Diabetes mellitus type I (insulin-dependent diabetes) is an autoimmune disease which is accompanied by destruction of the pancreas islets through autoreactive T cells and the formation of autoantibodies. It occurs predominantly in young people and represents 10% of all diabetes cases.

The determination of autoantibodies against pancreas islet cell antigens is used to confirm a diagnosis of type 1 diabetes and to identify preclinical autoimmune reactions in persons at risk. In most cases one or more diabetes mellitus-associated autoantibodies can be detected at the time of clinical manifestation.

Autoantibodies against pancreas islet cells (ICA) can be detected in 80% of patients with new-onset diabetes using indirect immunofluorescence. Two target antigens for ICA have been so far identified — the enzymes glutamic acid decarboxylase (GAD) and tyrosine phosphatase (IA2):

Autoantibodies against glutamic acid decarboxylase (GADA) were first observed in Stiff-Man syndrome, but also occur in type I diabetes mellitus at a prevalence of 60-85%. Autoantibodies against tyrosine phosphatase (IA2A) are not associated with Stiff-Man syndrome. Their prevalence in type I diabetes is 48-80%, whereby they are more frequently detected the younger patients are.

The prevalence of autoantibodies against insulin (IAA) is also age dependent. In patients under 5 years of age the prevalence amounts to over 90%, while by the 12th year it decreases to 40%. IAA are therefore of great relevance in paediatrics.

Autoantibodies associated with type I diabetes mellitus can be detected years before clinical manifestations appear. Their determination enables early identification of persons at increased risk. Through suitable intervention, for example maintaining glucose concentrations at a low level or implementing immunosuppressive measures, the development of the disease can be avoided in some cases.

EUROIMMUN offers reliable, state-of-the-art test systems for the determination of autoantibodies associated with type I diabetes. ICA are determined by indirect immunofluorescence (IIF) using pancreas tissue as the substrate. For the determination of GADA cerebellum is additionally included. IFT plays an important role in diabetes diagnostics: in spite of its lower sensitivity in comparison to ELISA, it is the only method that can detect antibodies that are not yet characterized at the immunobiochemical level.

With the development of specially configured ELISA for the quantitative determination of autoantibodies against GAD and IA2 new non-radioactive test systems are now available. They enable the automated investigation of these important autoantibodies in large sample series. Antibodies of the patient react specifically with the antigen of the solid phase as well as with the biotinylated antigen. Only the autoantibodies bound to the two antigen forms are detected allowing a high specificity and sensitivity.

Radioimmunoassays (RIA) are the gold standard for the quantitative determination of autoantibodies against insulin. Patient sample is incubated with radioactively labelled antigen (tracer). If the sample contains specific autoantibodies, antigen-antibody complexes are formed, which are then precipitated and centrifuged out. The radioactivity measured in the precipitate is directly proportional to the antibody concentration in the sample.

3) Sööker et al., Immunobiol. 181: 223 (1990)