

**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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