

Immunological Thyroid Disease

AITD are the more frequent pathological conditions of the thyroid gland. Although appearing as a single pathologic entity, the AITD comprise two main clinical presentations: Graves' disease and Hashimoto's thyroiditis. Both conditions are characterized by lymphocytic infiltration of the thyroid parenchyma.

In Graves' disease, the infiltration is mild and induces the production of anti-TSH receptor antibodies that stimulate the growth and the function of thyroid follicular cells, ultimately leading to hyperthyroidism.

In Hashimoto's thyroiditis, the lymphocytic infiltration is more severe and causes the destruction of the thyroid follicles and subsequent hypothyroidism. It is a typical T cell-mediated autoimmune disease, characterized by the ectopic formation of tertiary lymphoid follicles within the thyroid gland.

Causes of autoimmune thyroid diseases

1. Genetic susceptibility

2. Environmental factors

Aside the genetic factors, the remaining 20% or so contribution to the occurrence of AITD is thought to be due to environmental factors. Several factors have been identified and proposed. These include radiation, iodine status, smoking, infection, stress and drugs such as lithium and interferon .

3. Radiation

External radiation for Hodgkin's disease triggers the subsequent occurrence of antithyroid antibodies and AITD, hypothyroid thyroiditis as well as Graves' disease. Similarly, radioiodine treatment of toxic goitre

may be followed, years later, by the occurrence of Graves' disease, even Graves' ophthalmopathy . In a different context, children exposed to radiation from Chernobyl showed a greater incidence of thyroid autoantibody positivity, with no increase in the incidence of hypothyroidism .

4. Stress:- As early as one of the first description of the disease, stress has been considered as a trigger factor for Graves' disease onset. An abundant literature is devoted to that question , the approach of which remains relatively uncertain in the absence of objective markers.

5. Drugs:- Lithium treatment is associated with an increased prevalence of thyroid antibodies, hypothyroidism and, to a lesser extent, of Graves' disease. However, lithium-induced AITD must be differentiated from the inhibitory effect of lithium on thyroid secretion . Interferon-induced thyroiditis can manifest as classical autoimmune thyroiditis or, rarely, Graves' disease, but also as non-autoimmune thyroiditis. Whether the hepatitis C virus itself plays a role in the disease remains questionable.

Symptoms

The symptoms may vary depending on the thyroid function, i.e. hyperthyroidism or hypothyroidism.

Hyperthyroidism can cause sweating, rapid heart rate, anxiety, tremors, fatigue, difficulty sleeping, sudden weight loss, and protruding eyes.

Hypothyroidism can cause weight gain, fatigue, dry skin, hair loss, intolerance to cold, and constipation. The effects of this disease may be permanent but can sometimes be transient.

Symptoms may come and go depending on whether the person receives treatment.

- 1- Tiredness
- 2- Sensitivity to cold
- 3- Puffy face
- 4- Trouble pooping
- 5- Enlarged tongue
- 6- Pale, dry skin and brittle nails
- 7- Hair loss
- 8- Weight gain
- 9- Muscle aches and joint pain
- 10- Depression
- 11- Memory lapse
- 12- Heavy menstrual bleeding

Pathogenesis of AITD

Thyroid autoantibodies appear mostly with the presence of lymphocytes in the targeted organ. Lymphocytes produce antibodies targeting three different thyroid proteins: Thyroid peroxidase Antibodies (TPOAb), Thyroglobulin Antibodies (TgAb), and Thyroid stimulating hormone receptor Antibodies (TRAb). Some patients who are healthy may be positive for more than one of these antibodies. Doctors who attend to such patients will most likely do routine follow-ups on the patient's health since, even though it is highly unlikely that they will present any thyroid problems, there is still a chance that they will develop some type of dysfunction with time.

AITD is characterized by lymphocytic infiltration in the thyroid gland and the production of pathogenic thyroid autoantibodies . Autoantibodies against various thyroid antigens such as thyroid peroxidase (TPO), Tg, sodium iodide symporter, and pendrin are detected in the sera from patients with Hashimoto's thyroiditis . Production of TSAb against TSHR result is Graves' hyperthyroidism . It is clear that the production of autoantibodies requires disruption of self-tolerance and an adaptive immune response.

Diagnosis

For thyroid function evaluation, thyrotropin (TSH) is the usual starting point. TSH shows an exponential response to changing peripheral thyroid hormone levels, thereby providing high clinical detection sensitivity. Thyroxine (T4) or triiodothyronine (T3) is frequently measured alongside, mostly as free hormones (FT4 and FT3), to assess disease severity or treatment response. Some diseases require additional testing to determine the cause of observed abnormalities or to clarify contradictory results of TSH and T4/T3 testing. Thyroid autoantibody testing is important in this context.

Testing for structural thyroid disease centers on tumor markers, mainly thyroglobulin (Tg), calcitonin, and carcinoembryonic antigen, all of which are primarily used for follow-up. Tg immunoassays are not infrequently compromised by anti-Tg autoantibody interferences, which can be partially overcome by mass spectrometry (MS) Tg measurements.

Various tests can be chosen depending on the presenting symptoms. Doctors may search for Thyroid peroxidase Antibodies (TPOAb) when a person has symptoms of hypothyroidism, or when a person will be started on a drug therapy associated with risks of developing hypothyroidism, such as lithium or Interferon alfa. This antibody is related to Hashimoto's thyroiditis and Graves' disease. If the person presents symptoms of hyperthyroidism, doctors are more likely to test for Thyroid stimulating hormone receptor Antibodies (TRAb), and monitor the effects of anti-thyroid therapy, also associated with Graves' disease.

Doctors may check Thyroglobulin Antibodies (TgAb) also, whenever a thyroglobulin test is performed to see if the antibody is interfering. TgAb may also be ordered in regular intervals after a person has been diagnosed with thyroid cancer, and just like TPOAb, it can be associated with Hashimoto's thyroiditis.

College of Health and Medical Techniques/ kufa

Clinical immunology

Fourth stage

25 & 26

Lecture :- week

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