

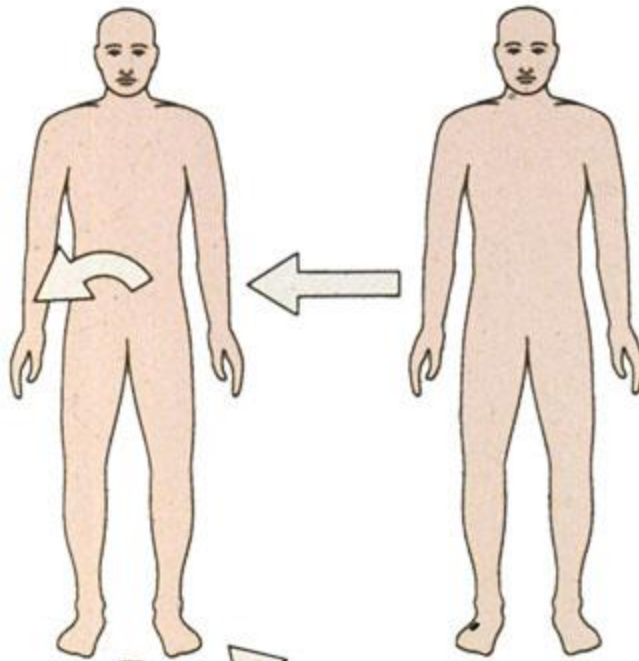
# Immunology of transplantation

# Types of transplantation

- Autotransplantation –within one organism
- Allotransplantation- between one species
- Xenotransplantation- between two different species

**autograft**

from one part  
of the body  
to another  
e.g. trunk  
to arm

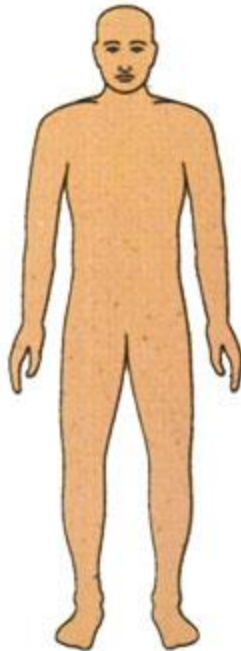


**isograft**

between  
genetically  
identical  
individuals  
e.g.  
monozygotic  
twins, or  
within an  
inbred strain

**allograft**

between  
different  
members  
of the same  
species  
e.g. Mr Smith  
to Mr Jones



**xenograft**

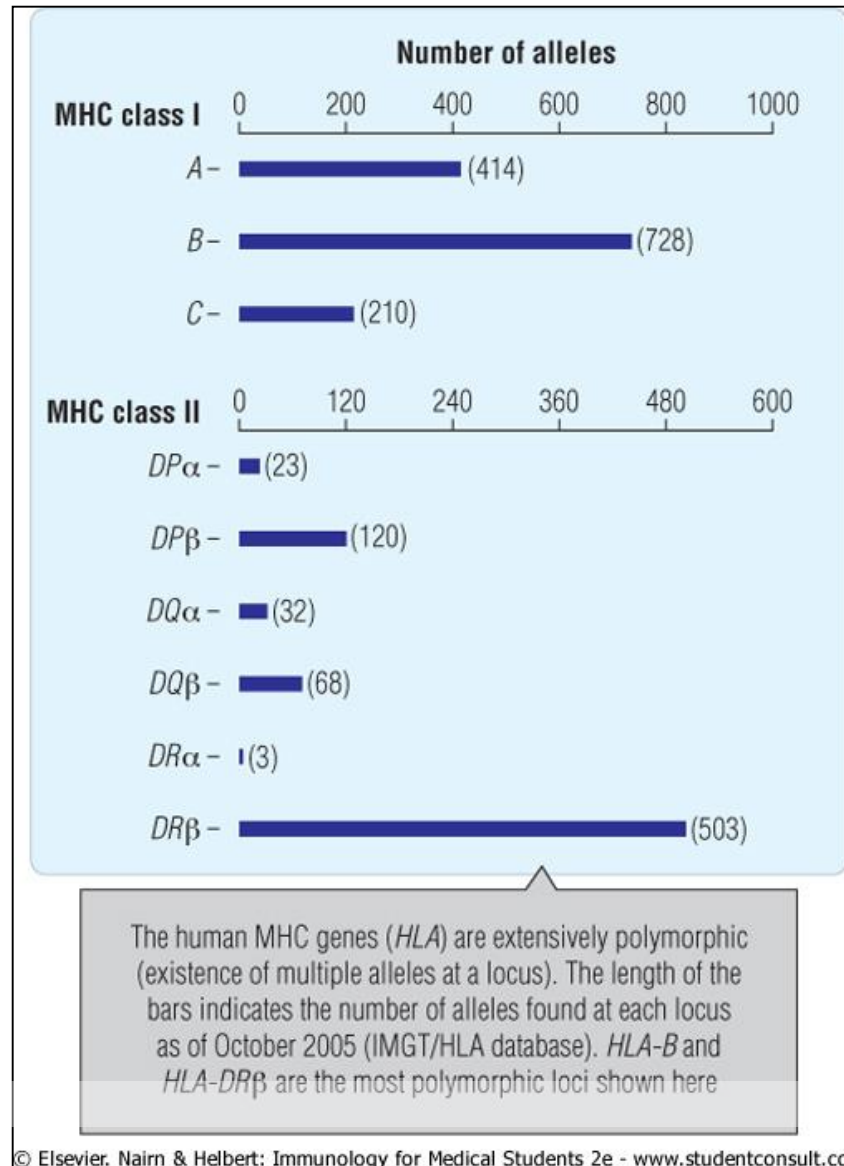
between  
members of  
different  
species  
e.g. monkey  
to man



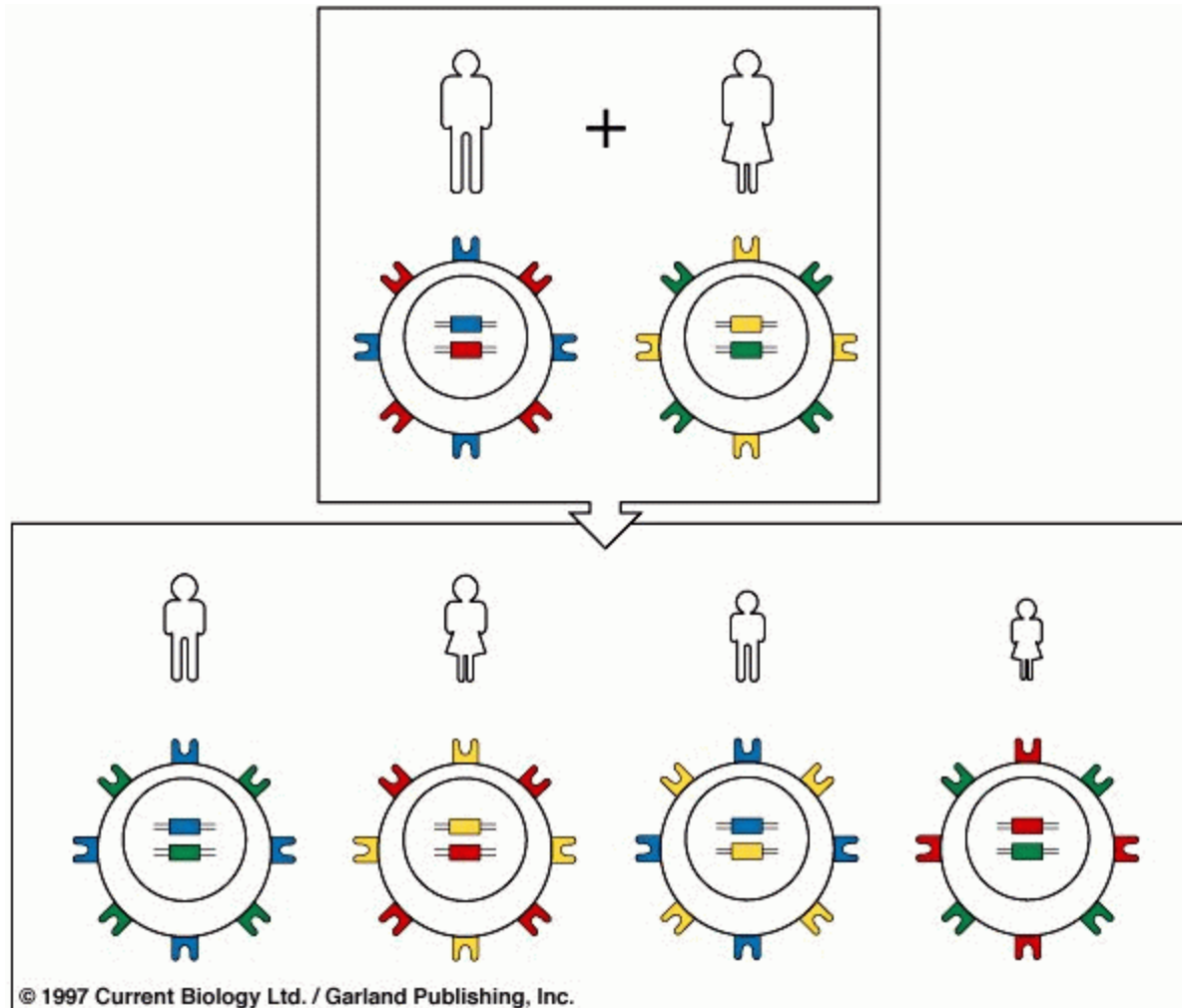
## Success rate of transplantation in humans

Tissue transplanted	5-year graft survival*	No. of grafts in USA (1999)
Kidney	80–90%	13,429 (12,483)
Liver	40–50%	4698
Heart	70%	2234 (2185)
Lung	30–40%	934 (885)
Cornea	~70%	~40,000†
Bone marrow	80%	23,500‡

# Polymorphism of HLA antigens



# Co-dominant expression of HLA genes

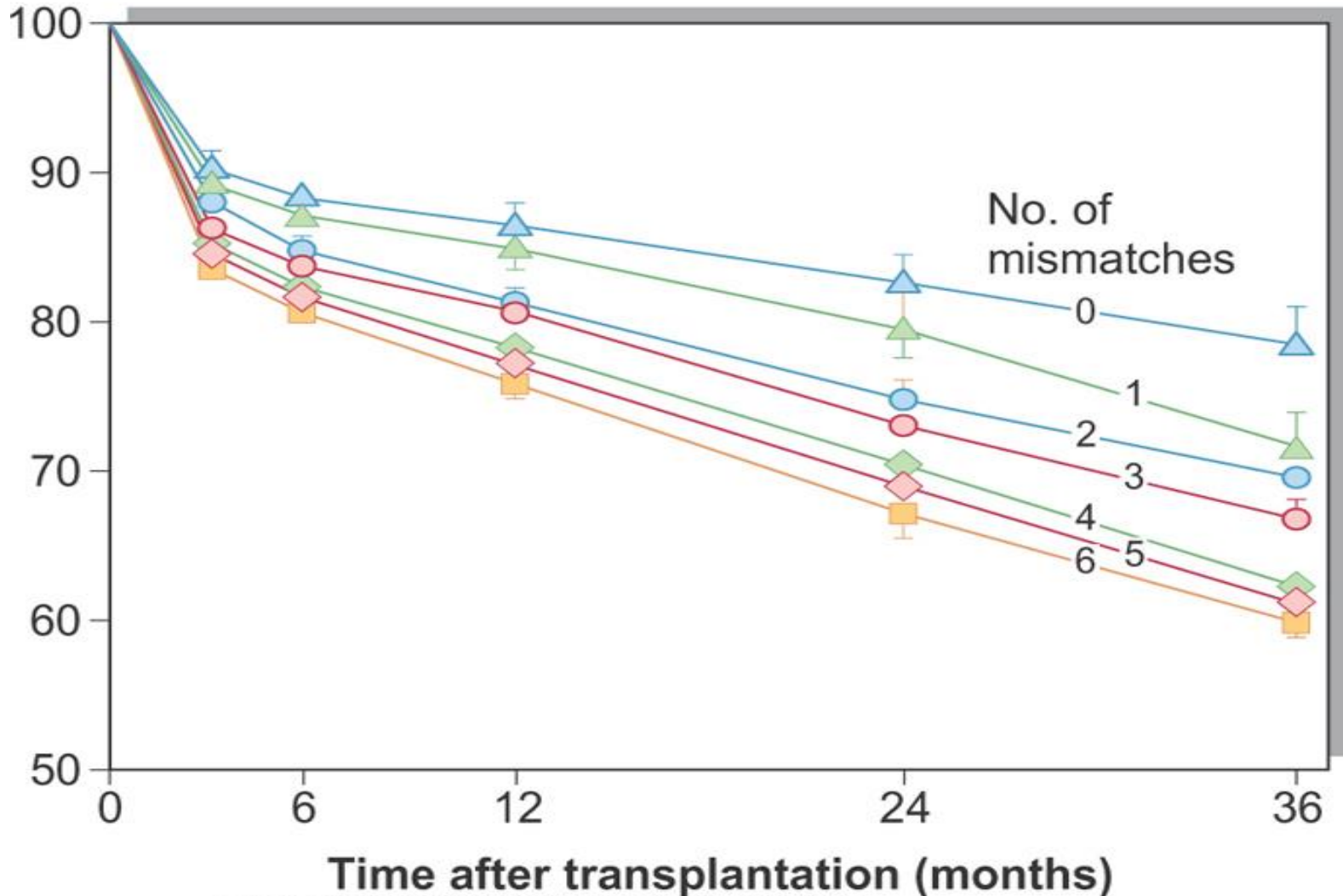


# Requirements before solid organ transplantation

- ABO blood groups compatibility
- Negativity of cross match test
- HLA „similarity“ (does not play a significant role in heart and liver transplantation)

# Effect of HLA-identity on kidney graft survival

Graft-survival rate  
(% total grafts)





# Cross match test

- Used for detection of recipient's antibodies against donor's antigens (mainly HLA antigens)
- Donor's leukocytes + patient's plasma
- Positive – antibodies bind to leukocytes – can be detected e.g. by flow cytometry
- Positivity contraindicates transplantation

# Types of graft rejection

- Hyperacute - minutes to hours after transplantation. Caused by pre-formed recipient antibodies against HLA antigens of the donor. Irreversible.
- Acute - several days to months after transplantation. Mainly T-cell mediated. Usually reversible by aggressive immunosuppression.
- Chronic - years after transplantation. Continuous decrease in graft function. Irreversible. Mechanism unknown.

# The most frequent types of organ transplantation

- Heart
- Kidney
- Liver
- Lungs
- Pancreas
- Cornea
- Many other organs
- Extremities, face...

# Hematopoietic stem cells transplantation

- Indications: malignancies, bone marrow failure, primary immunodeficiencies.
- “Whole“ bone marrow or separated CD34+ cells can be used.
- The most significant complication: graft-versus host reaction (GVHR).
- Optimal HLA-matched donor is required.

# Graft-versus host reaction (GVHR)

- Immunological reaction of transplanted T-cells against recipients (HLA) antigens.
- Skin, liver, intestine predominantly affected.
- Milder forms can be treated by immunosuppression, severe forms may be fatal.
- Can be induced by transfusion of non-irradiated blood to immunodeficient patients (primary immunodeficiencies, leukemia...).