


Immune System(s)

- Innate immunity
- Adaptive immunity

Humoral

IgG antibodies

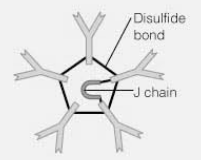
- Monomer
- 80% of serum antibodies
- Fix complement
- In blood, lymph, and intestine
- Cross placenta
- Enhance phagocytosis; neutralize toxins and viruses; protects fetus and newborn
- Half-life = 23 days



Humoral

IgM Antibodies

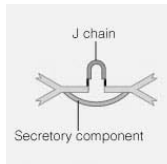
- Pentamer
- 5-10% of serum antibodies
- Fix complement
- In blood, lymph, and on B cells
- Agglutinates microbes; first Ab produced in response to infection
- Half-life = 5 days



Humoral

IgA Antibodies

- Dimer
- 10-15% of serum antibodies
- In secretions
- Mucosal protection
- Half-life = 6 days



Humoral

IgD Antibodies

- Monomer
- 0.2% of serum antibodies
- In blood, lymph, and on B cells
- On B cells, initiate immune response
- Half-life = 3 days



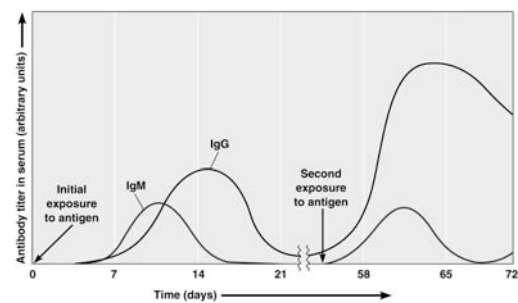
Humoral

IgE Antibodies

- Monomer
- 0.002% of serum antibodies
- On mast cells, basophils, and in blood
- Allergic reactions; lysis of parasitic worms
- Half-life = 2 days



Humoral



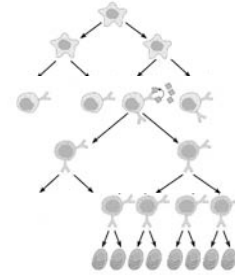
Humoral

How?

- Naturally acquired passive immunity
- Naturally acquired active immunity
- Artificially acquired passive immunity
- Artificially acquired active immunity

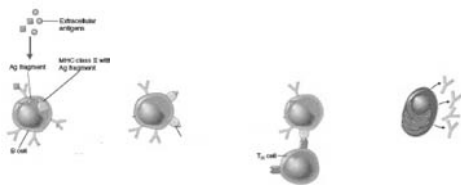
Humoral

Clonal Selection: T independent



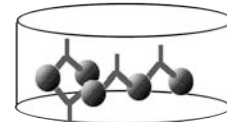
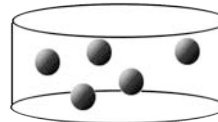
Humoral

Clonal Selection



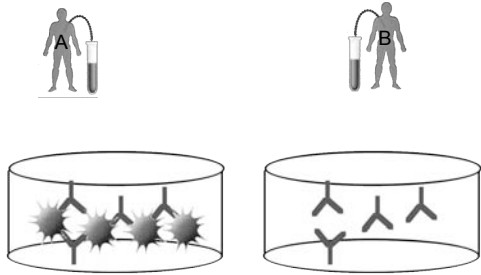
Humoral

Which patient has the disease?



Humoral

Which patient is pregnant?



The diagram illustrates a pregnancy test using agglutination. Two patients, A and B, are shown with blood samples. Patient A's sample shows agglutination of red blood cells, while Patient B's sample shows no agglutination. This indicates that Patient A is pregnant.

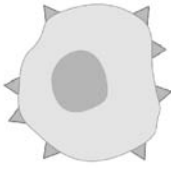
Humoral

Uses of Abs

- Treatment
 - 1901 von Behring
- Diagnosis
- Pregnancy testing
- Tissue typing
- HLA
 - 1980 Benacerraf, Dausset, Snell

Humoral

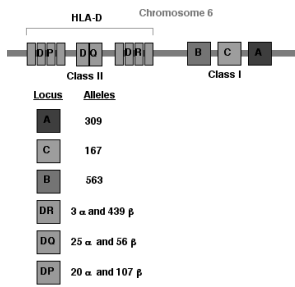
Tissue Typing



ABO
Rh
MHC (HLA allele)
Complement
1919 Bordet

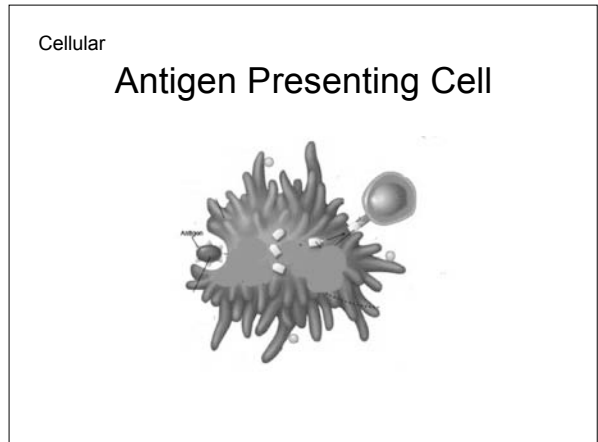
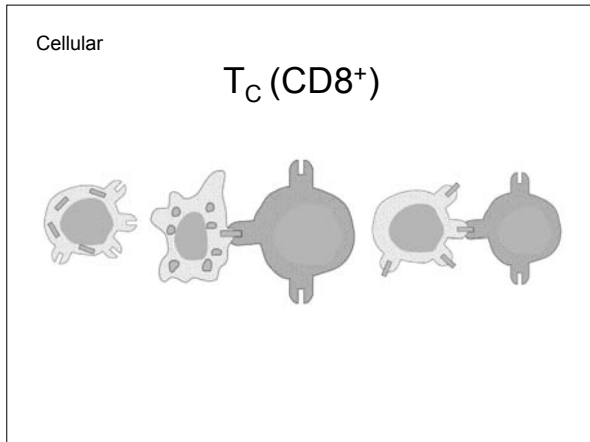
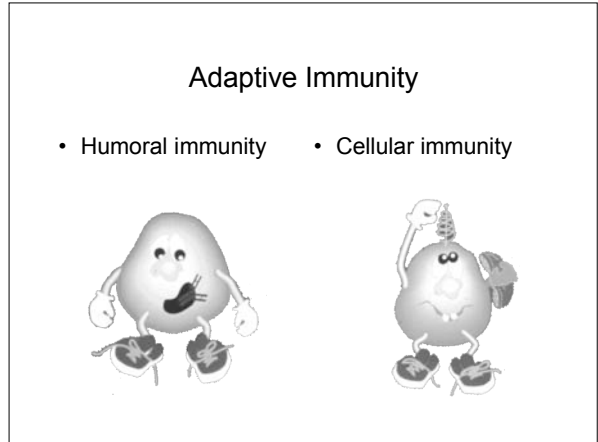
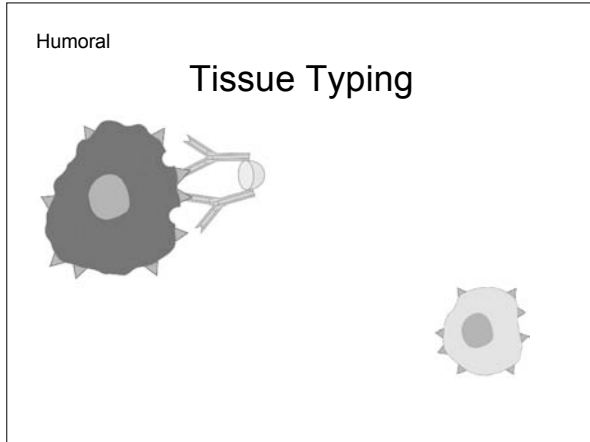
Humoral

Tissue Typing



Class	Locus	Alleles
Class II	A	309
	C	167
	B	563
Class I	DR	3 α and 439 β
	DO	25 α and 56 β
	DP	20 α and 107 β

ABO
Rh
MHC (HLA allele)



Ab Specificity

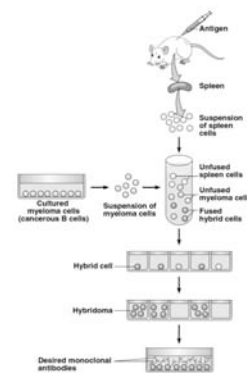
- Clonal Selection Theory
 - 1960 Burnet
- Ab Genetics
 - 1987 Tonegawa

From where do you get Abs?

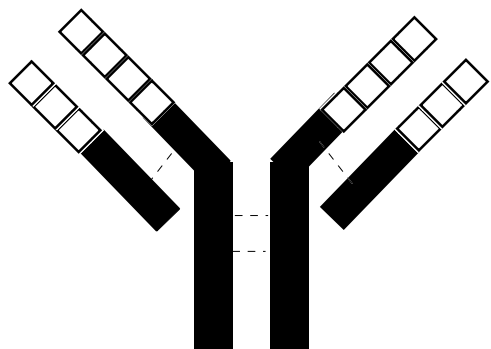
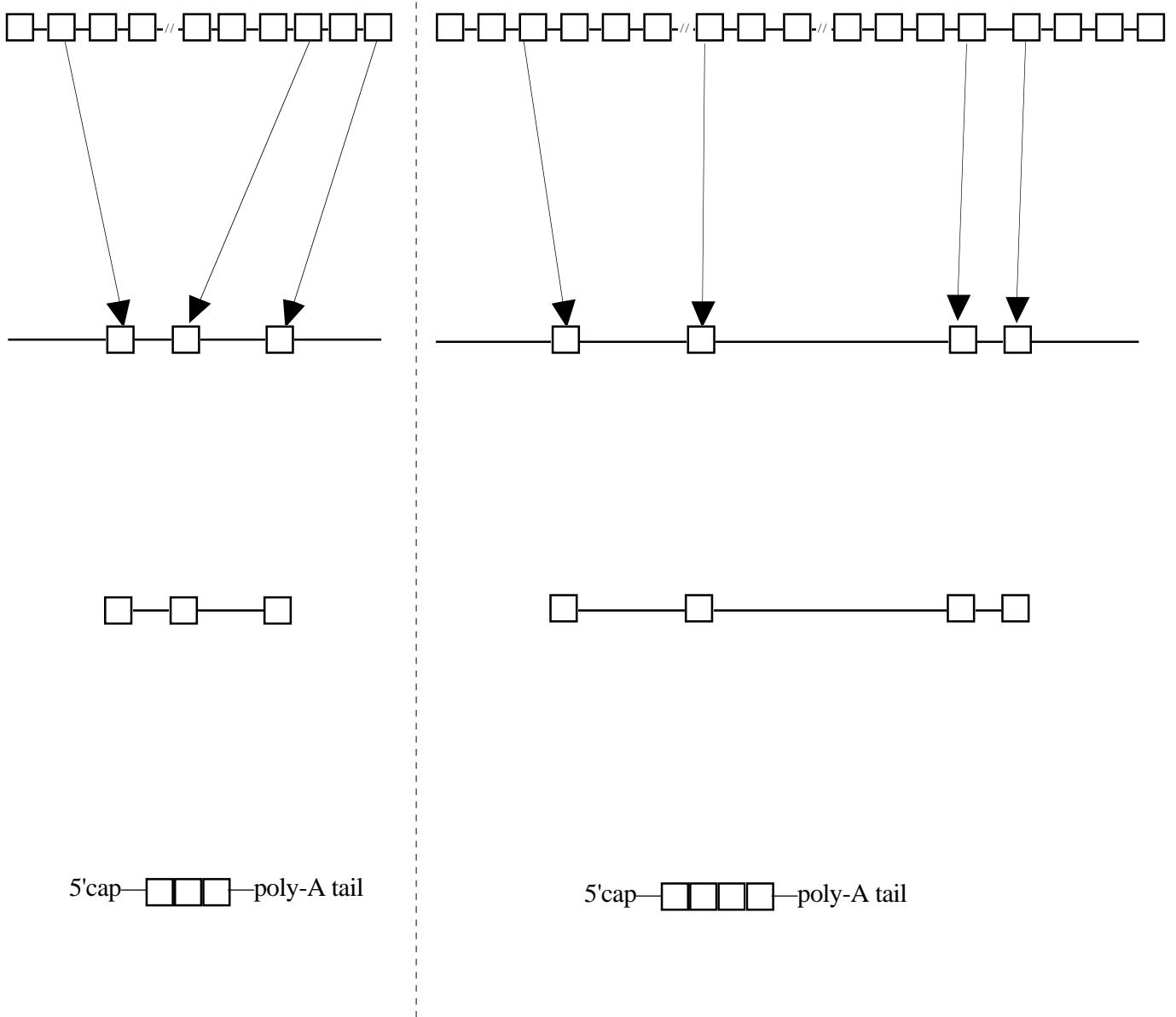
- Treatment
 - 1901 von Behring Snake Venum...antivenin?
- Diagnosis
 - Rabies Virus...antirabies?
- Pregnancy testing
 - Anti-A serum?
- Tissue typing
- Monoclonal Abs
 - 1984 Jerne, Köhler, Milstein

- 1960 Medawar
 - "forever will inhibit transplantation from one individual to another"
- Graft v. host disease
 - 1990 Murray & Thomas

Mabs



The Genetic Basis of Antibody Diversity



- Antibody
- Stem cell DNA
- B cell DNA
- pre-mRNA
- mRNA
- Light chain
- Heavy chain
- V, J, D
- C_κ
- C_λ
- C_μ
- C_γ
- C_ε
- C_α