

**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
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Societies (FOCIS)**

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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?

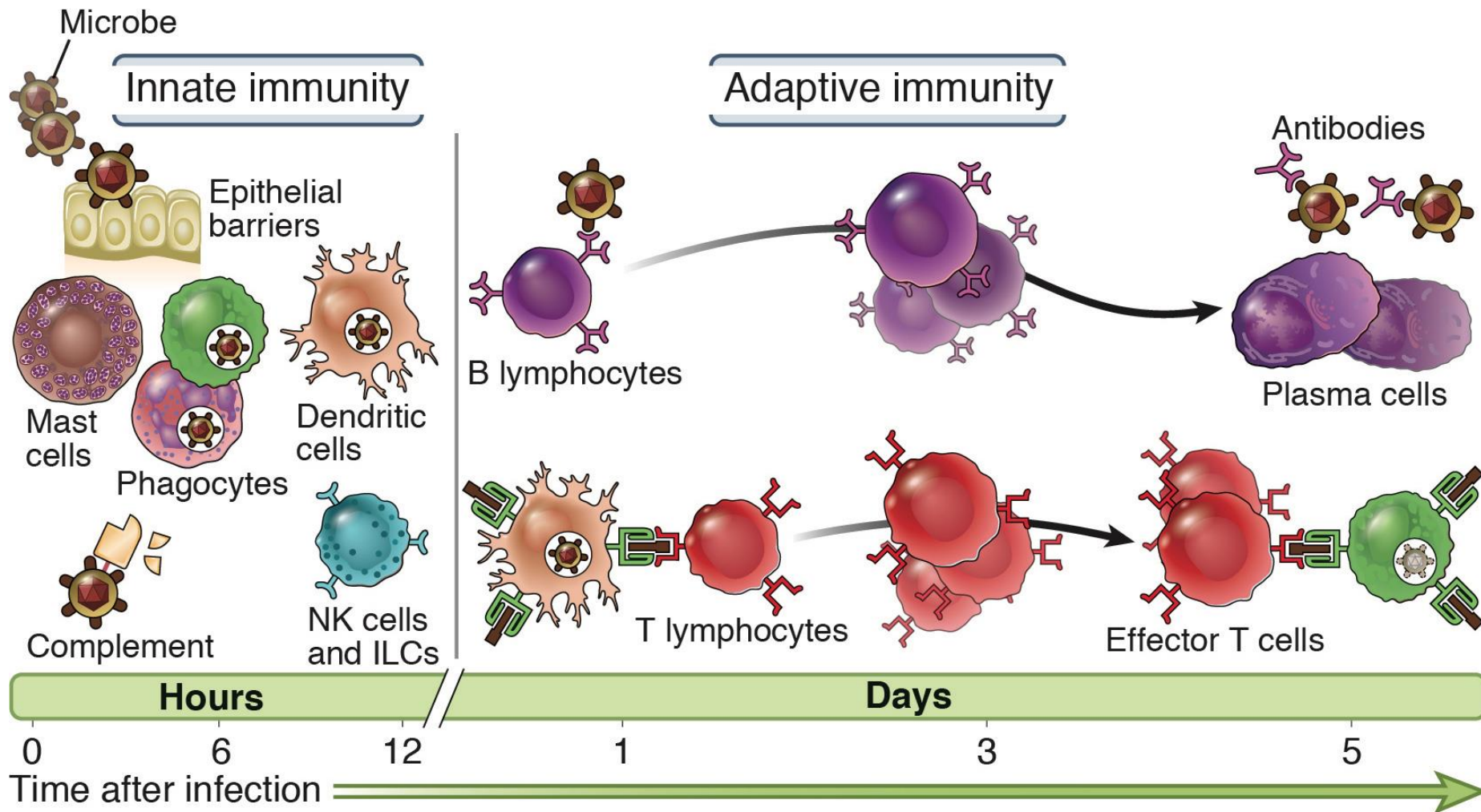
Normal functions

- Defense against infections
- Defense against some tumors

Disease and therapeutic implications

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

Innate and adaptive immunity

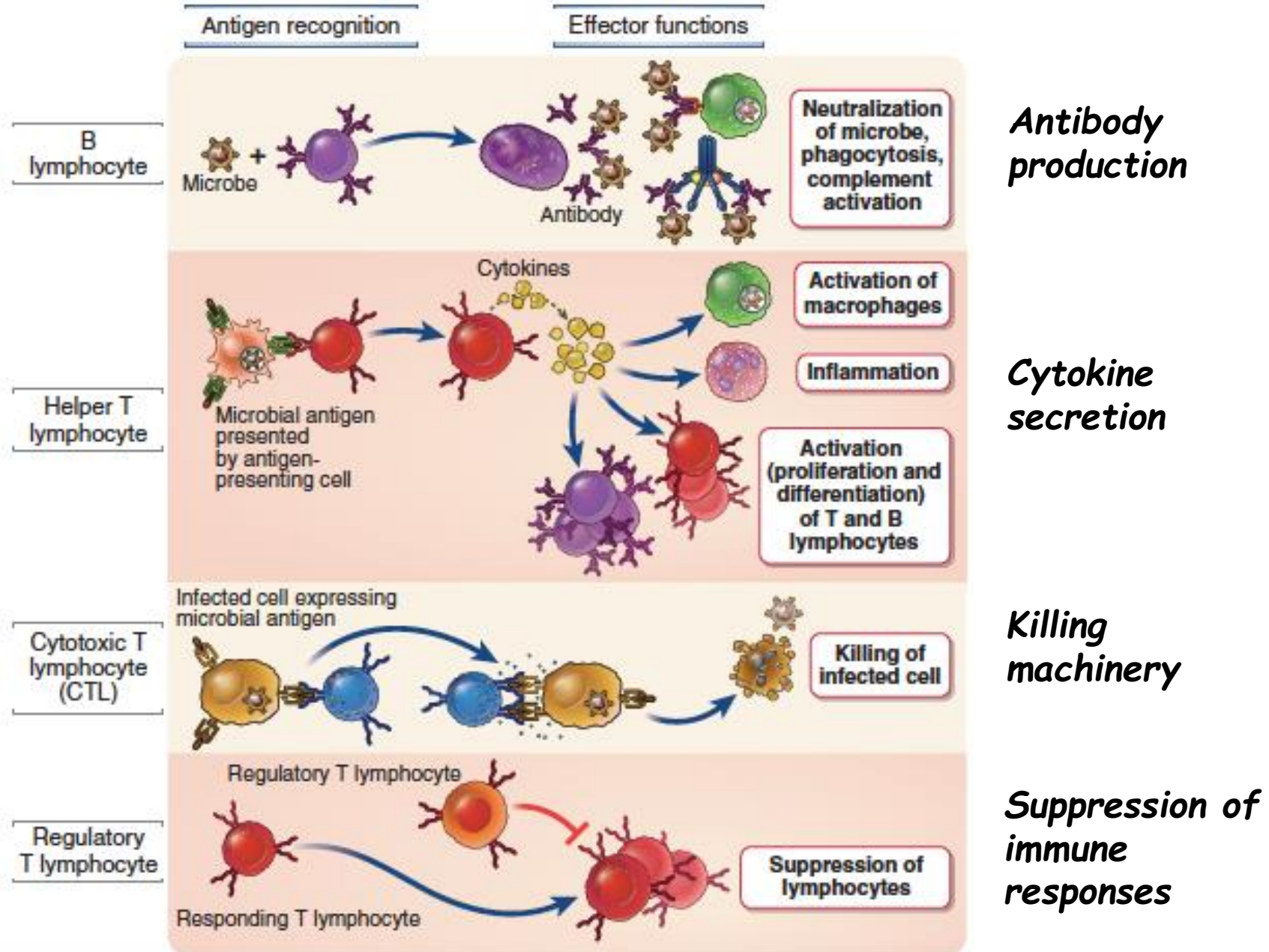


Abbas, Lichtman and Pillai. *Basic Immunology*, 5th edition, 2016, Elsevier

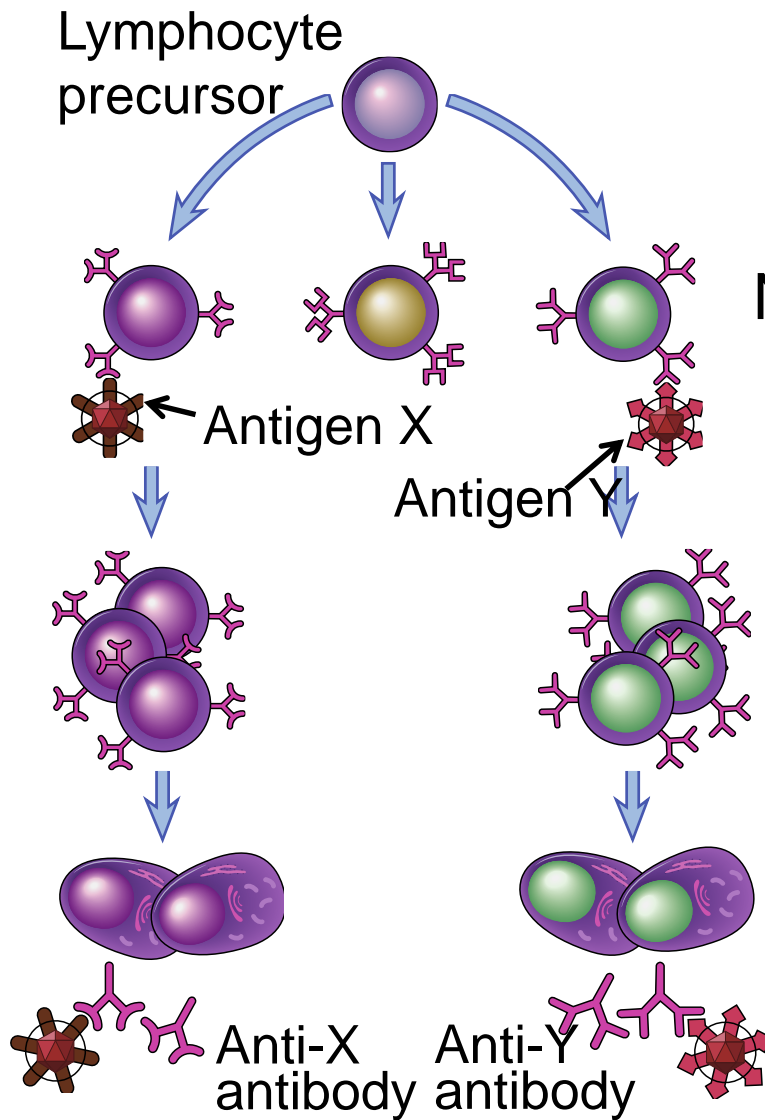
Innate immunity: always present (ready to attack); many pathogenic microbes have evolved to resist innate immunity

Adaptive immunity: stimulated by exposure to microbe; more potent

Classes of lymphocytes



Lymphocyte diversity and clonal selection



Generation of mature lymphocytes with many different antigen receptors

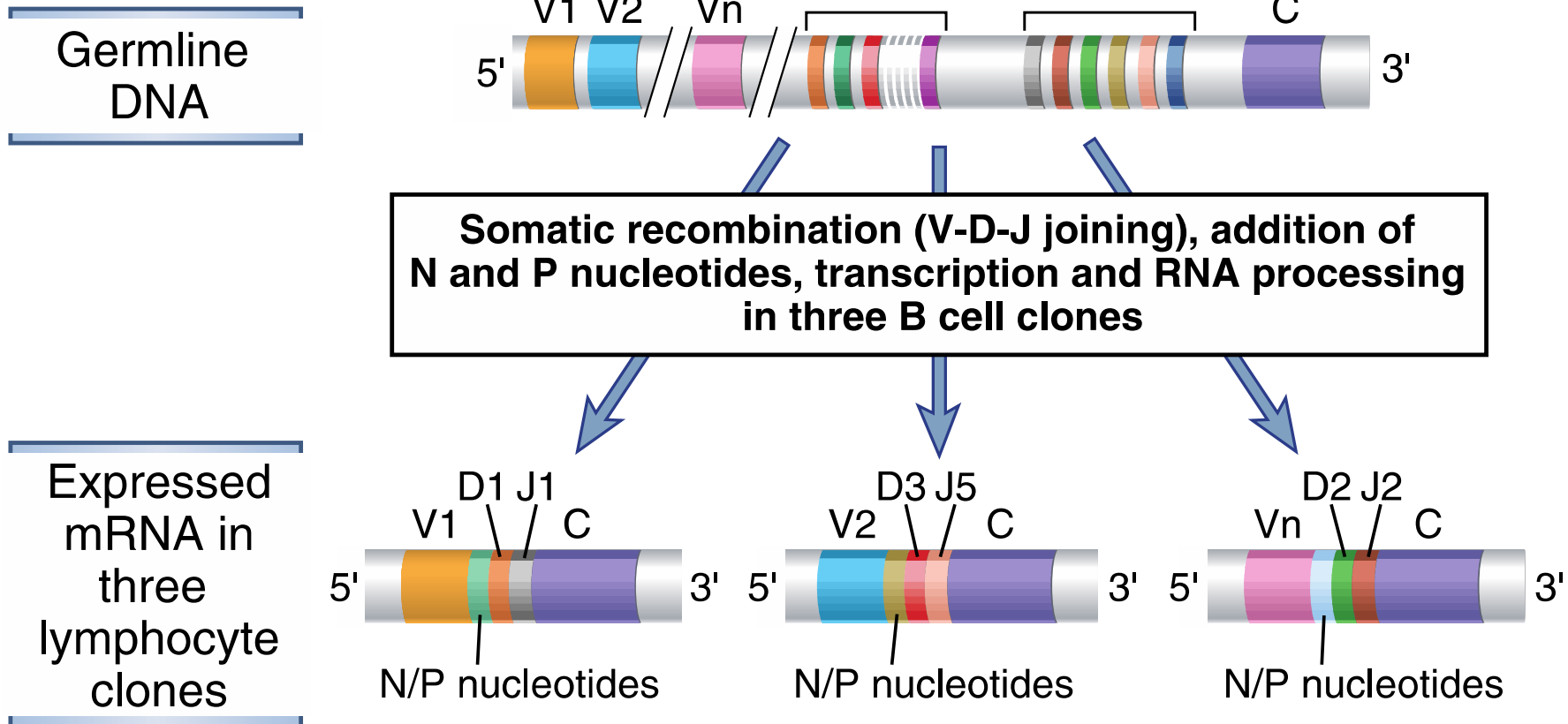
Naïve lymphocytes circulate through lymphoid organs

Specific lymphocytes recognize antigens

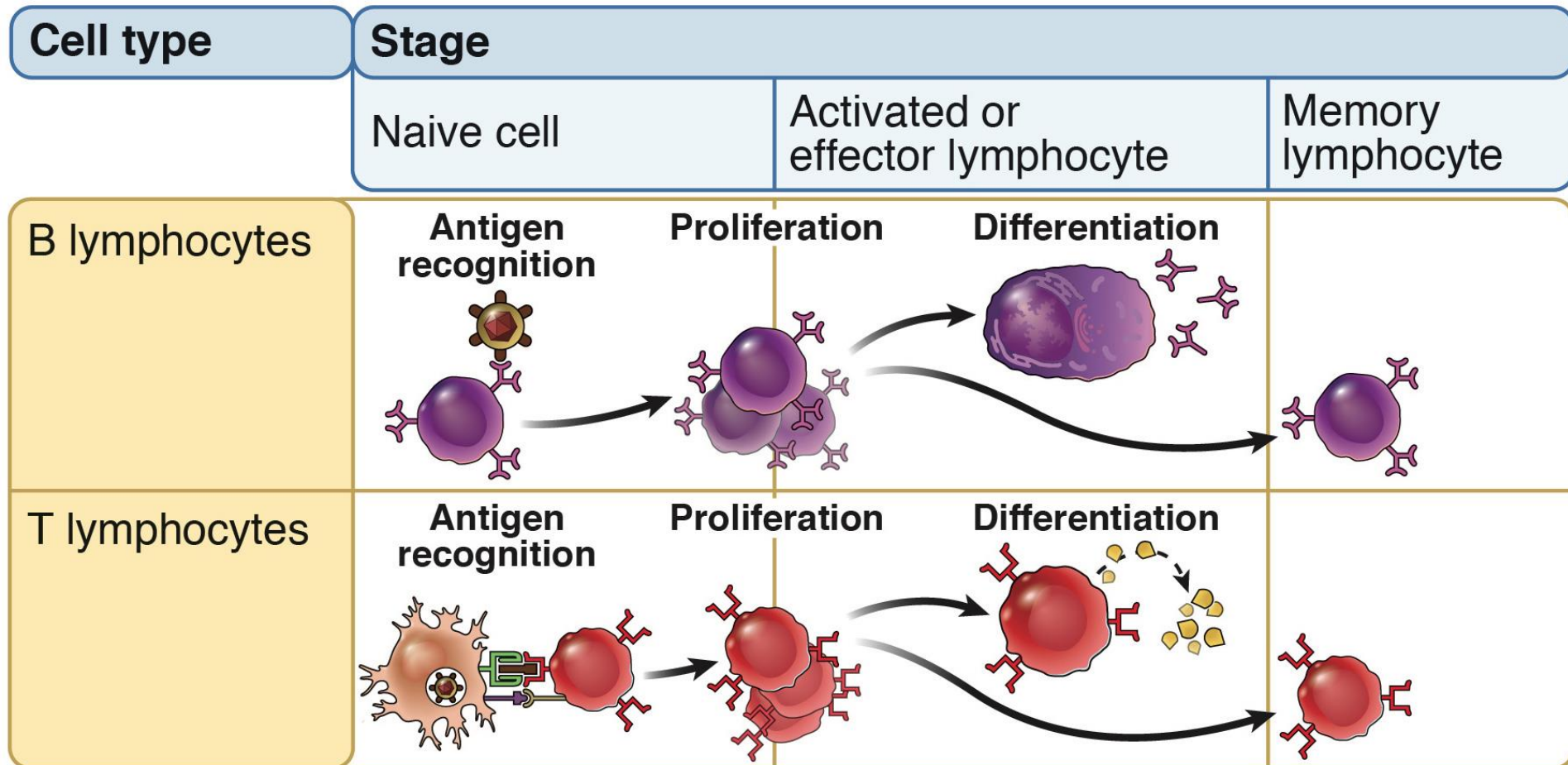
Lymphocytes are activated to proliferate and to differentiate into effector cells

Lymphocytes with highly specific and diverse antigen receptors develop prior to exposure to antigens

Generation of diversity



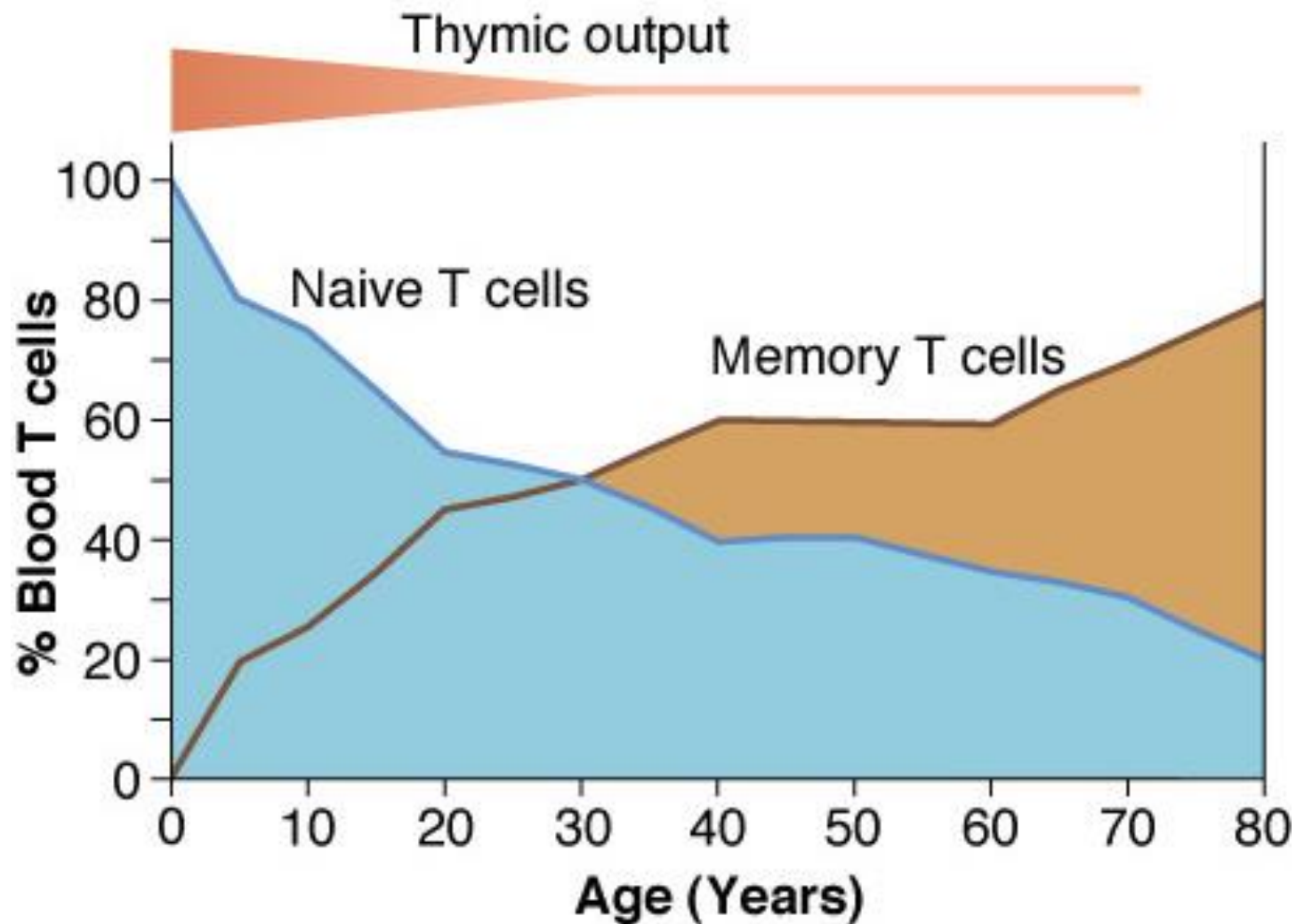
Stages in the life history of lymphocytes



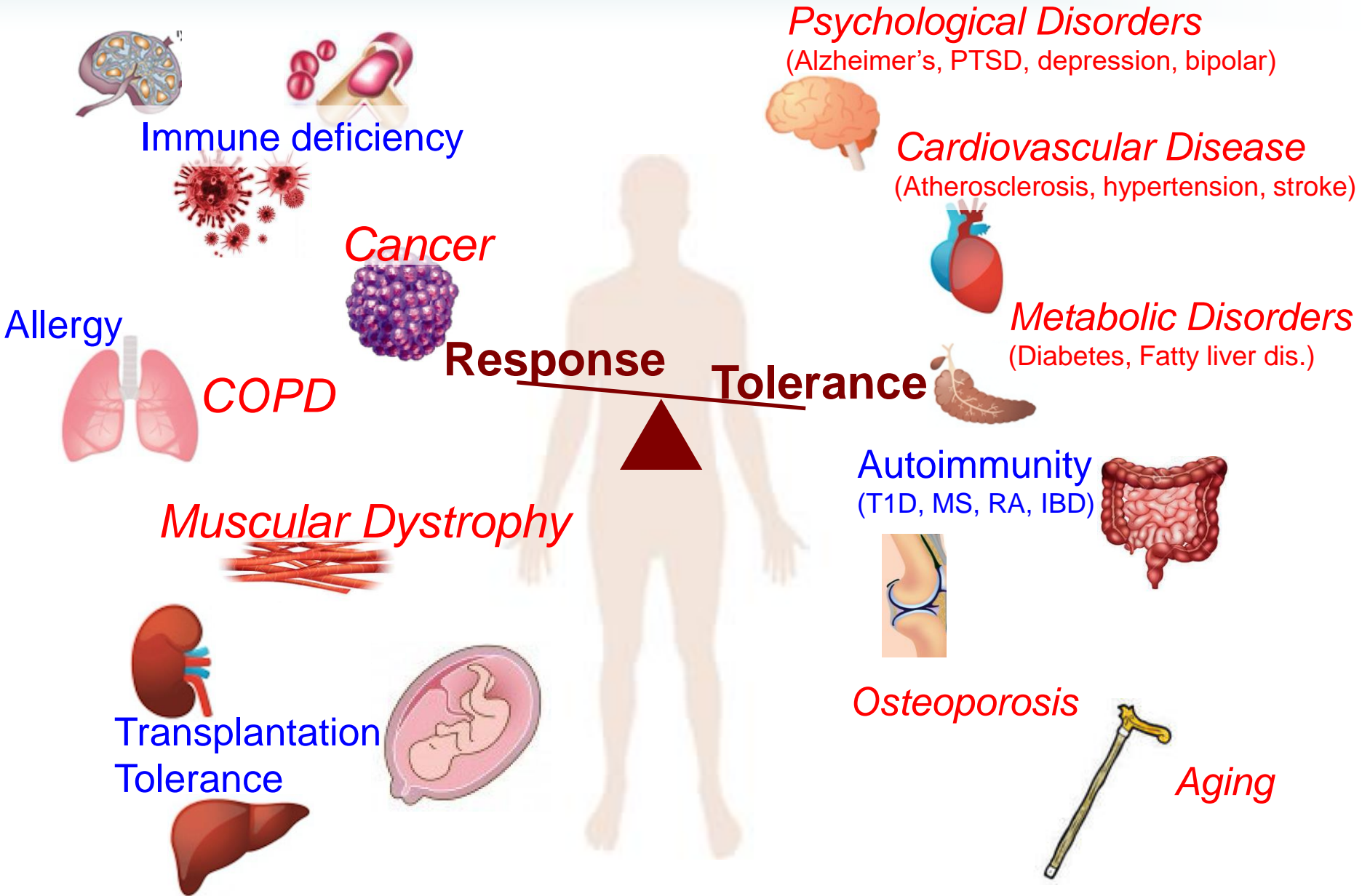
Proliferation: expands number of antigen-specific cells

Differentiation: converts lymphocytes into effective defenders

Accumulation of memory T cells with age



Immunological basis of human disease



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**