprietary biochip array technology (BAT) and state of the art instrumentation with the option of high throughput and near-patient testing. This combination of T1D genetics and AA testing has the potential to improve patient care, treatment plans and final outcomes and possibly aid in the introduction of pre-emptive therapies of lifestyle modification and pharmaceutical intervention to reduce T1D progression.