IMMUNOLOGY

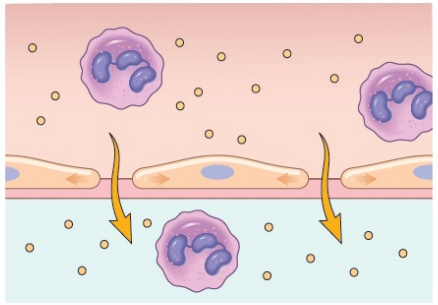
INFLAMMATION

VASODILATION

Increased permeability

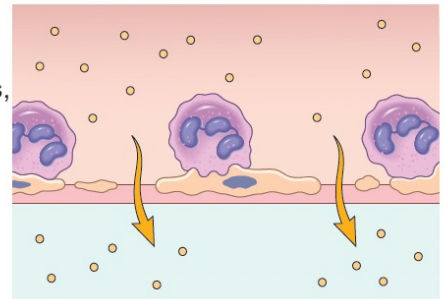
RETRACTION OF ENDOTHELIAL CELLS

- Induced by histamine, other mediators
- Rapid and short-lived (minutes)

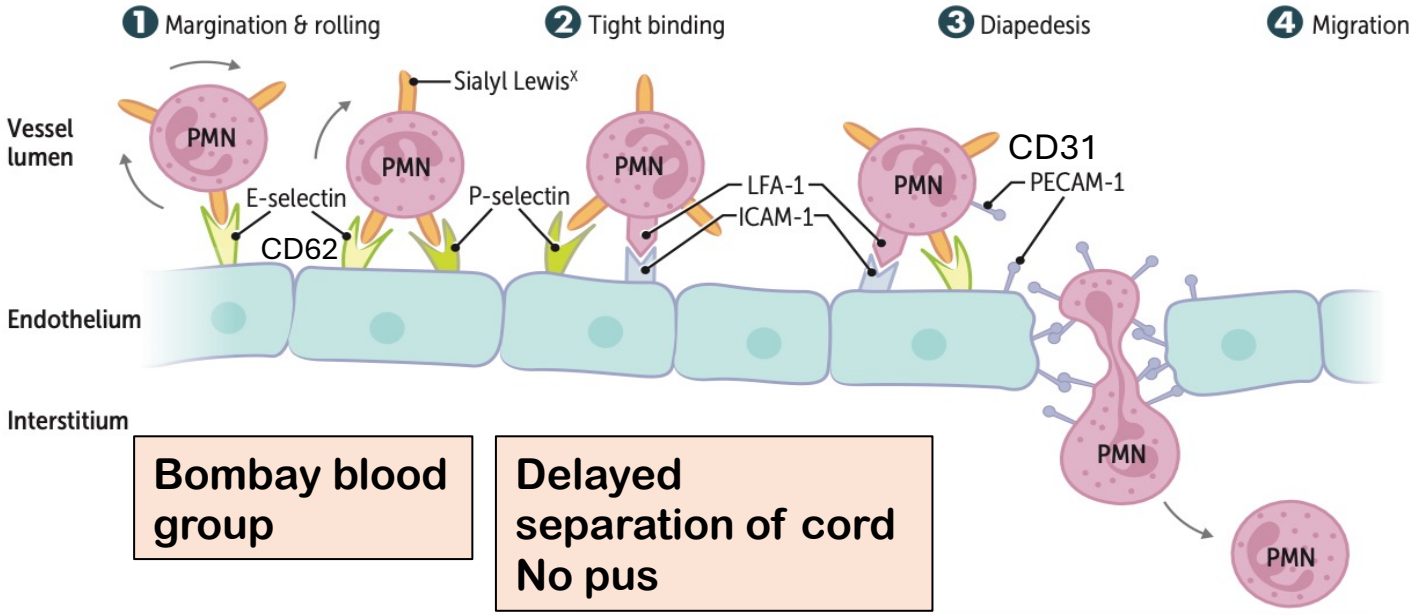


ENDOTHELIAL INJURY

- Caused by thermal burns, some microbial toxins
- Rapid; may be long-lived (hours to days)



EXTRAVASATION
Site:



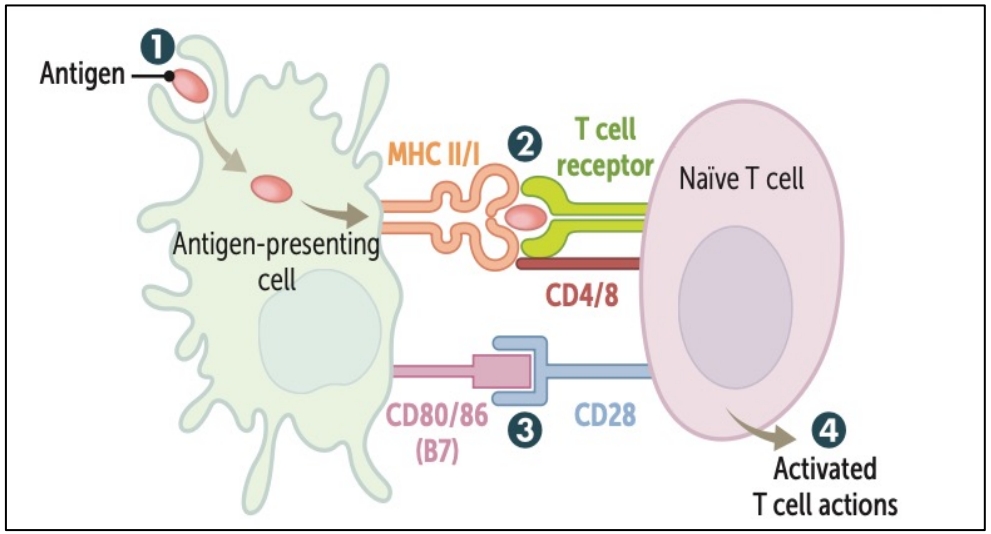
Bombay blood group

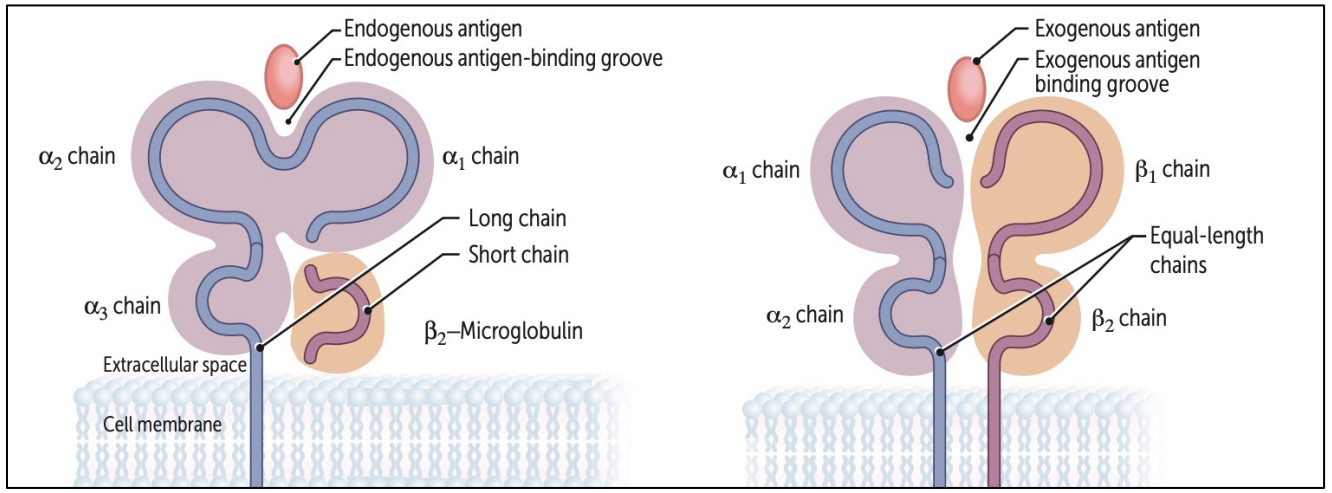
Delayed separation of cord
No pus

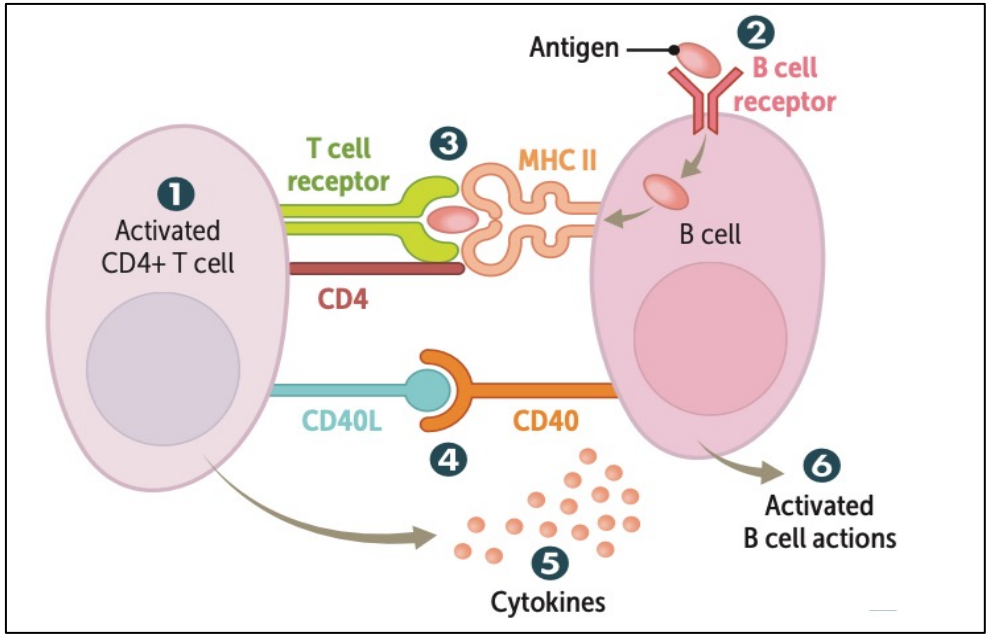
IL-8, C5a, LTB4, 5HETE, Kallikrein

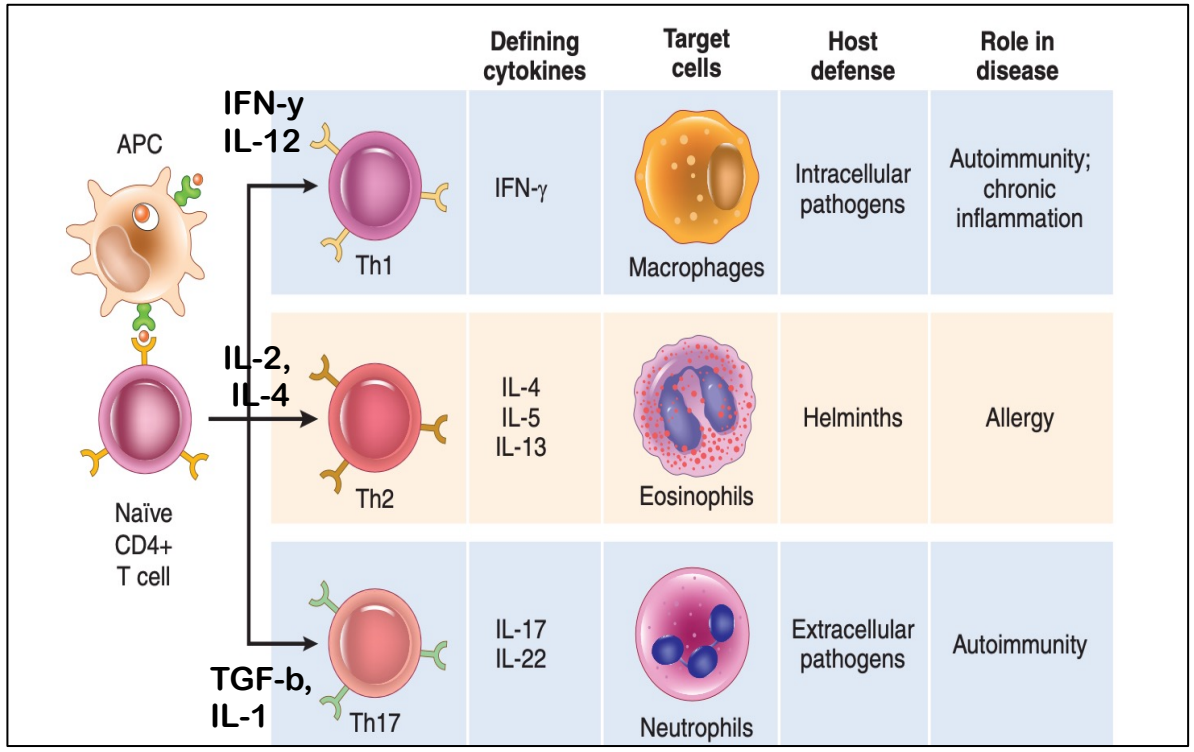
Chemokine family	Examples
CXC chemokines (α)	IL-8 → Neutrophils
CC chemokines (β)	Eotaxin → Eosinophils MCP-1 /RANTES → Monocytes / Macrophages
C chemokines (γ)	Lymphocytes
CX3C chemokines (δ)	Fractalkine-Monocytes and T-cells

Baby-steps in immunology!









1L-2, IL-12, INF-G:
IL-4, IL-5, IL-13:
IL-1, IL-6, TNF-A:
1L-10, TGF-B, Lipoxin:
C3b, IgG:

C3a, c5a:

Treg cells: Peripheral immune tolerance
Induced by: TGF-β/ IL-2
Shimon Sakaguchi, Fred Ramsdell, and Mary Brunkow
IPEX (Immune dysregulation, Polyendocrinopathy, Enteropathy, X-linked) syndrome : FOXP3 defect

Positive selection:
Negative selection:
AIRE in thymus:

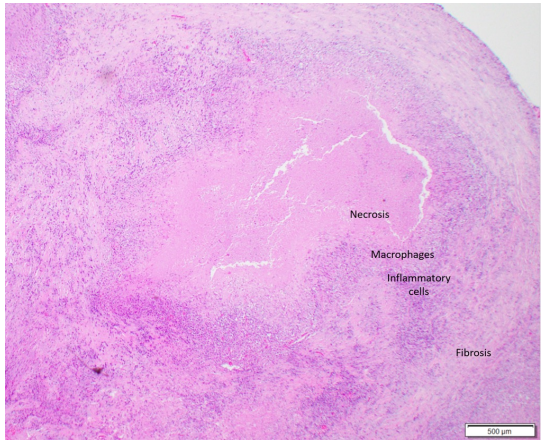
AIPS-1

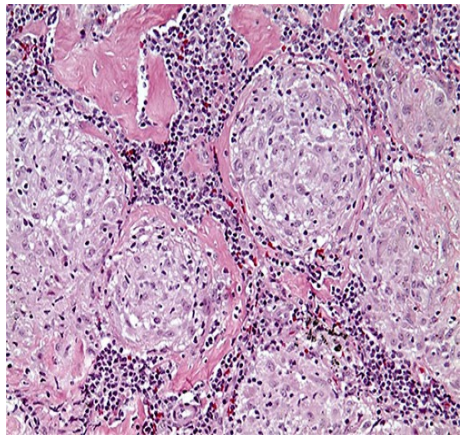
AIPS-2

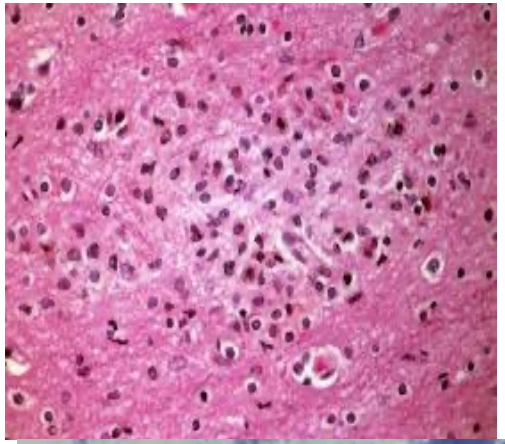
IL-12 receptor defect (AR)-Mendelian Susceptibility to Mycobacterial Disease (MSMD)

GRANULOMAS

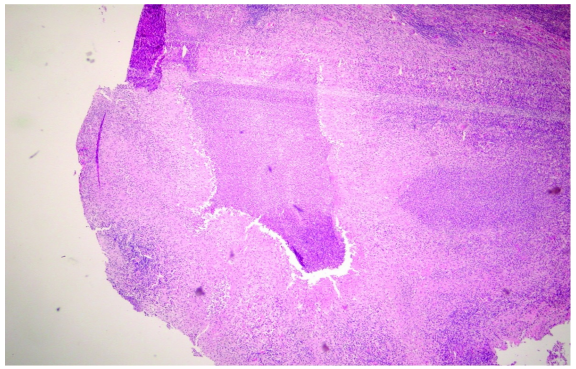
GRANULOMAS:
Caseating-
Non-caseating-
Histiocytes in gumma-
Stellate-
Durck-
Doughnut-

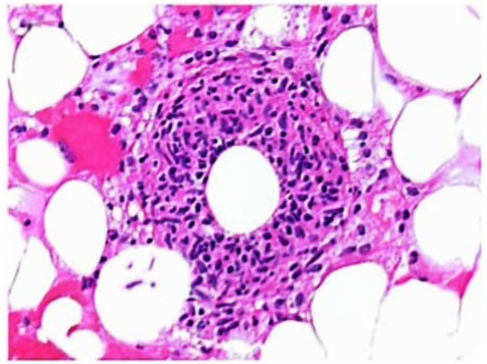


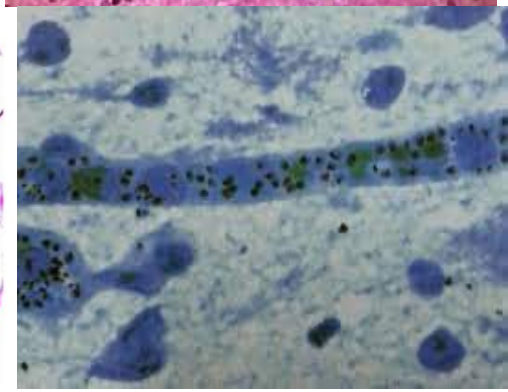




Listeria/ Schistosomiasis
CGD
PBC
GPA, EGPA, Takayasu / GCA
De Quervian thyroiditis
Berylliosis, HSP, Talcosis



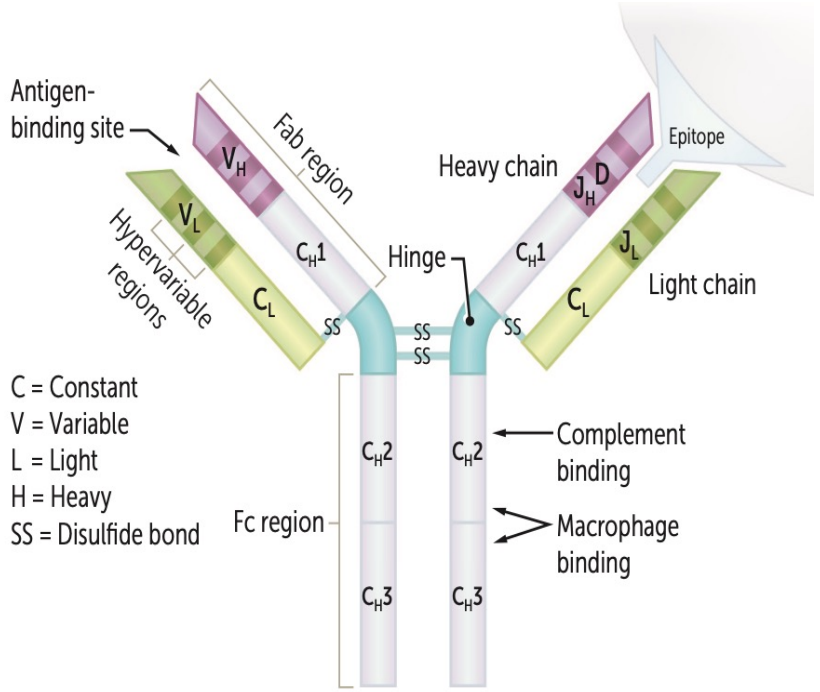


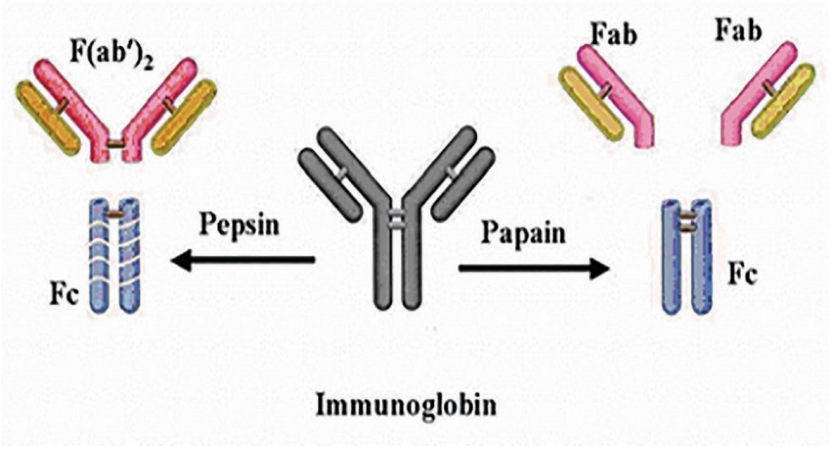


Immunoglobulins

Affinity maturation-Somatic hypermutation
Isotype switching-Alternate RNA splicing
Hyper IgM disease

Generation of antibody diversity
1. Random recombination of VJ (light-chain) or V(D)J (heavy-chain) genes by RAG1/2
2. Random addition of nucleotides to DNA during recombination by TdT
3. Random combination of heavy chains with light chains





Ig Type	Half-life	Key Features
IgG	23 days	- Appears late → chronic infection - Only Ig to cross placenta - Opsonization, complement fixation, neutralization
IgA	6 days	- Two types: Serum IgA & Secretory IgA (dimer) - Secretory IgA → mucosal immunity
IgM	5 days	- Pentamer, highest molecular weight - Appears early → recent infection - Intravascular only - Agglutination, hemolysis, opsonization
IgD	2–8 days	- Surface Ig on B cells - Acts as antigen recognition receptor
IgE	1–5 days	- Type I hypersensitivity - Heat-labile

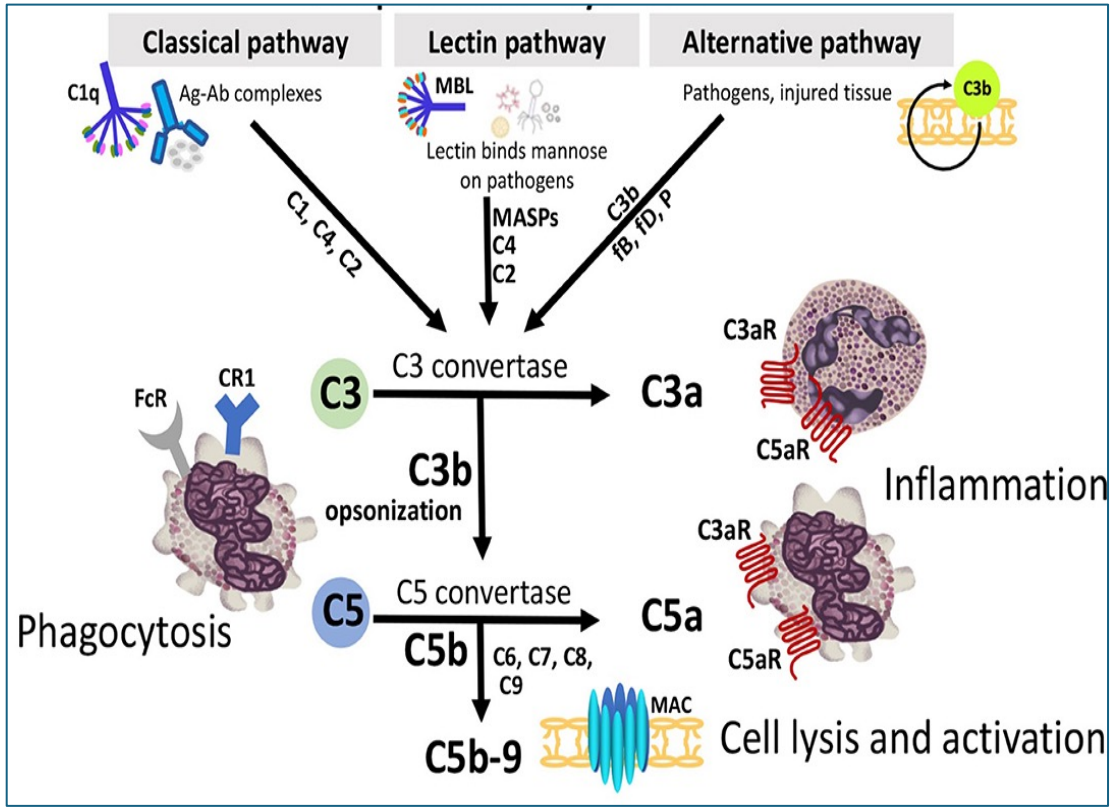
Miscellaneous

Primary: Bone marrow, Thymus
- Lymphocyte formation and development

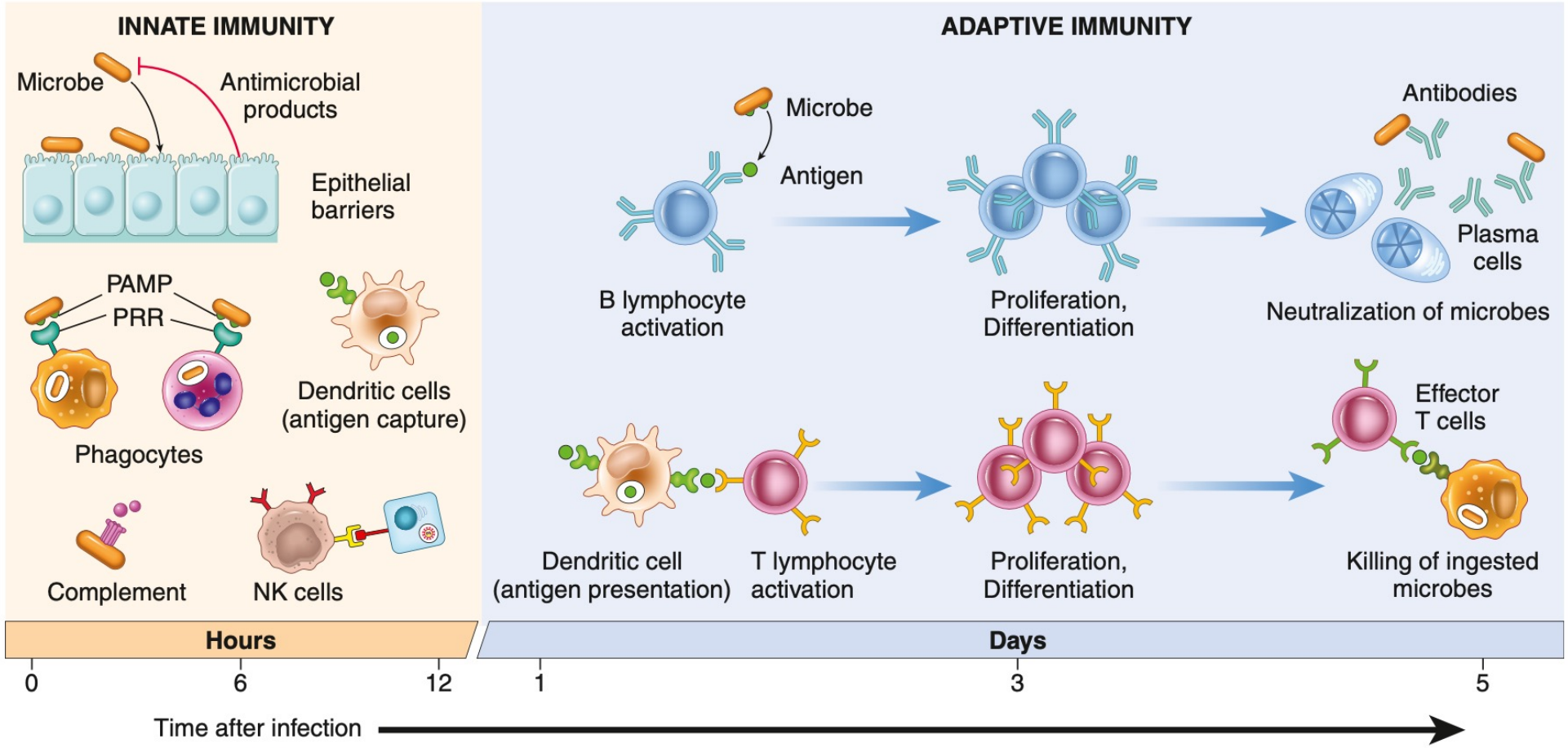
Secondary: Spleen, Lymph node, Peyer's patches, Tonsils
- Lymphocyte activation and proliferation

MC complement deficiency:
Early complement deficiency:
Terminal comp /MAC def:

T cell receptor: Gamma-delta:

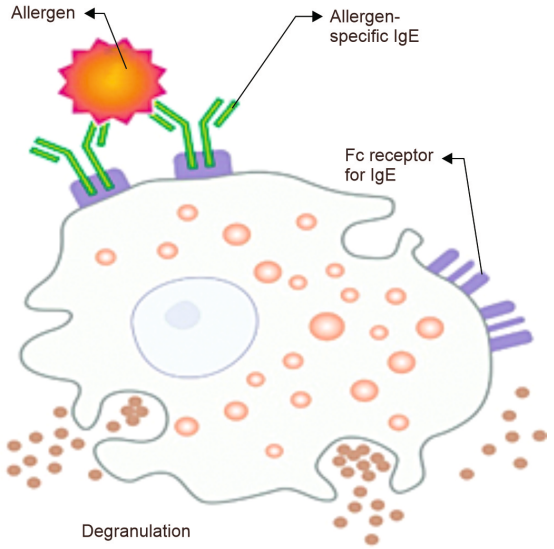


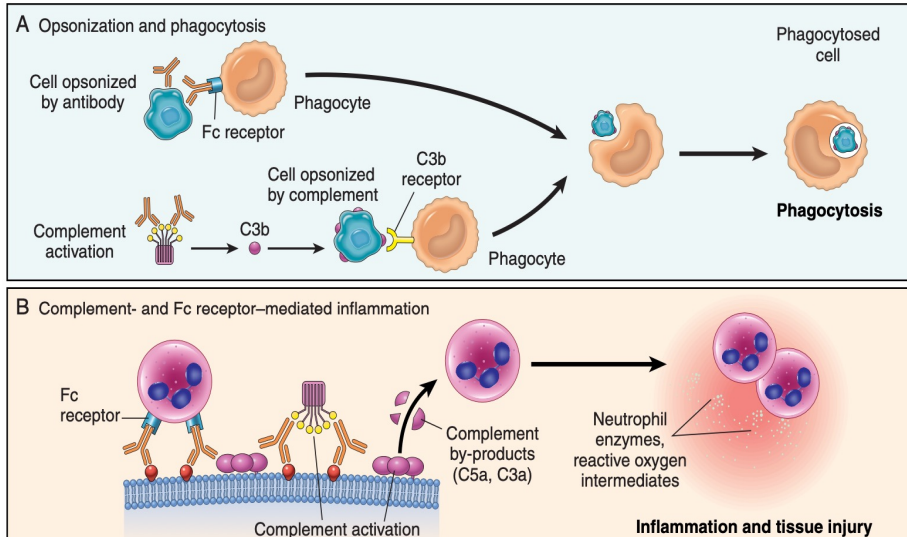
- C1-esterase inhibitor prevents cleavage of C2 and C4
- DAF (CD55) prevents formation of C3 convertase
- MIRL (CD59) prevents formation of MAC

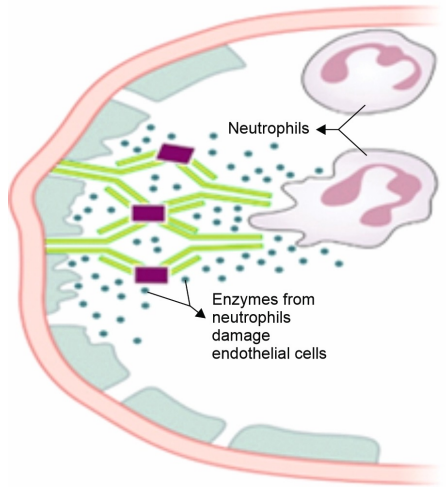


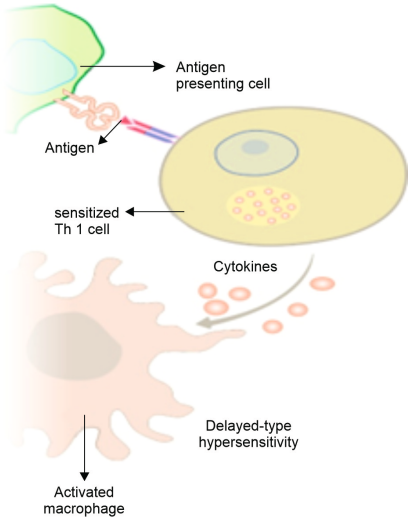
PAMPs: LPS (GNB)- TLR4, flagellin, nucleic acids (viruses)-RIG-1
DAMPs: mitochondrial DNA, histones, heat shock proteins

Hypersensitivity Reactions









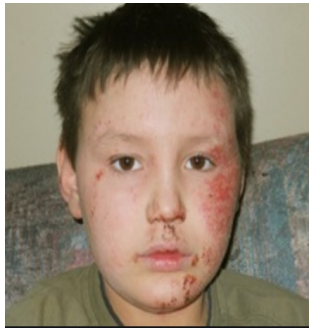
- Autoimmune hemolytic anemia
- Immune thrombocytopenia
- Transfusion reactions
- Hemolytic disease of the newborn
- Good pasture syndrome
- Rheumatic fever
- Hyperacute transplant rejection
- Pemphigus
- Myasthenia gravis
- Graves disease

- Serum sickness, Arthus reaction
- HSP/ IgA vasculitis
- SLE
- Polyarteritis nodosa
- Cryoglubulinemia
- PSGN
- Rheumatoid arthritis Reactive arthritis
- Hypersensitivity pneumonitis
- Shick test

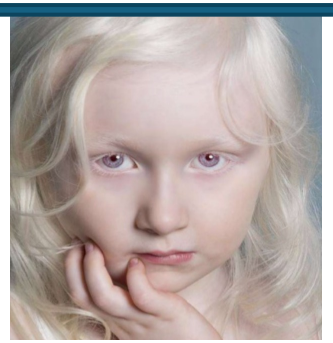
- Contact dermatitis
- Graft-versus-host disease
- PPD for TB infection
- Patch test
- Lepromin test
- Montenegro test
- Transplant rejection- Chronic

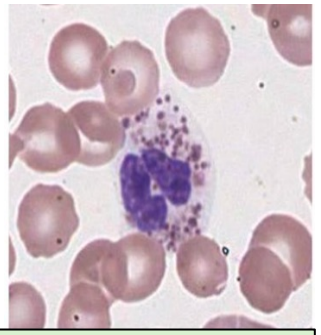
Immunodeficiency disorders

Thrombocytopenia
Infections
Eczema- High IgE
WASP
XLR



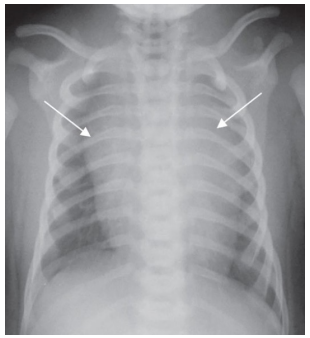
Facies
Abscess-Cold
Teeth
Eczema-IgE high



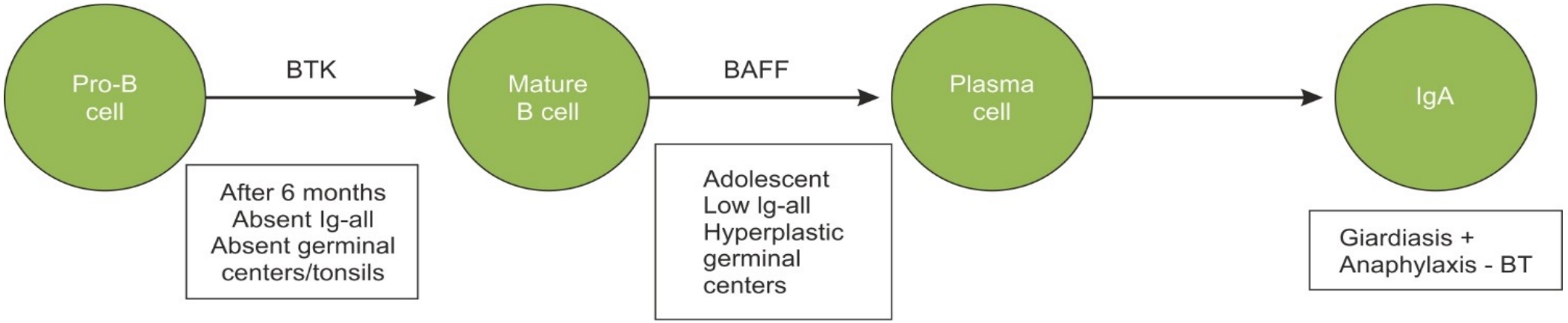


Lyst, Light
Microtubule
Neurodegeneration
phagOlysosome
Platelet, Neutrophil dense granules

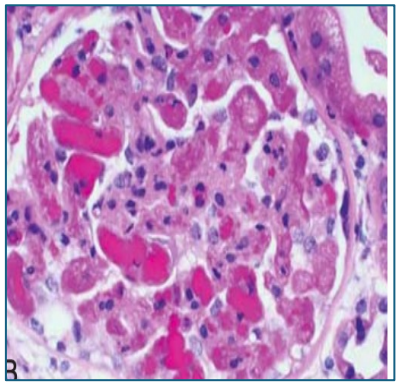
Recurrent infections since Birth
IL-2R: XLR
ADA : AR
Absent germinal centers/ thymus
TRECs (T-cell receptor excision circles)

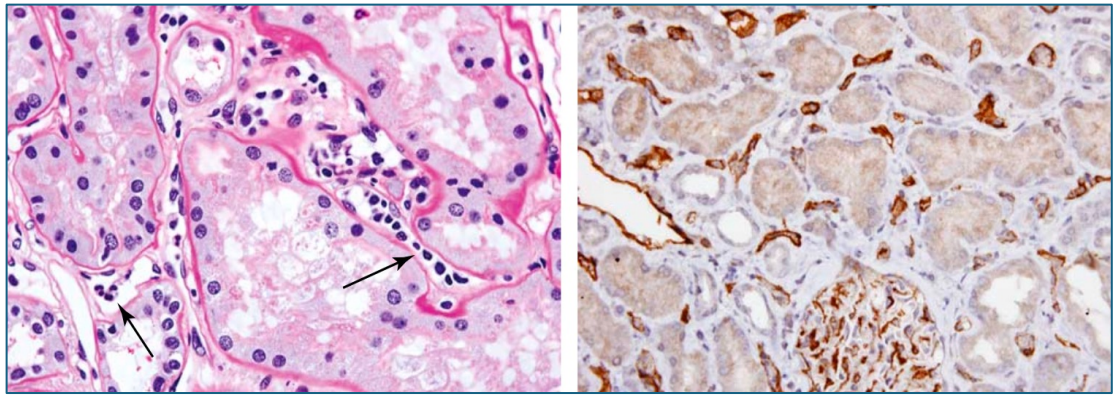


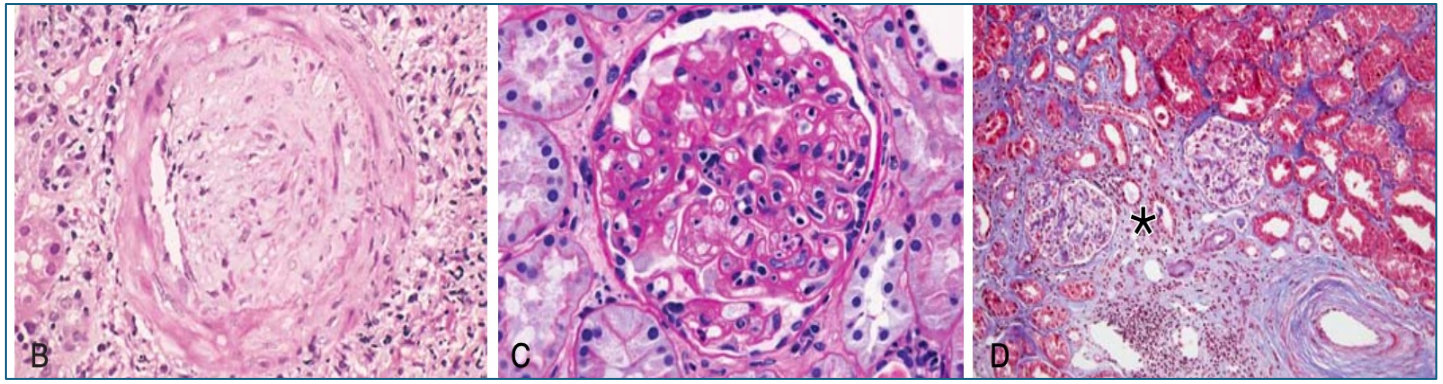
Absence of MHC class I / II on lymphocyte:



Transplant immunology







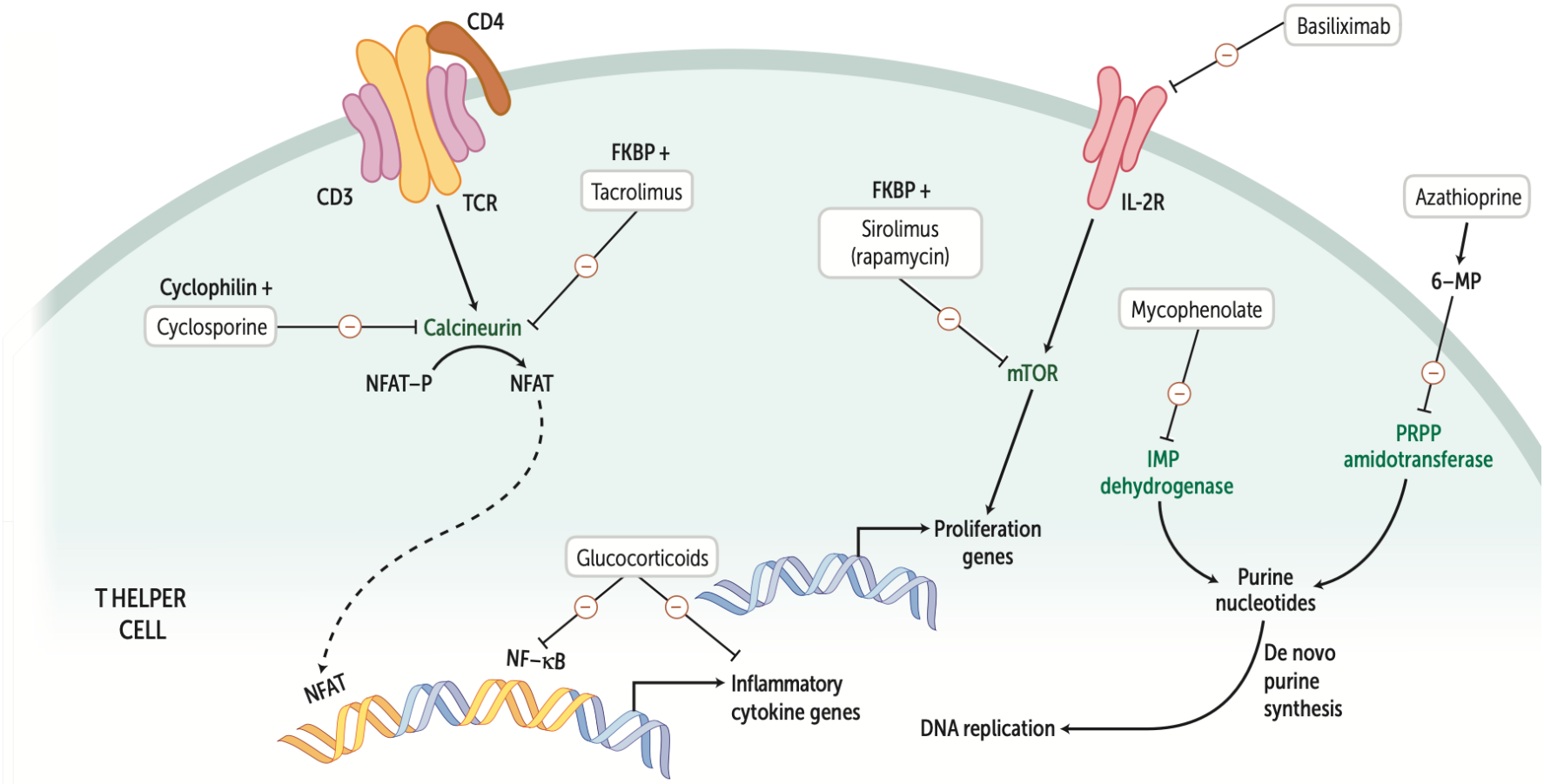
Autograft:
Isograft:
Allograft/ Homograft:
Xenograft/ Heterograft:
Most important HLA:

MC infection (1-3month) post transplant:
GVHD:
100d

Graft VS Leukemia effect:

Max solid organ transplant with GVHD:

IMMUNO-SUPRESSANTS



IMMUNE CHECK POINT INHIBITORS

Advanced melanoma, RCC

Melanoma
HL
NSCLL
UB
Merkel cell ca