Autoimmune thyroid diseases (AITD) are characterized by the presence of thyroid-specific autoantibodies. These are directed against thyroid microsomes, for which the main target antigen is thyroid peroxidase (TPO), against thyroglobulin (TG), or against the thyroid stimulating hormone (TSH) receptor. AITD frequently occur in combination with other autoimmune diseases, such as myasthenia gravis, pernicious anaemia, chronic atrophic gastritis or autoimmune polyendocrinopathy. Therefore, further, corresponding autoantibodies are often found in the serum of AITD patients.

AITD can occur in the form of a thyroid overfunction (hyperthyroidism, e.g., Graves’ disease) or an underfunction (hypothyroidism). Graves’ disease accounts for 60% of all cases of hyperthyroidism. The main symptoms are struma, exophthalmos, and tachycardia (Merseburg triad). Anti-TSH receptor antibodies (TRAb) are considered a serological marker for the diagnosis of Graves’ disease: they are detectable in 90% of patients. Monitoring TRAb levels during the course of disease provides an important aid for prognosis and therapy management. High TRAb titers following a long thyrostatic therapy indicate an increased risk of relapse. Furthermore, the presence of TRAb in the serum of pregnant women with Graves’ disease is an indication of hyperthyroidism in the fetus. Anti-TPO antibodies are detected in over 70% of Graves’ disease patients and anti-TG antibodies in 20-50%, and their detection can confirm a diagnosis.

Hashimoto’s thyroiditis is generally associated with hypothyroidism. Symptoms are fatigue, muscle weakness and weight increase. The disease is considered a risk factor for the development of coronary heart disease. In many cases it is initially asymptomatic. Serology is of decisive importance for the diagnosis of Hashimoto’s thyroiditis: autoantibodies against TPO are detected in almost all patients, while antibodies against TG are found in 90% of cases.

Postpartum thyroiditis, a special form of autoimmune thyroiditis, is a transient, hyperthyroid functional disorder of the thyroid gland, which is accompanied by high titers of anti-TPO antibodies. This disease affects about 5% of women. The risk is particularly high in women with insulin-dependent diabetes mellitus. The measurement of anti-TPO antibodies is advisable in all women who have just given birth, since in the case of illness hormone replacement is required.

Anti-TG antibodies are additionally determined in the diagnosis of differentiated thyroid carcinoma, since the presence of these antibodies can interfere with measurement of TG concentrations in serum (tumour marker).

EUROIMMUN provides a variety of test systems for the quantitative and monospecific detection of autoantibodies against TPO, TSH and TSH receptors. In the Anti-TPO and Anti-TG microplate ELISA, recombinant TPO and native TG, respectively, are used as substrates. The TRAb ELISA measures the concentration of TSH binding inhibiting immunoglobulin (TBII) - a subtype of TRAb with high clinical sensitivity and specificity. In the test procedure autoantibodies compete with added enzyme-labelled TSH. EUROIMMUN ELISA are supplied with all necessary reagents and can be easily automated.

Anti-TG, anti-TPO and TRAk can also be investigated quantitatively using radioimmunoassay (RIA). EUROIMMUN offers test systems based on different separation techniques: coated tubes, precipitation and magnetic separation. Due to the wide measurement range repeated measurements with other dilutions have become more or less superfluous. Furthermore, each test kit contains ready-for-use reagents and controls for evaluation.

Another method for the determination of autoantibodies against TPO and TG is the indirect immunofluorescence test (IIFT) using frozen sections of thyroid gland as the substrate. Anti-TPO antibodies give a smooth fluorescence in the cytoplasm of the follicle epithelium, while TG antibodies react with the colloid of the follicles and cause a streaky or reticular fluorescence. Today, multiple tissue sections are combined with one another (BIOCHIP Mosaic) to determine an antibody profile, for example to confirm autoimmune polyendocrinopathy. The BIOCHIP combination of thyroid gland and rat kidney facilitates reliable differentiation of anti-thyroid antibodies from antibodies against mitochondria (AMA).

In the EUROASSAY (not shown) membrane strips printed with parallel lines of antigens are fixed into the test fields of a microscope slide. This system allows simultaneous monospecific detection of anti-TPO and anti-TG antibodies.