

Autoimmunity

Auto or self antigens

- ❖ Are antigens that presents in one's own cells
- ❖ Are altered by the action of bacteria, viruses, chemicals or other drugs

Auto antibodies

- Altered cell (Auto Ag) - elicits the productions of Antibody

What is autoimmunity?

- Autoimmunity is defined as the presence of immune response of auto Ab against self Ag
- It can be a humoral or cell mediated immune response against the constituents of the body's own tissues.

Autoimmune disease

Autoimmunity is the failure of an organism in recognizing its own constituent parts as non self, which allows an immune response against its own cells and tissues. Any disease that results from such an aberrant immune response is termed an autoimmune disease.

Causes of autoimmune diseases

1. Sequestered or Hidden antigens
Ag in the secluded places - are not accessible to the immune system.
E.g. Lens Ag, Sperm Ag, etc.
2. Neo antigens
Altered or Modified Antigens – by physical (irradiation), chemical (drugs) or microbial agents (intracellular viruses)
3. Cessation of Tolerance
It may result when tolerance to the self-Ag is abrogated.
4. Cross reacting Antigens

A foreign Ag which resembles self a 2nd Ag

Many species share organ specific Ags.

E.g. Ag of Human brain & Ag of sheep brain, Streptococcal M protein & Heart muscles, Nephritogenic strains of Streptococci Ags & Renal glomeruli shares similar epitopes.

5. Loss of Immunoregulation

Loss of Self tolerance - caused by over activity or lowered activity of T and B- cells

Classification of autoimmune disorders

Broadly classified into 3 groups

1. Haemolytic autoimmune diseases
2. Localised autoimmune diseases
3. Systemic autoimmune diseases

1. Haemolytic autoimmune diseases

- Clinical disorder due to destructions of blood components. Auto Ab are formed against one's own RBCs, Platelets or Leucocytes.
- E.g.
- Haemolytic anaemia
- Thrombocytopenia
- Leucopenia

2- Localised autoimmune diseases or Organ specific autoimmune disease

A particular organ is affected due to auto Abs.

For example:

- Thyroiditis
- Multiple sclerosis

- Myasthenia gravis
- Type I Diabetes Mellitus
- Graves' Disease

3- Systemic autoimmune disease or non-specific autoimmune disease

Immune complexes accumulate in many tissues and cause inflammation and damage Affects many organs or the whole body

E.g.

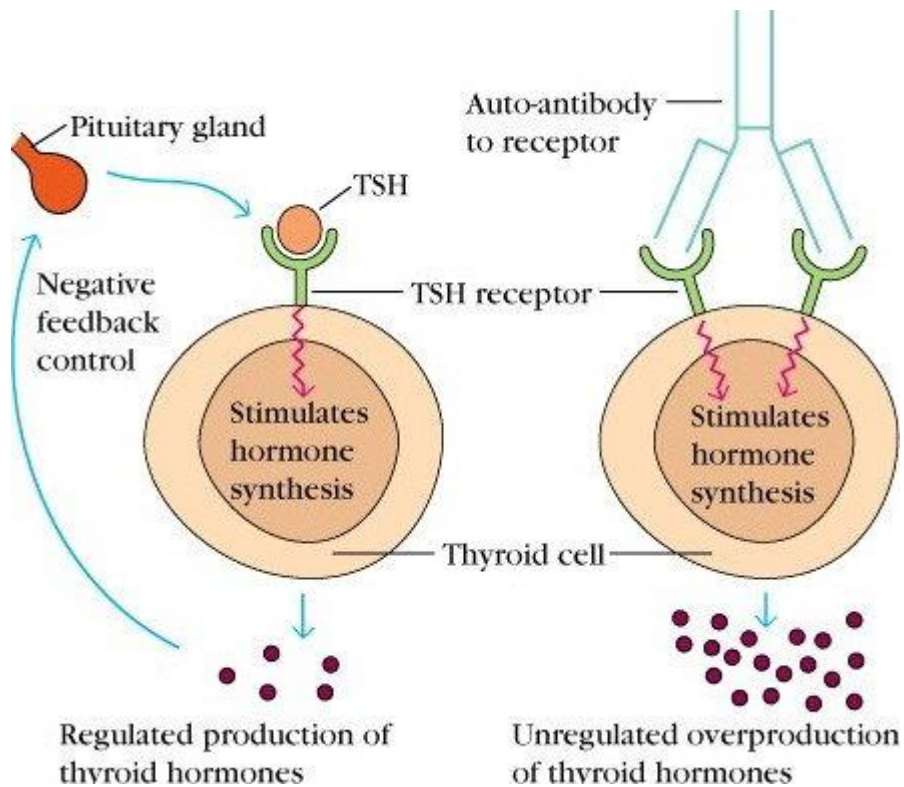
- + Systemic lupus erythematosus
- + Rheumatoid arthritis
- + Rheumatic fever

Graves' Disease

- ✓ Graves' disease is an autoimmune disease where the thyroid is overactive, producing an excessive amount of thyroid hormones (a serious metabolic imbalance known as hyperthyroidism and thyrotoxicosis).
- ✓ This is caused by thyroid autoantibodies that activate the TSH-receptor, thereby stimulating thyroid hormone synthesis and secretion, and thyroid growth (causing a diffusely enlarged goiter).
- ✓ The body produces antibodies to the TSH-Rs (Thyroid Stimulating Hormone Receptors). *(Antibodies to thyroglobulin and to the thyroid hormones T3 and T4 may also be produced.)
- ✓ These antibodies (TSHR-Ab) bind to the TSH-Rs, which are located on the cells that produce thyroid hormone in the thyroid gland (follicular cells),

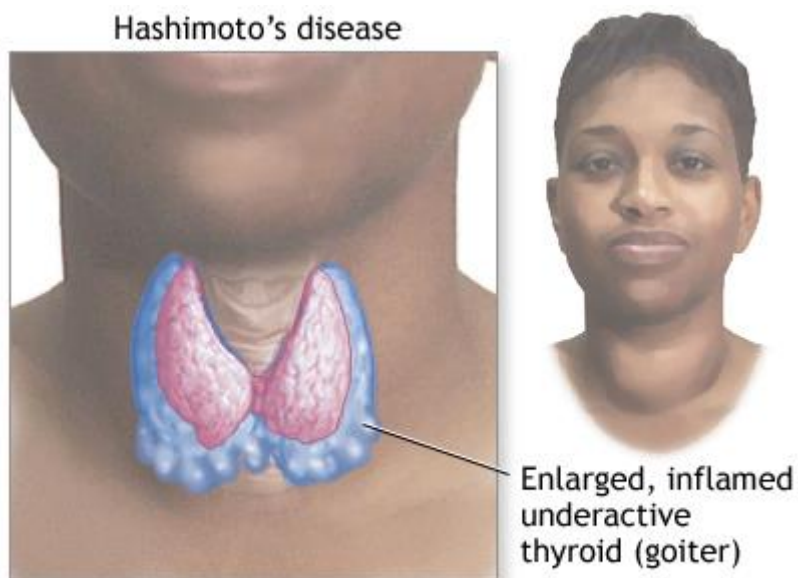
and chronically stimulate them, resulting in an abnormally high production of T3 and T4.

- ✓ This causes the stimulation of Thyroid gland to secrete more TH (Hyperthyroidism) resulting in Exophthalmos , bulging eyes & Goitre.



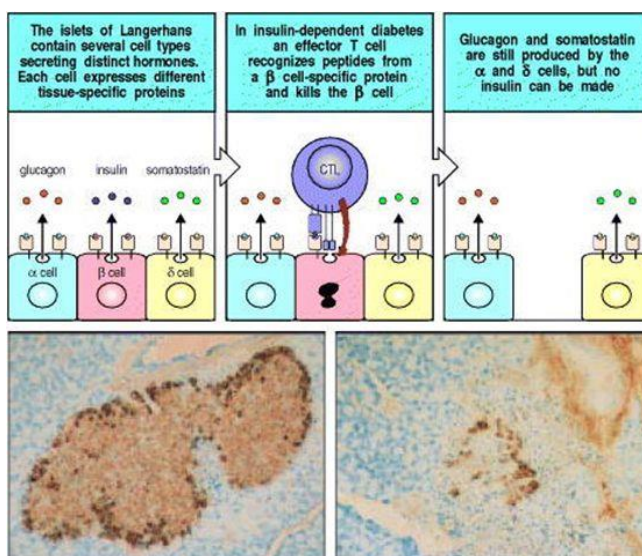
Hashimoto's thyroiditis

- Hashimoto's thyroiditis is a condition caused by inflammation of the thyroid gland.
- It is the most common thyroid disease in the U.S.
- Is characterized by the destruction of thyroid cells by various cell- and antibody-mediated immune processes.
- Caused by auto Ab of IgG & IgM type against the constituents of thyroid gland
- Characterised by Goitre, enlarged thyroid gland, deficiency of TH (Thyroxin)



Diabetes Mellitus Type 1

- ❖ Insulin dependent diabetes mellitus (type 1) is an inflammatory autoimmune disease of the pancreas, resulting in a lack of insulin.
- ❖ Insulin is produced in the pancreas by beta cells of the islets of Langerhans. Insulin is necessary for glucose to get into cells and be used for energy production. After eating, the glucose level in blood rises, which leads to insulin being released from the pancreas.
- ❖ In a person with type 1 diabetes mellitus, the beta cells of Langerhans are damaged by autoimmune inflammation, leading to an insufficiency of insulin. The glucose level in blood rises and cells do not have enough energy for metabolism.



Selective destruction of pancreatic β cells in **insulin-dependent diabetes mellitus** (IDDM) indicates that the autoantigen is produced in β cells and recognized on their surface