A course on Basic and Translational Immunology, with emphasis on immunologic diseases and therapeutic strategies

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Developed as an education program of the Federation of Clinical Immunology Societies (FOCIS)

Themes of the course

- The nomenclature of immunology
- Basic principles: mechanisms underlying immune responses
- Emerging concepts, and their potential clinical and therapeutic implications

What does the immune system do?

Normal functions

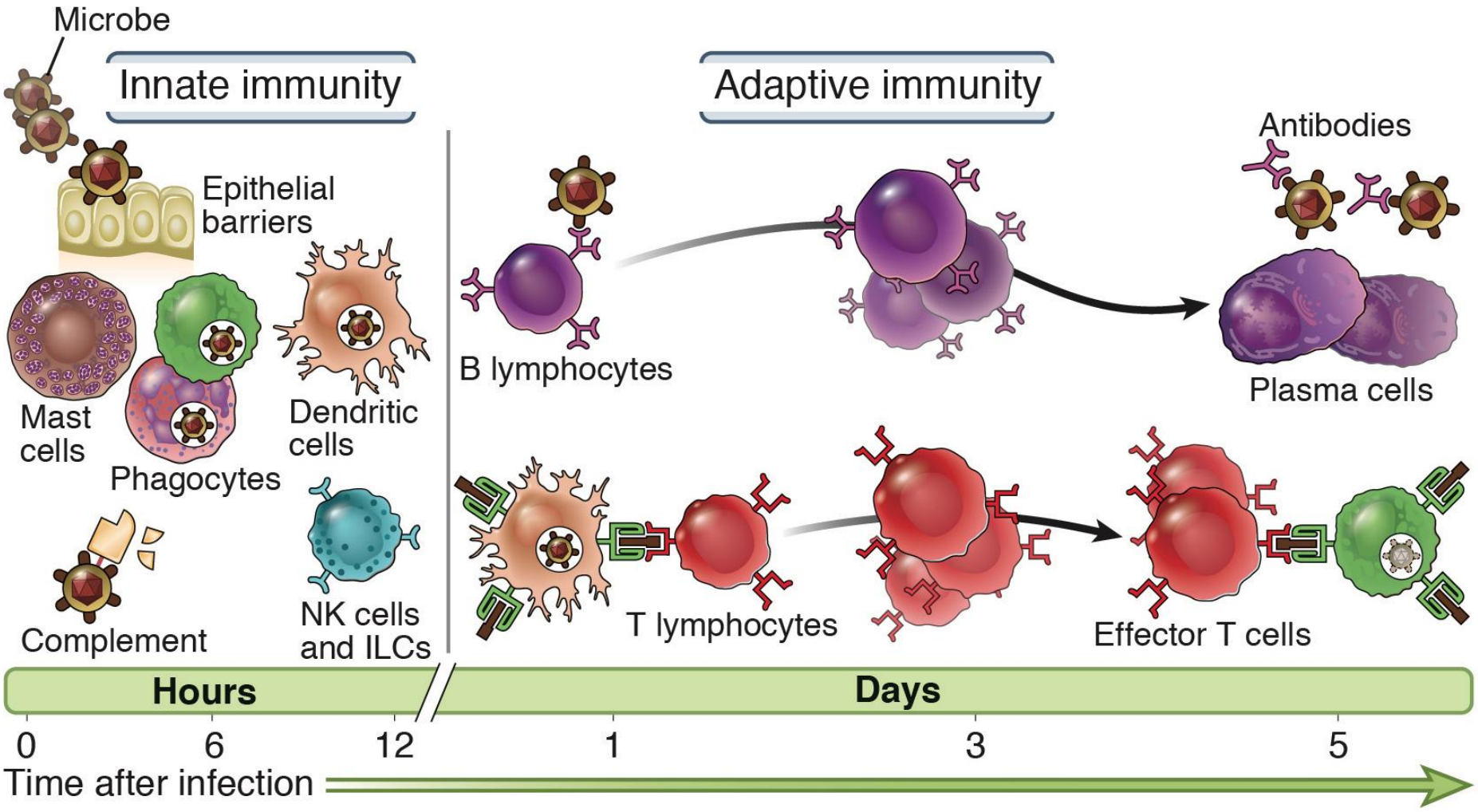
- Defense against infections
- Defense against some tumors

Disease and therapeutic implications

- Cause of disease (autoimmunity, allergy)
- Barrier to transplantation, gene therapy

Take home messages

Innate and adaptive immunity

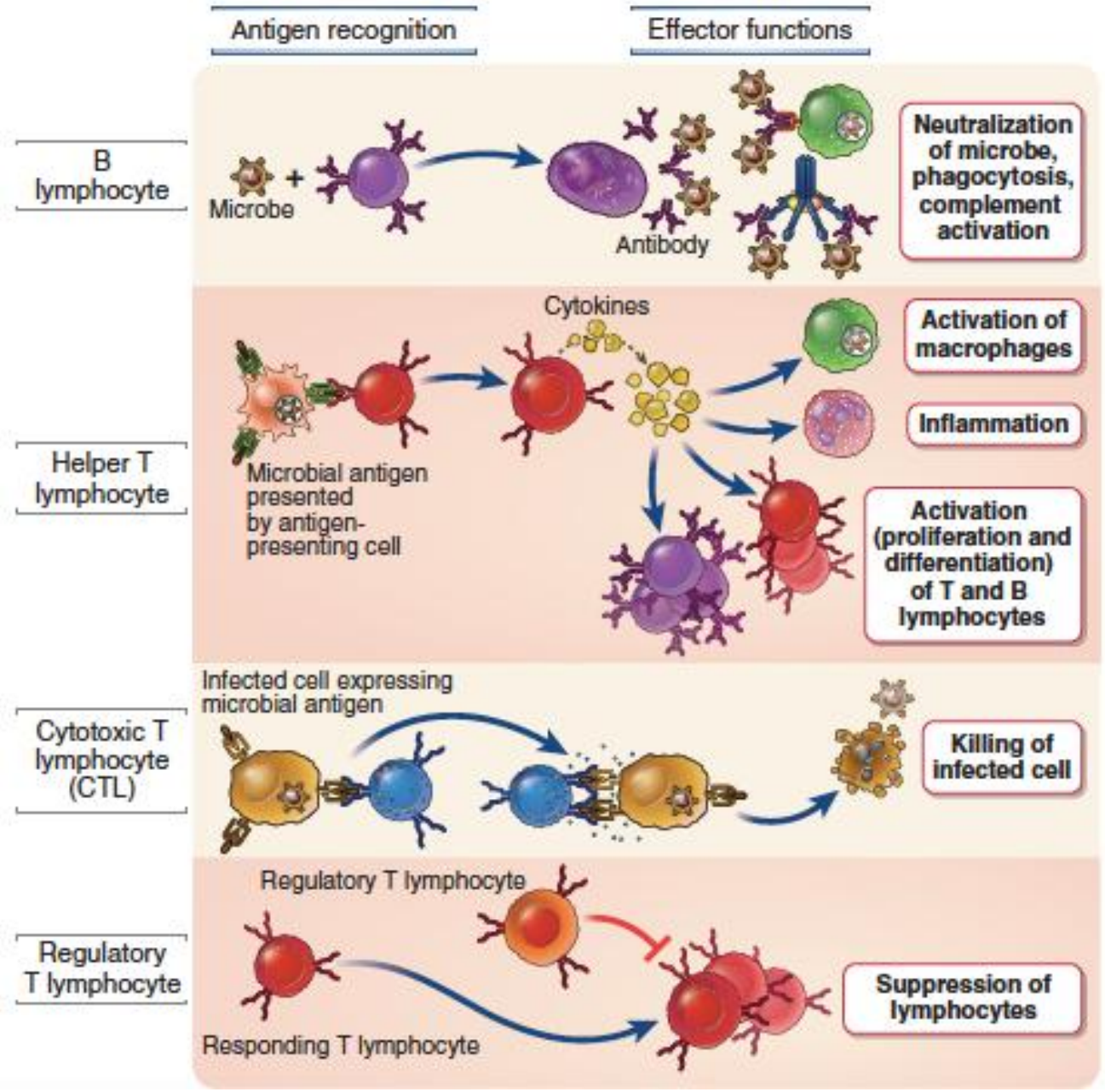


Abbas, Lichtman and Pillai. *Basic Immunology, 5th edition, 2016, Elsevier*

Innate immunity: ***always present (ready to attack); many pathogenic microbes have evolved to resist innate immunity***

Adaptive immunity: ***stimulated by exposure to microbe; more potent***

Classes of lymphocytes



Antibody production

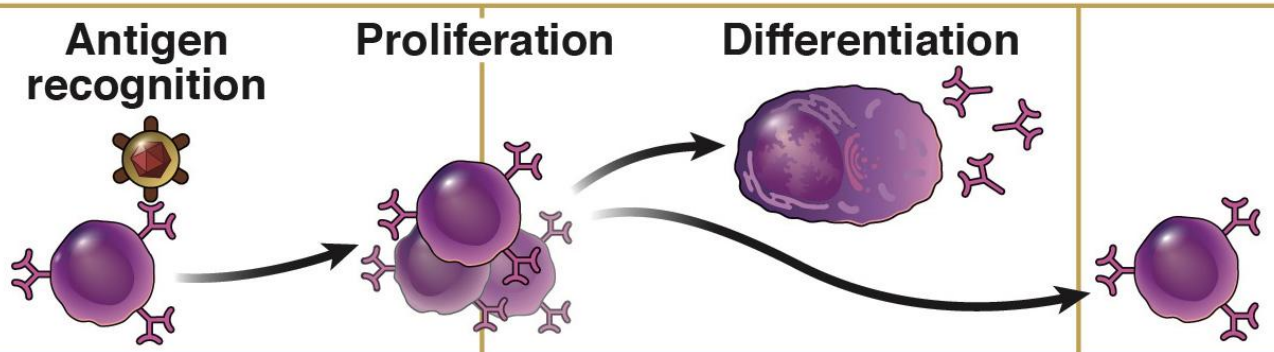
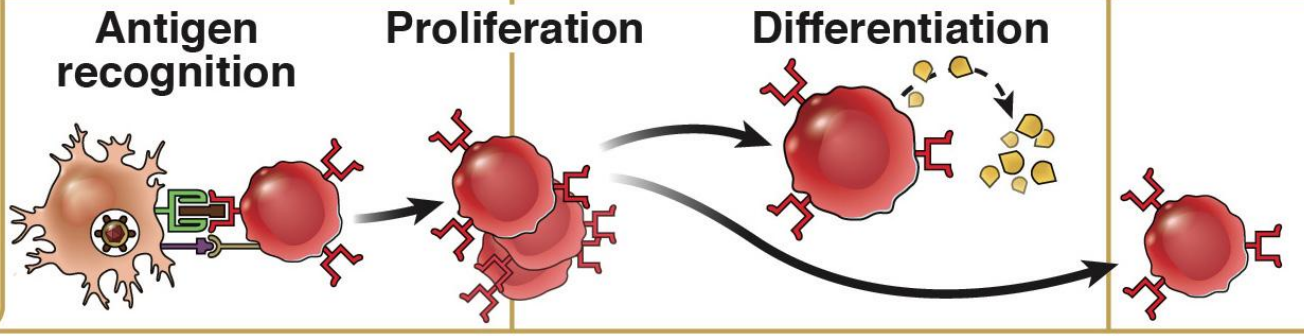
Cytokine secretion

Killing machinery

Suppression of immune responses

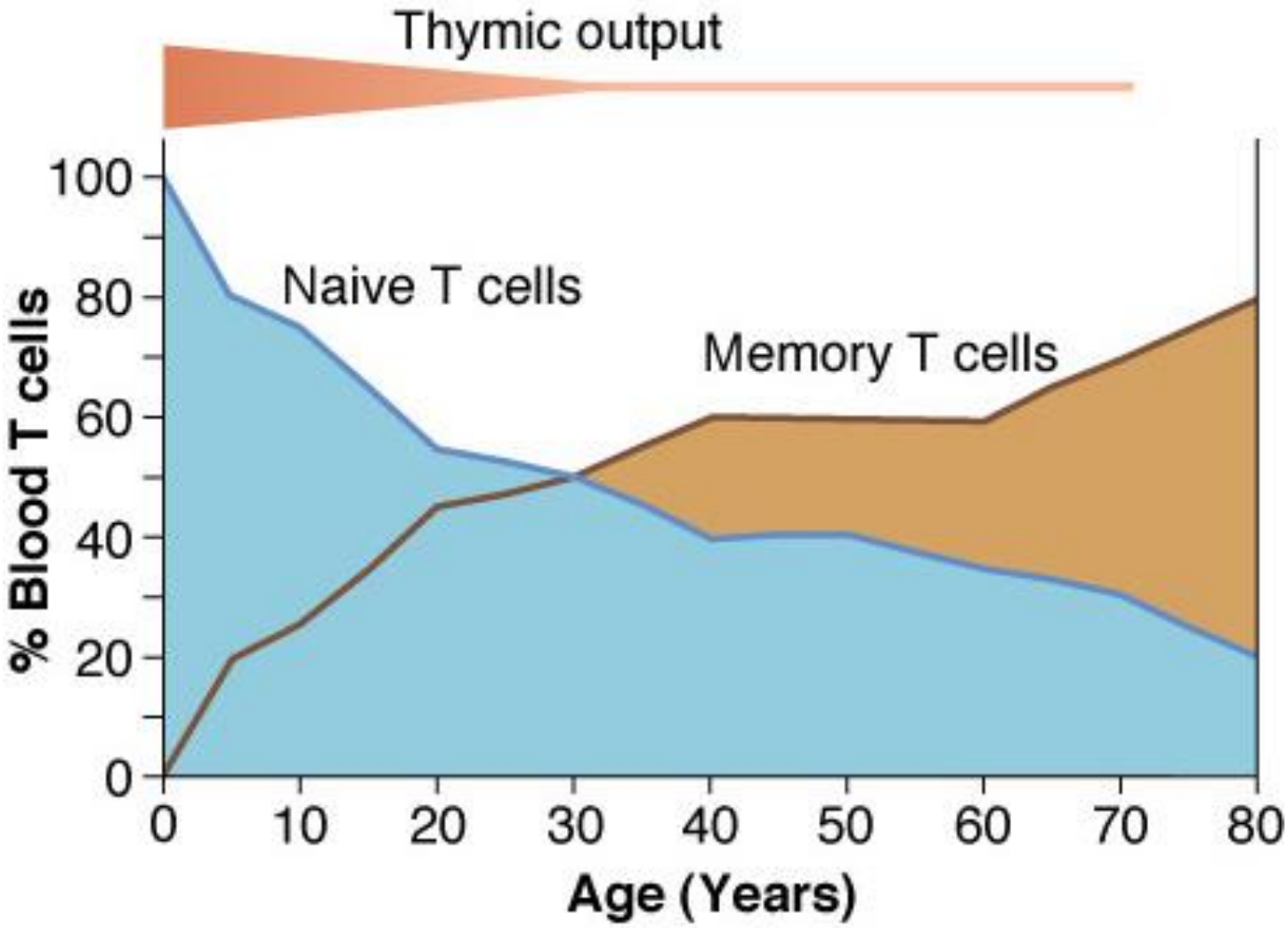
Abbas, Lichtman and Pillai. *Cellular and Molecular Immunology, 9th edition, 2017*

Stages in the life history of lymphocytes

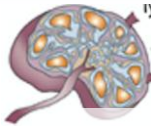
Cell type	Stage		
	Naive cell	Activated or effector lymphocyte	Memory lymphocyte
B lymphocytes			
T lymphocytes			

Proliferation: expands number of antigen-specific cells
Differentiation: converts lymphocytes into effective defenders

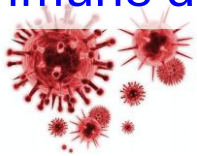
Accumulation of memory T cells with age



Immunological basis of human disease




Immune deficiency



Cancer

Allergy

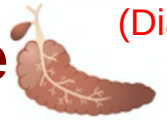
COPD

Response **Tolerance**

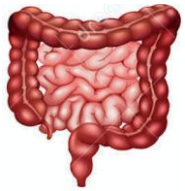
Psychological Disorders
(Alzheimer's, PTSD, depression, bipolar)

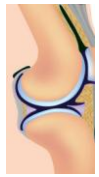
Cardiovascular Disease
(Atherosclerosis, hypertension, stroke)

Metabolic Disorders
(Diabetes, Fatty liver dis.)



Autoimmunity
(T1D, MS, RA, IBD)





Muscular Dystrophy

Transplantation
Tolerance

Osteoporosis

Aging

The significance of recent advances

- Provides a solid foundation of basic principles
- Improved understanding of disease mechanisms
- Development of novel therapies
- Appreciation of the role of the immune system in non-immune diseases

Challenges in Immunology

- Explosion of information creates complexity
  - "Big data" is difficult to interpret, has not yet provided many useful answers
  - Many complex cell populations and pathways
- Translating results from mouse to human
  - Co-housing with dirty mice makes the immune system of lab mice more like humans
- Translating results from cell cultures to in vivo