

**A.S.D.GOVERNMENT DEGREE COLLEGE FOR WOMEN  
(AUTONOMOUS) KAKINADA**

**DEPARTMENT OF MICROBIOLOGY**

***Autoimmune Diseases***

**II BSc CBMB SEM IV**

**BY**

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# What is Autoimmunity?

Autoimmunity is defined as the presence of immune response of Auto-Antibodies against self Ag (healthy cells and tissues)

It can be humoral or cellular response against the constituents of the body's own tissues.

Any disease that results from such an aberrant immune response is termed an "**autoimmune** disease".

## **Auto or Self antigens**

Are antigens that are present in ones own cell

Are altered by action of bacteria, viruses, chemicals and other drugs

## **Auto antibodies**

Altered cells (Auto- Antigens)- elicits the production of Antibodies

# Causes of Autoimmune Disease

## 1. Sequestered or Hidden Antigens

Ag is in the secluded place –are not accessible to the immune system

## 2. Neo antigens

Eg: Lens antigen, Sperm antigen

## 3. Cessation of Tolerance

It may be results that the self antigen is abrogated

## 4. Cross reaction of antigen

## 5. Loss of Immunoregulation

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

# Organ-Specific Autoimmune Diseases

<b>Disease</b>	<b>Self Antigen</b>
<b>1. Addison's Disease</b>	<b>Adrenal cells</b>
<b>2. Autoimmune hemolytic anemia</b>	<b>Membrane proteins</b>
<b>3. Pernicious anemia</b>	<b>Intrinsic factor</b>
<b>4. Goodpasture's syndrome</b>	<b>Renal and lung basement membranes</b>
<b>5. Graves's disease</b>	<b>Thyroid –stimulating Hormone</b>
<b>6. Hashimoto's thyroiditis</b>	<b>Thyroid proteins and cells</b>
<b>7. Insulin-dependent diabetes mellitus</b>	<b>Pancreatic <math>\beta</math> cells</b>
<b>8. Myasthenia gravis</b>	<b>Acetylcholine receptors</b>
<b>9. Thrombocytopenia</b>	<b>IgG antibodies</b>

Autoimmune disease causes cellular damage, Lymphocytes or antibodies binds to cell membrane antigens, causing cellular lysis or inflammatory reaction

# Systemic Autoimmune Diseases

<b>Disease</b>	<b>Self Antigen</b>
<b>1.Rheumatoid arthritis</b>	<b>Connective tissues and IgG</b>
<b>2.Multiple Sclerosis</b>	<b>Brain or White matter</b>
<b>3.Systemic lupus erythematosus</b>	<b>DNA, Nuclear Protein, RBC and Platelets membrane</b>

# Organ-Specific Autoimmune Diseases

## 1. Addison's Disease:

It is due to adrenocortical damage and hence insufficient secretion of adrenal hormones. Tissue damage is caused by auto-antibody against adrenal cortex

## 2. Autoimmune Anemia:-

Auto-antibodies to RBC antigens, Leads to compliment mediated lysis, antibody –mediated opsonisation and phagocytoses

## 3. Pernicious anaemia :-

In this disease an autoantibody interferes(a membrane –bound intestinal protein on gastric parietal cells) it facilitates the uptake of vitamin B12.

Vitamine B12 is not absorbed directly, but must first associated with a protein called intrinsic factor; the vitamin-protein complex is then transported across the intestinal mucosa.

Binding of auto-antibodies to the intrinsic factor blocks the intrinsic factor – mediated absorption of vitamin B12.

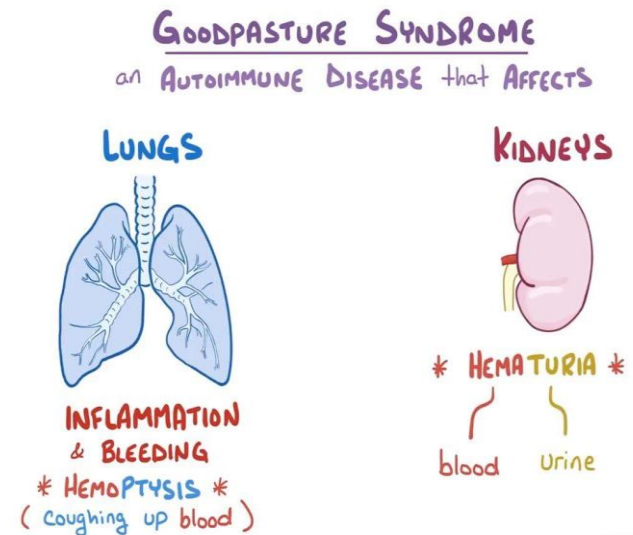
# Organ-Specific Autoimmune Diseases

## 4. Goodpasture's syndrome:

Auto-antibodies specific for basement membranes antigens, binds to to the basement membranes of kidney glomeruli and the alveoli of the lungs. Leads complement activation and cellular damage.

**Goodpasture's syndrome affects the kidneys and lungs, symptoms may include:**

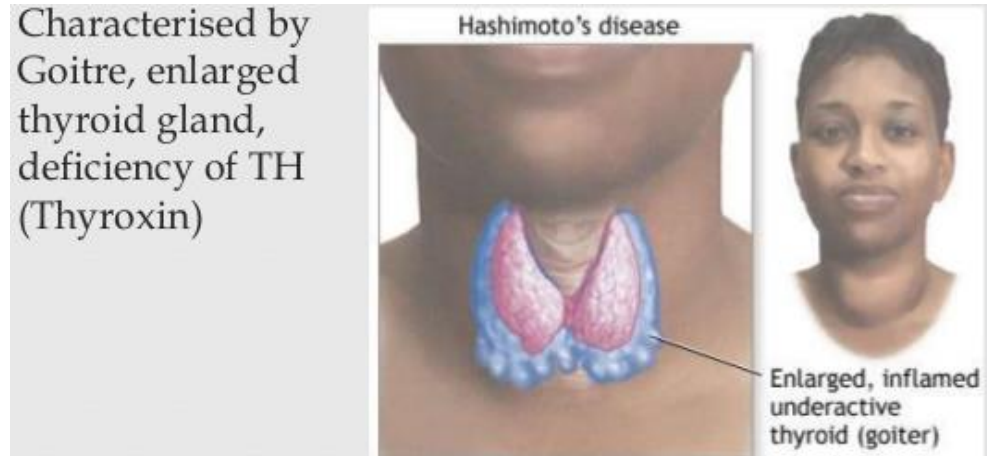
- Blood in the urine.
- Foamy urine.
- Swelling in the legs.
- High blood pressure.
- Burning or difficulty when urinating.
- Back pain below the ribs.
- Swelling of the hands and feet.



# Organ-Specific Autoimmune Diseases

## 5. Hashimoto's thyroiditis: (thyroid protein)

Auto antibodies to and sensitized TH1 cells specific for thyroid antigen. DTH response, intense infiltration of thyroid gland by lymphocytes, macrophages and plasma cells. Inflammatory response causes goiter or visible enlargement of the thyroid gland.



## 6. Thrombocytopenia

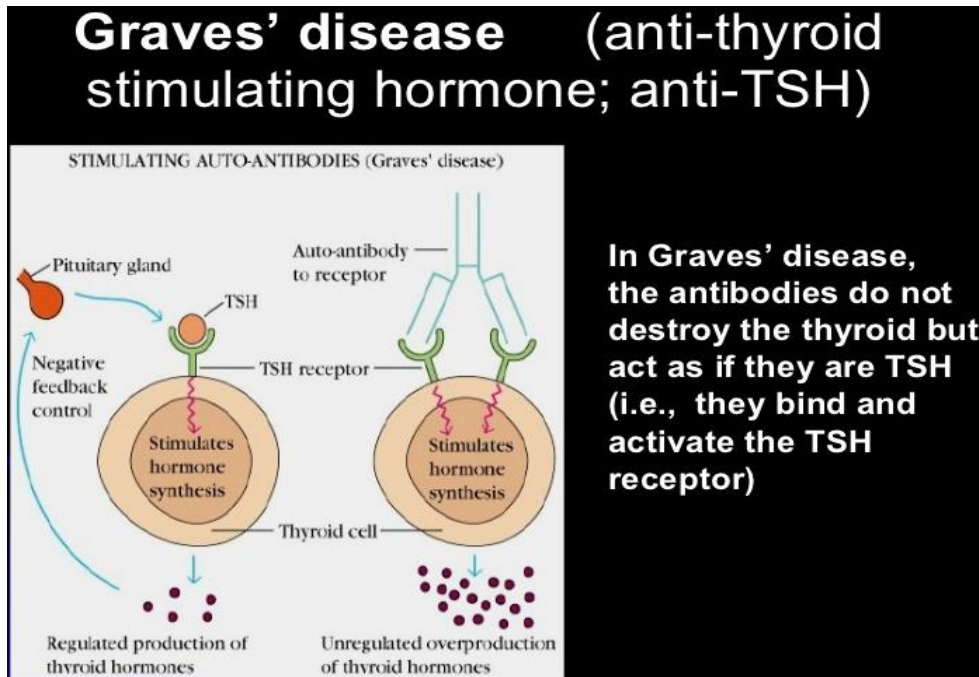
Characterized by low platelets due to auto -antibodies (IgG type).

# 7. Graves's disease

The immune system produces antibodies that stimulate the [thyroid](#) gland to release **excess amounts of [thyroid](#) hormones**(thyroxin and triiodothyronin) into the blood ([hyperthyroidism](#)).

**Symptoms** of Graves' disease can include bulging [eyes](#) as well as weight loss, nervousness, irritability, rapid [heart rate](#), weakness, and brittle [hair](#).

Destruction or removal of the [thyroid](#) gland, using medicines or surgery, is usually required to treat Graves' disease.



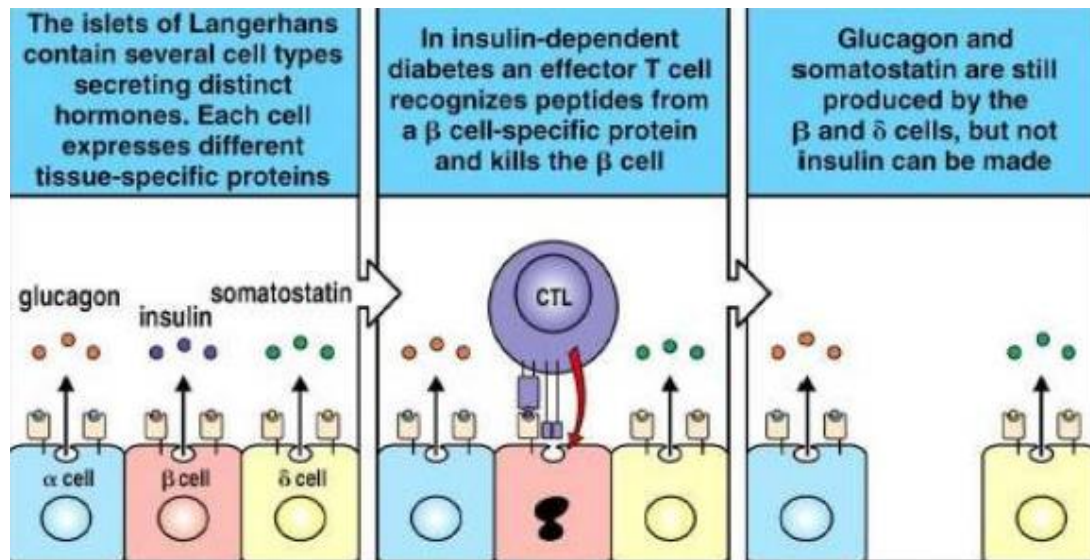
# Organ-Specific Autoimmune Diseases

## 8. Insulin-dependent diabetes mellitus (IDDM)

Auto-antibodies attack the pancreas. They attack the insulin producing cells (beta cells). Destroy the beta cells, and results in decreased production of insulin and increase in levels of blood glucose.

Cytotoxic T lymphocytes also attack the beta cells and produce cytokine (INF $\gamma$ -, TNF- $\alpha$ , and IL-1). Activation of macrophages leads to DTH response.

Beta cell destruction may also be by complement activation and ADCC



# Organ-Specific Autoimmune Diseases

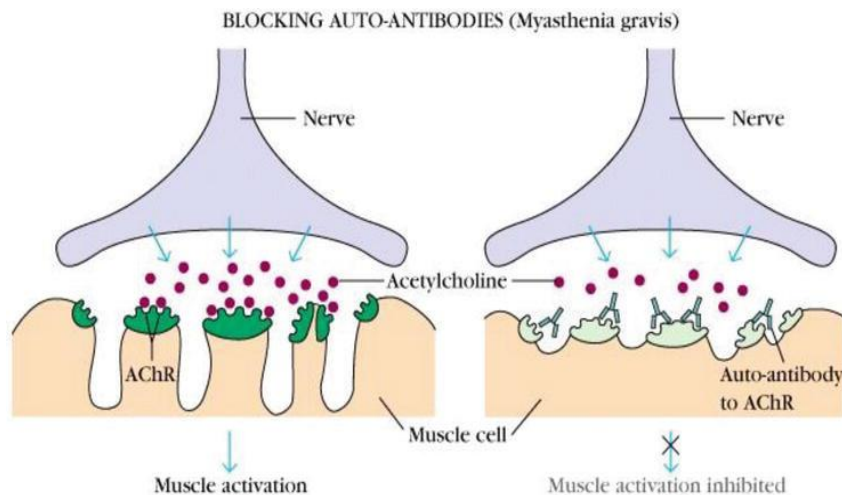
## 9. Myasthenia gravis:

Binding of auto-antibodies to the **acetylcholine receptor (AChR)** and blocks the normal binding of acetyl choline and subsequent muscle activation.

Auto antibodies activates complement, which damage the muscle end-plate (complement mediated lysis)

Weakening of the skeletal muscles.

Early signs of the disease includes drooping eyelid and inability to retract the corners of the mouth, which gives the appearance of snarling.



Myasthenia Gravis (MG disease)

# Systemic Autoimmune Diseases

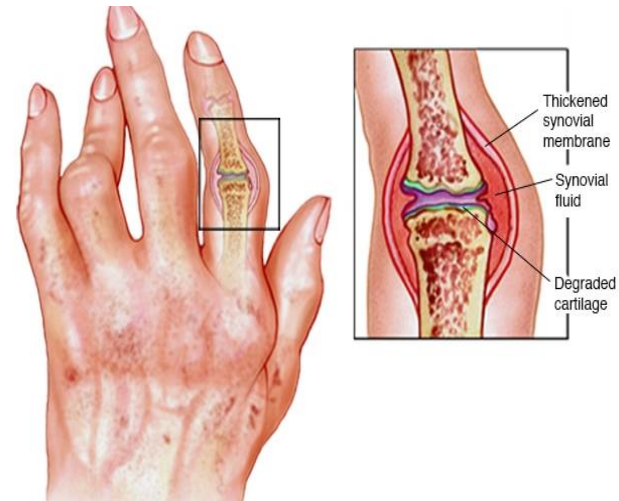
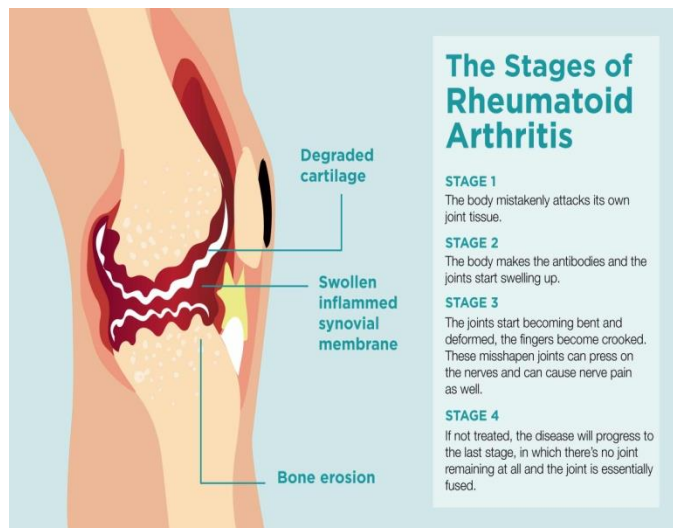
## 1. Rheumatoid arthritis:

The immune system produces antibodies that attach to the linings of joints. Auto-Antibodies to Rheumatoid factors is in Ig M antibody and reacts with Fc region of Ig G.

These immune ne complexes are deposited in the joints.

These immune complexes activates the compliment results in a type -III hypersensitivity reaction.

Leads to chronic inflammation of joints with swelling and pain



# Systemic Autoimmune Diseases

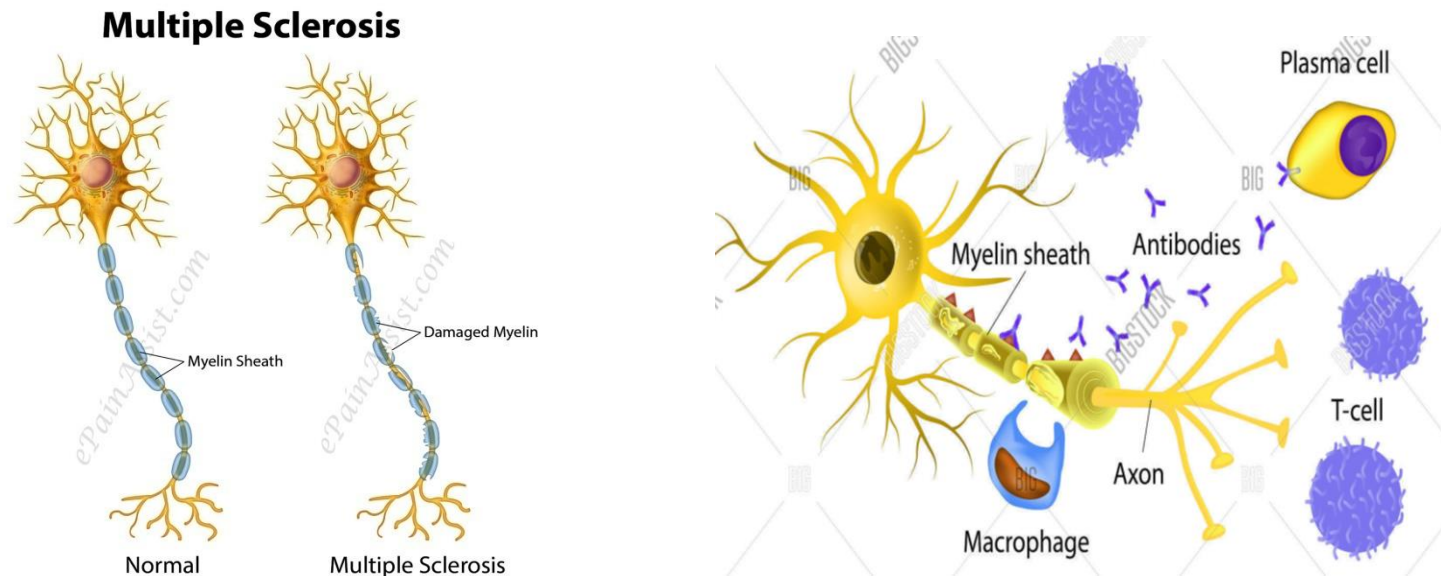
## 2. Multiple Sclerosis:

Multiple sclerosis (MS) is a chronic autoimmune debilitating disease in which nerve damage in the brain and spinal cord disrupts their communication with the body.

Disease produce auto reactive T cell and participate in formation of inflamatory lesions along myelin sheath of nerve fibers.

Activation of T lymphocytes in cerebrospinal fluids and causes inflamatory lesions and destroy the myeline.

Break done of myeline sheath leads to neurological dysfunctions.



# Systemic Autoimmune Diseases

## 3. Systemic lupus erythematosus (SLE)

- It is characterized by fever, weakness, arthritis, skin rashes, pleurisy and kidney dysfunction.
- Auto-antibodies to tissue antigens such as **DNA, Nuclear Protein, RBC and Platelets membrane and clotting factors.**
- Interaction of auto-antibodies to with RBC and platelets (antigens) lead to compliment – mediated lysis resulting **haemolytic anemia and thrombocytopenia.**
- Immune complexes of auto-antibodies with nuclear antigens are deposited along wall of blood vessels leads to type III hypersensitivity reaction . The compliment activation to form MAC and compliment split products damage the blood vessel, resulting vacuities and glomerulonephritis.



Thank you

