

Important terms:

Hypersensitivity – immune responses that causes tissue damage

Autoimmune disease – immune responses to self-antigens

Immunodeficiency – insufficient immune response

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Topics

- **Transplantation immunity**
- **Autoimmune diseases**
- **Immunodeficiency disorders**

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Transplantation immunity

- **Allografts**
- **Xenografts**
- **Genetically non – identical grafts cause rejections**
- **Type IV reaction – delayed cell-mediated**
 - Immunological rejection of transplant**
 - Killing of graft by sensitized cytotoxic T cells**
 - Natural killer cells (ADCC)**
 - MHC antigens major cause of rejection**
 - Requires immunosuppression for successful transplants**
 - Cyclosporin A, tacrolimus**
 - interfere with cell signaling**
 - inhibit clonal expansion of T cells**

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Autoimmune disease

Negative selection eliminates self reactive lymphocytes
Autoimmune diseases caused by body responding
to self antigens
MHC genes involved; genetically based

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Autoimmune disease

- Spectrum of autoimmune reactions
- Treatment of autoimmune diseases

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Table 18.4 Characteristics of Some Autoimmune Diseases

Disease (Known MHC Relationship)	Organ Specificity	Major Mechanism of Tissue Damage
Graves' disease (DR3)	Thyroid	Autoantibodies bind thyroid-stimulating hormone receptor, causing overstimulation of thyroid
Myasthenia gravis (DR3)	Muscle	Autoantibodies bind to acetylcholine receptor on muscle, preventing muscle contraction
Insulin-dependent diabetes mellitus (DR3/DR4)	Pancreas	T-cell destruction of pancreatic cells
Autoimmune hemolytic anemia	Red blood cells	Antibody, complement, and phagocyte destruction of red cells
Rheumatoid arthritis (DR4)	Widespread, especially joints	Lymphocyte destruction of joint tissues; immune complexes of IgG and anti-IgG <i>Type III Hypersensitivity</i>
Systemic lupus erythematosus (DR3)	Widespread (glomerulonephritis, vasculitis, arthritis)	Autoantibodies to DNA and other nuclear components form immune complexes in small blood vessels <i>Type III</i>

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Treatment of autoimmune diseases

- **Immunosuppressants (eg cyclosporins)**
- **Anti – inflammatory drugs (eg steroids)**
- **Replacement therapy (eg insulin, thyroid hormone)**
- **Feeding or oral tolerance (induce tolerance to antigen)**
 - **Feed insulin for diabetes**
 - **Collagen for rheumatoid arthritis**
 - **Cause local intestinal immune response,
down regulation of antigen receptors
deletion of immune cells**

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Immunodeficiency disorders

- **Primary immunodeficiencies (genetic, inborn)**
- **Secondary immunodeficiencies (acquired, disease)**

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Primary immunodeficiencies

- Lack of B – cell function
- Lack of the different T – cell functions
- Lack of both T and B cell functions
- Defective phagocytes

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Table 18.6 Some Primary Immunodeficiency Diseases for Which Genetic Defects Are Known

Severe combined immunodeficiency (SCID) <i>no functional T, B cells</i>	X-linked hyper-IgM syndrome
X-linked SCID	Wiscott-Aldrich syndrome
MHC class II deficiency *	Ataxia telangiectasia
CD3 deficiency	* Chronic granulomatous disease
CD8 deficiency	* Leukocyte adhesion deficiency
X-linked agammaglobulinemia <i>no Ig</i>	* Many complement deficiencies

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Secondary immunodeficiencies

- **Malnutrition**
- **Immunosuppressive agents**
- **Infections (measles, AIDS, SARS, promote secondary infections)**
- **Malignancies (multiple myeloma – from one B cell)
consumes immune resources
can't mount normal responses**

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