

Topics

- Overview
- B cell development
- T cell development

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Lymphocyte development overview (Cont)

- Receptor diversity is produced by gene rearrangement and is random
- Includes specificities that will bind to SELF
- Lymphocytes go through a process of selection
 - Self-recognizing cells are removed from the system during development (Negative selection)
 - Sells that recognize self antigens weakly or that recognize self antigens in a particular way receive a survival signal (positive Selection)

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Lymphocyte development overview

- Ag receptors in B and T cells are immensely variable
- Diversity is generated during development by gene rearrangement
- Lymphopoiesis occurs mainly in Central Lymphoid Tissues (Bone Marrow & Thymus)

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Lymphocyte development overview (Cont)

- Negative Selection ensures Immunological Tolerance
- Positive Selection ensures MCH Restriction (T-cells)
 - Default fate = cell death
- Most lymphocytes generated in the Bone Marrow do not survive
- In the fetus lymphocytes are generated in the liver

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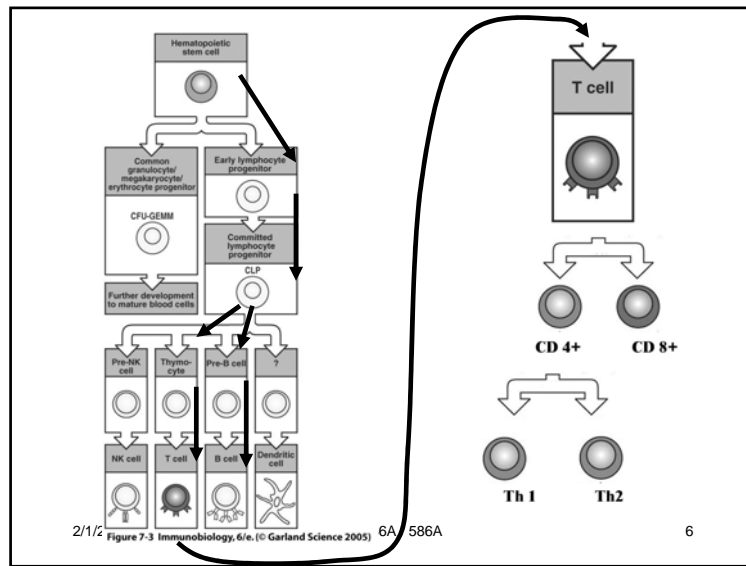
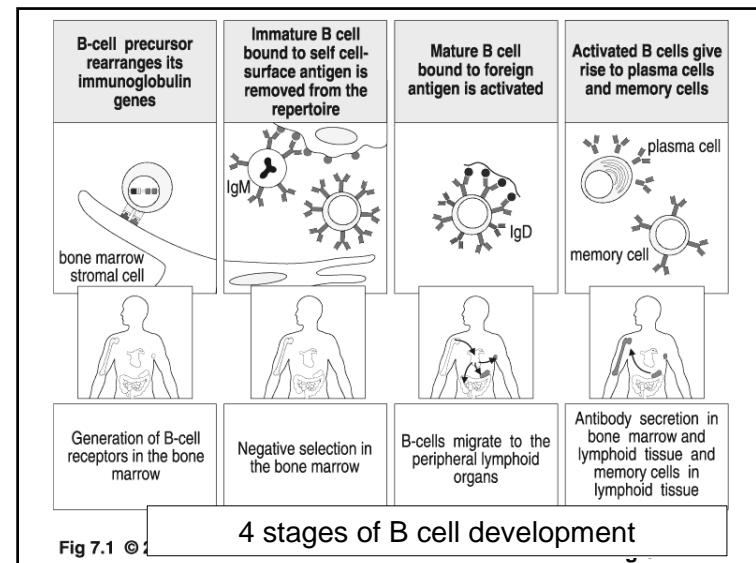
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- In the fetus and juvenile individuals:
- large production of new lymphocytes that populate the peripheral lymphoid tissues
- In the mature individual:
 - New T cell production slows down. T cells are maintained by division of mature T cells.
 - New B cells are constantly being produced

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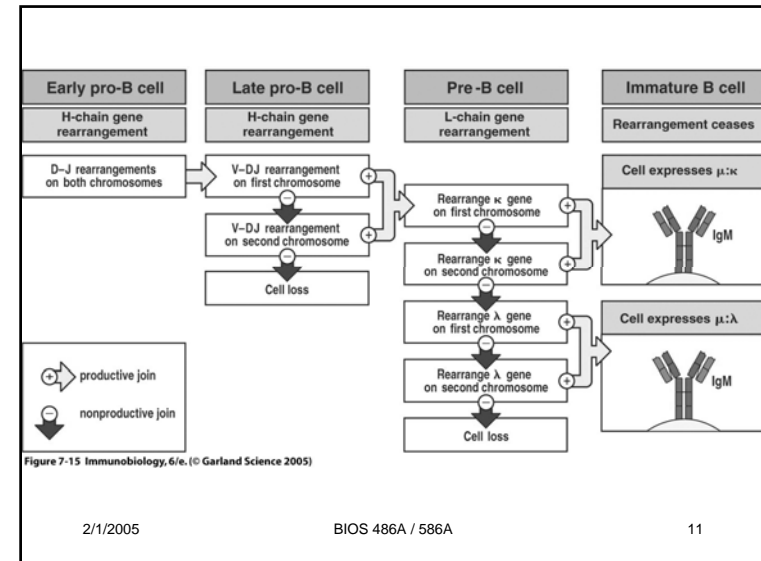
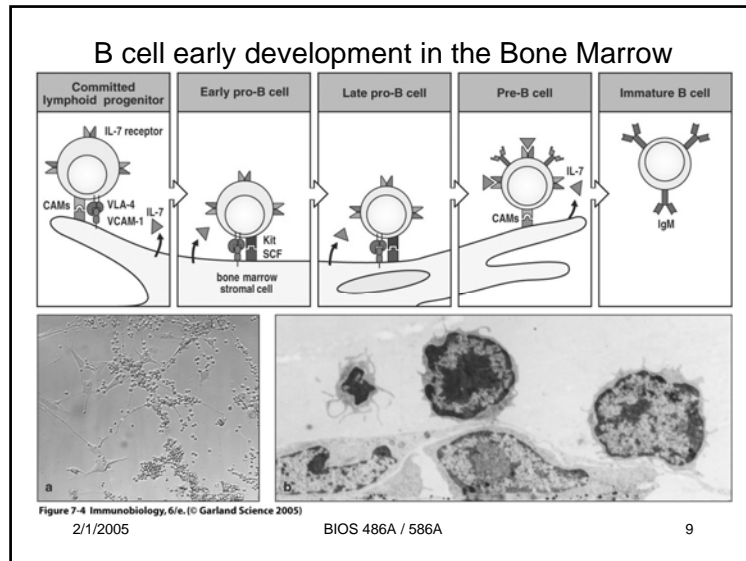
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- Development requires signals from to microenvironment to start gene rearrangements
- Stromal cells (Stroma = mattress)
 - Specific adhesion contacts via interaction of cell-adhesion molecules and their ligands
 - Provide growth factors that stimulate lymphocyte differentiation and proliferation

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- Development occurs in stages
 - is measured by successful rearrangement of genes and expression of receptor molecules
 - Development is accompanied by expression of other cell surface and intracellular proteins
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- Productive rearrangement leads to protein expression
 - Non-productive rearrangement leads to apoptosis
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B cell development in Secondary lymphoid organs

- Immature cells complete development in secondary lymphoid organs
 - Spleen, Lymph nodes, MALT
- Small proportion complete maturation and survive to recirculate between Lymphoid organs and the blood
- Survival is a consequence of competition for a place in the pool of long-lived recirculating B cells
- Follicular dendritic cells, located in FOLLICLES provide survival signals to all cells
- B cells stay for one day in follicle

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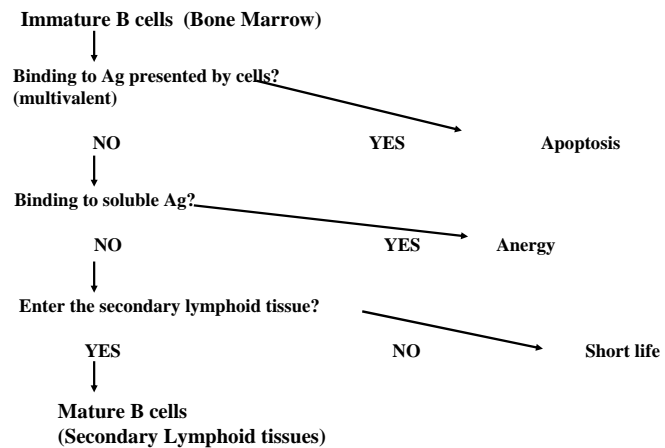
T cell Development

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B cell selection

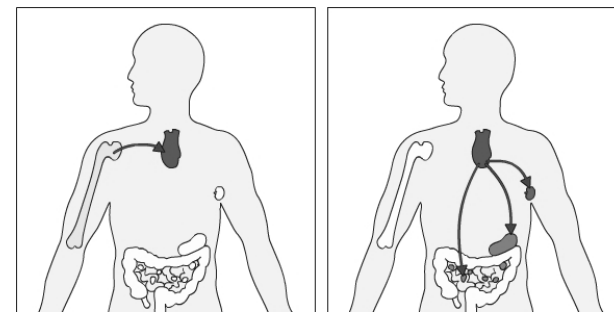


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T cell origin



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–Fetus : Bone Marrow & Liver

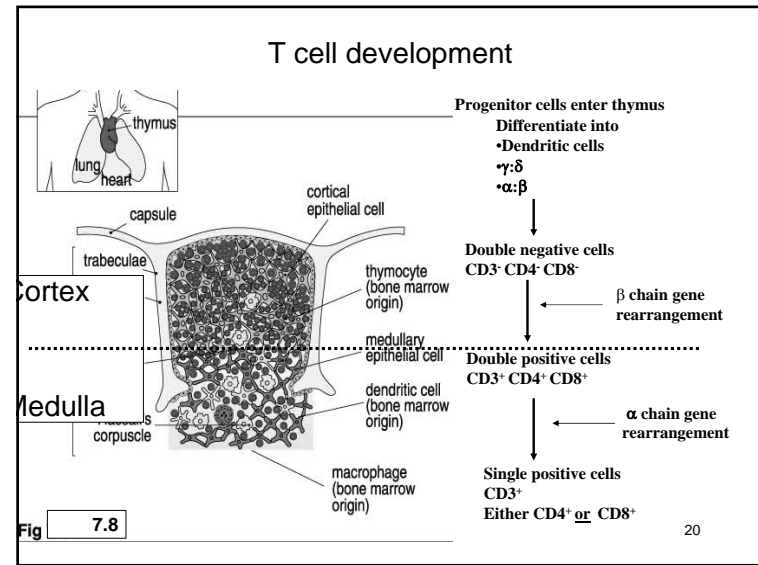
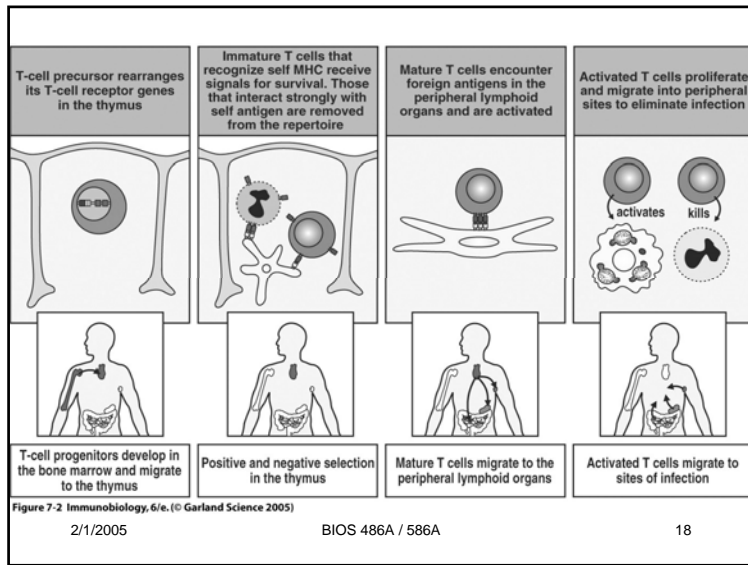
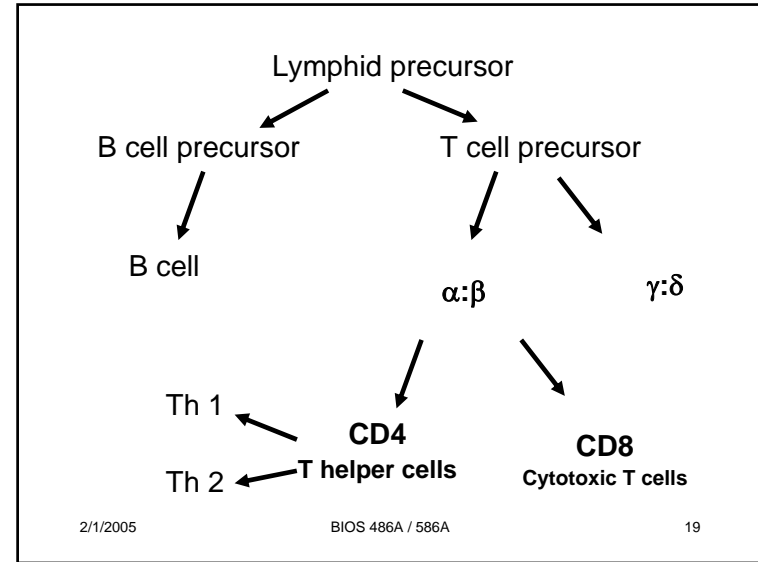
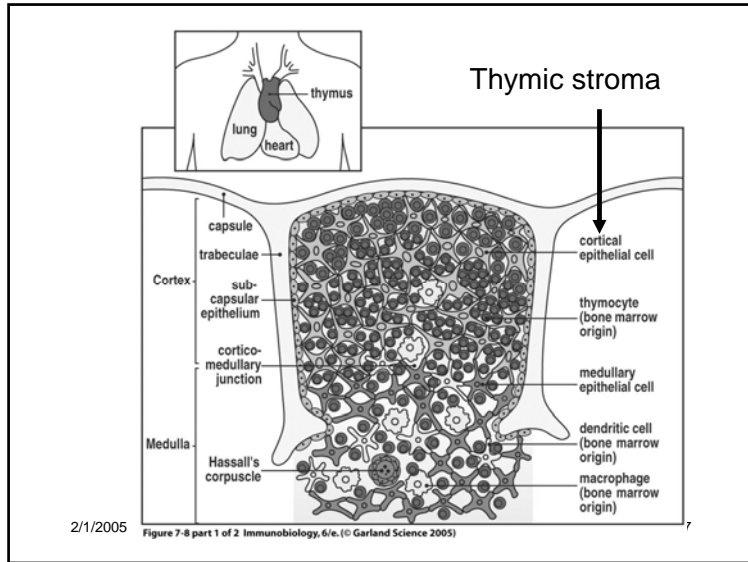
–Infants, juveniles: Bone Marrow & Thymus – High production

–Adults: Thymus atrophied – #s maintained by division of Mature T cells

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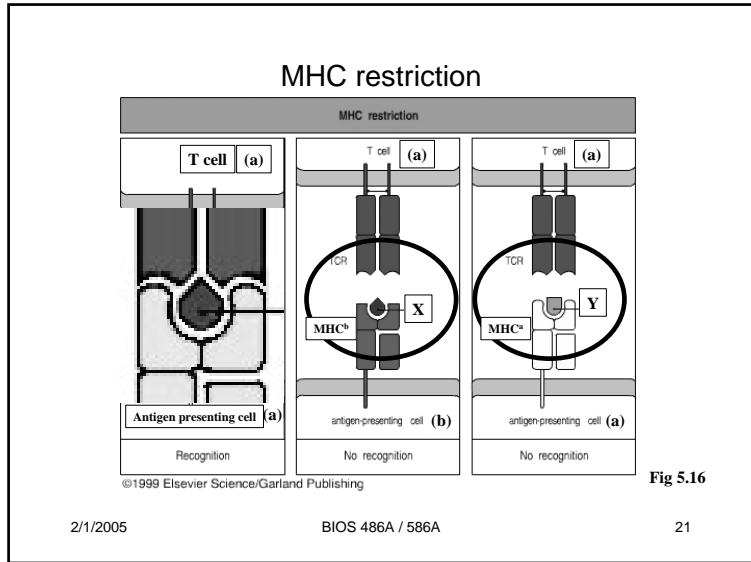


Fig 5.16

