

Johns Hopkins Engineering

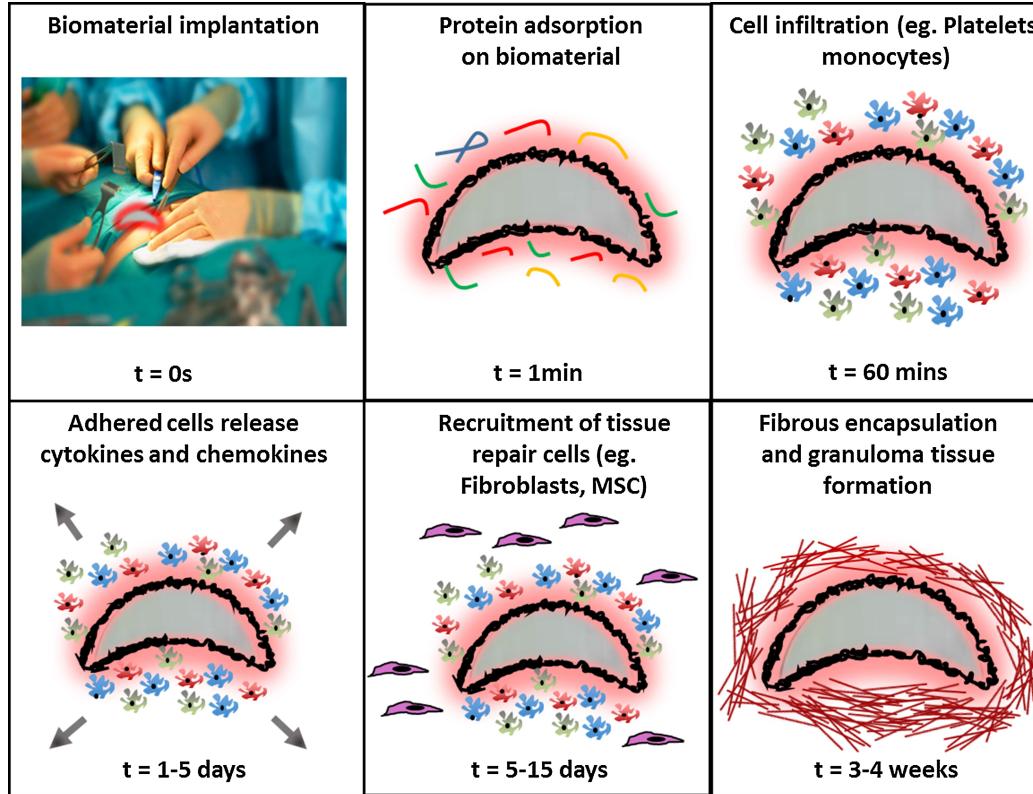
Immunoengineering

Immune Response to Biomaterials: Protein Adsorption



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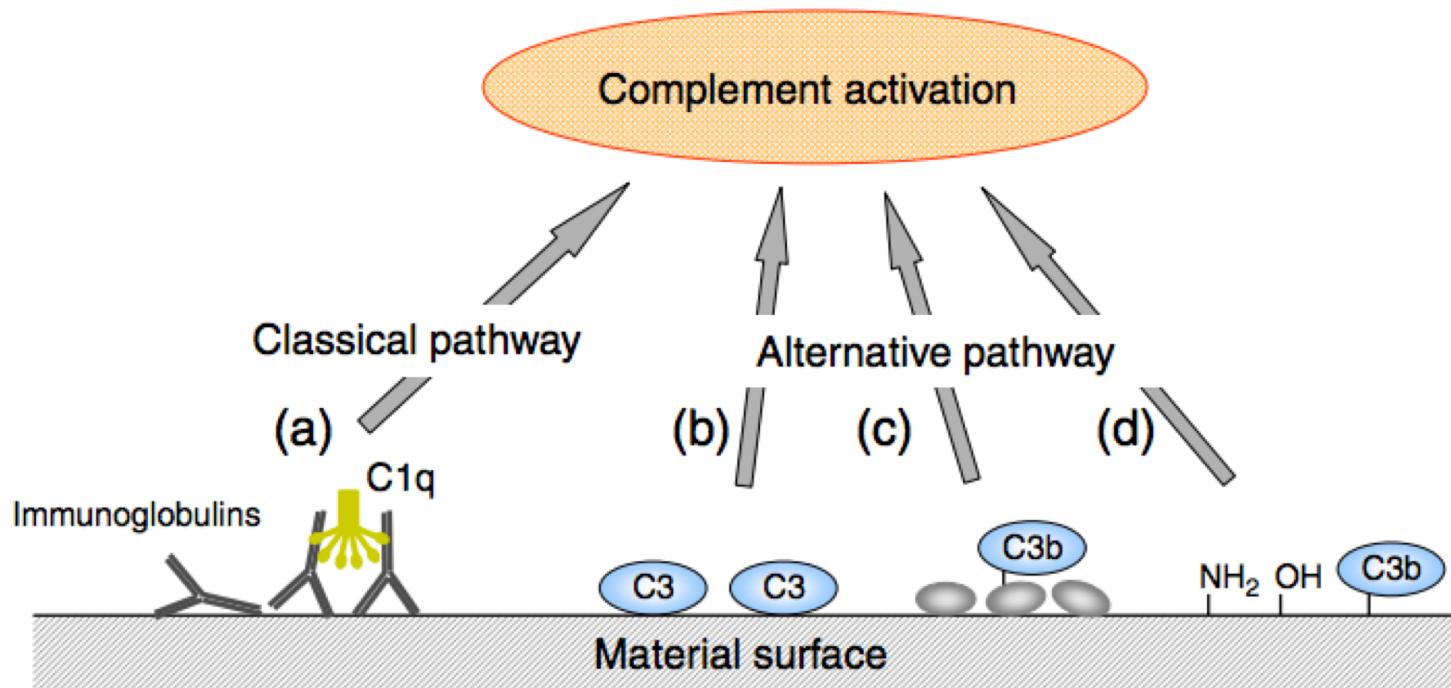
Immune Response to Biomaterials



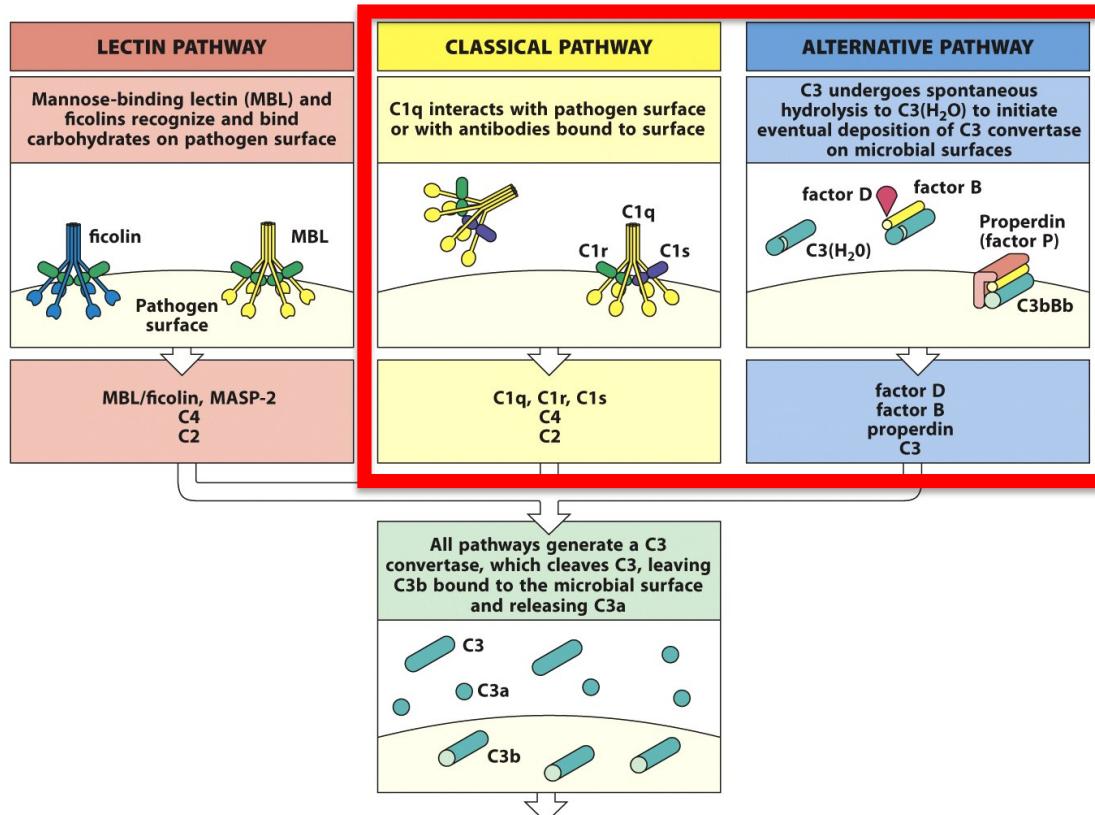
Protein Adsorption

- Proteins in blood, including immunoglobulins and complement proteins, rapidly adsorb to biomaterial surfaces
- Serum proteins enable cell adhesion
- Complement proteins cause inflammatory response

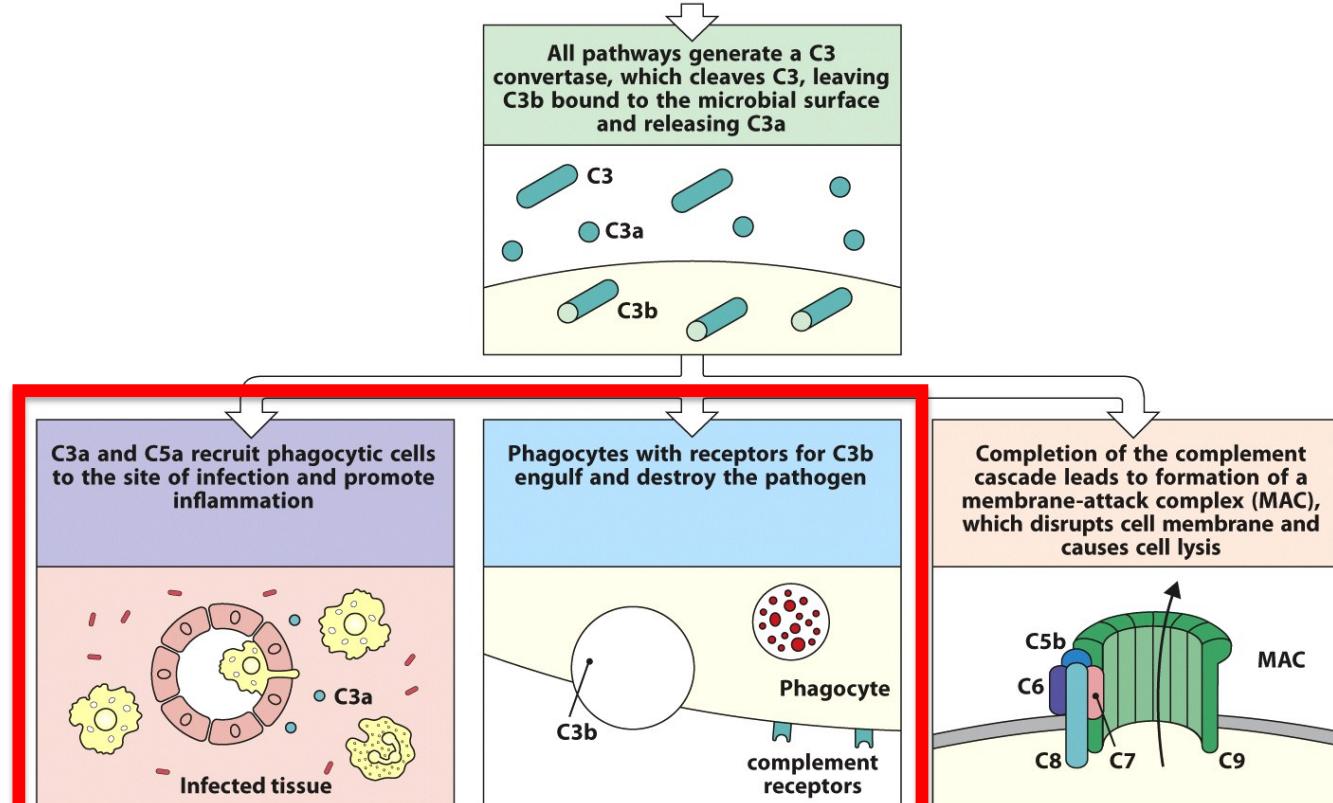
Complement Proteins



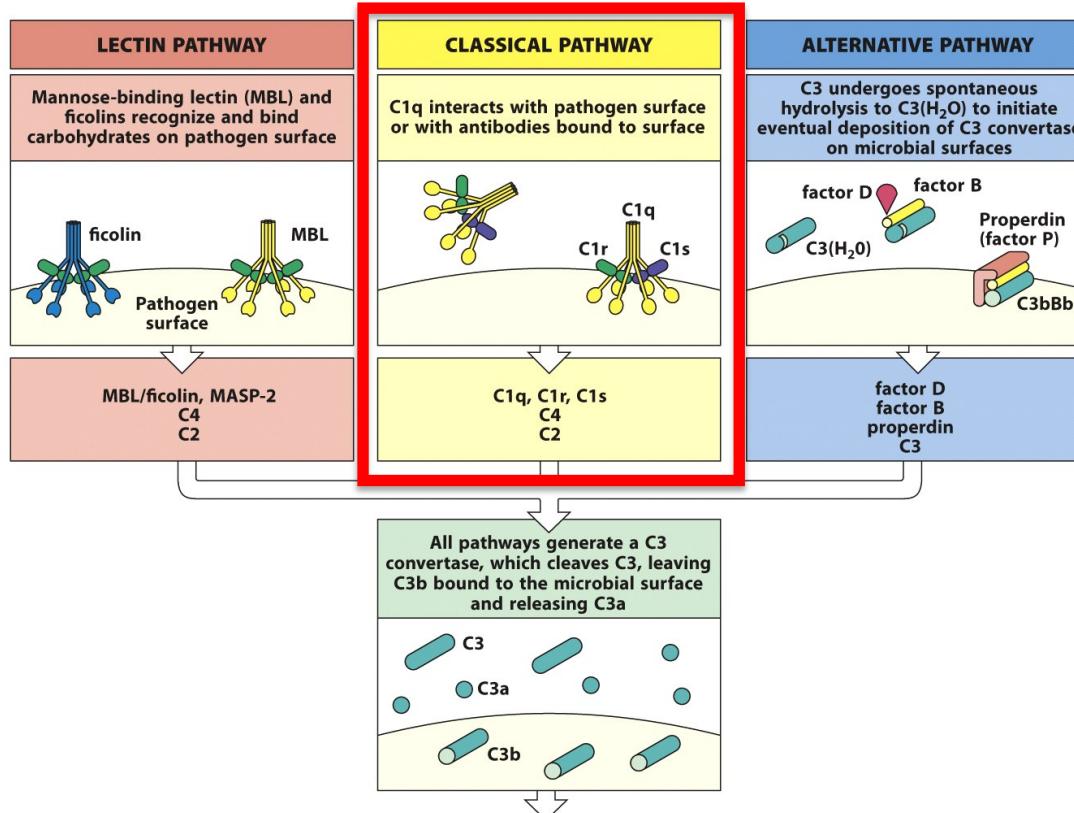
Complement Cascade



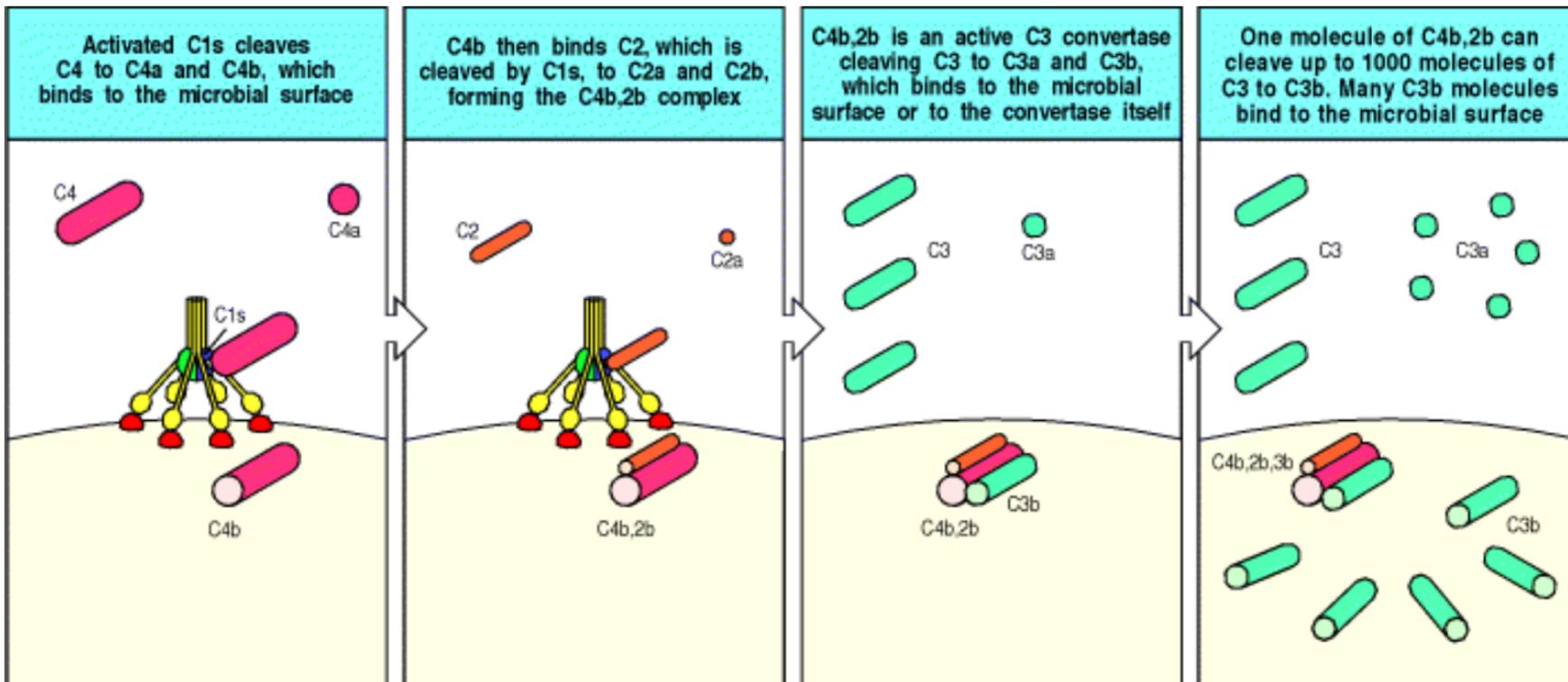
Complement Cascade



Classical Pathway



Classical Pathway



Amplification of Classical Pathway

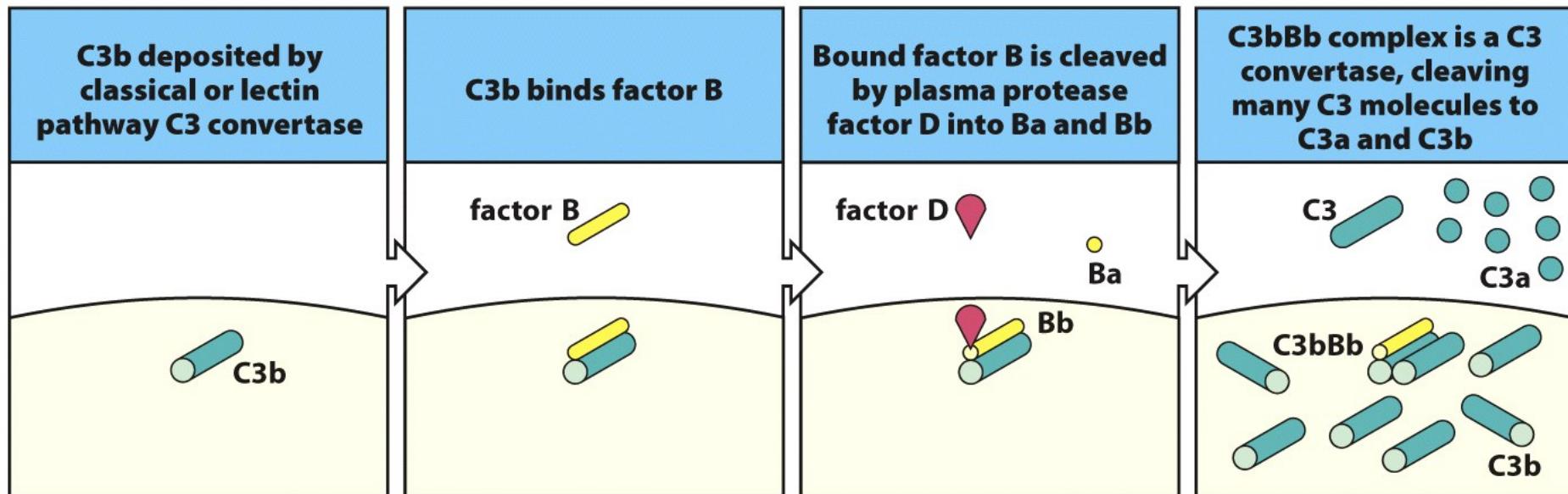
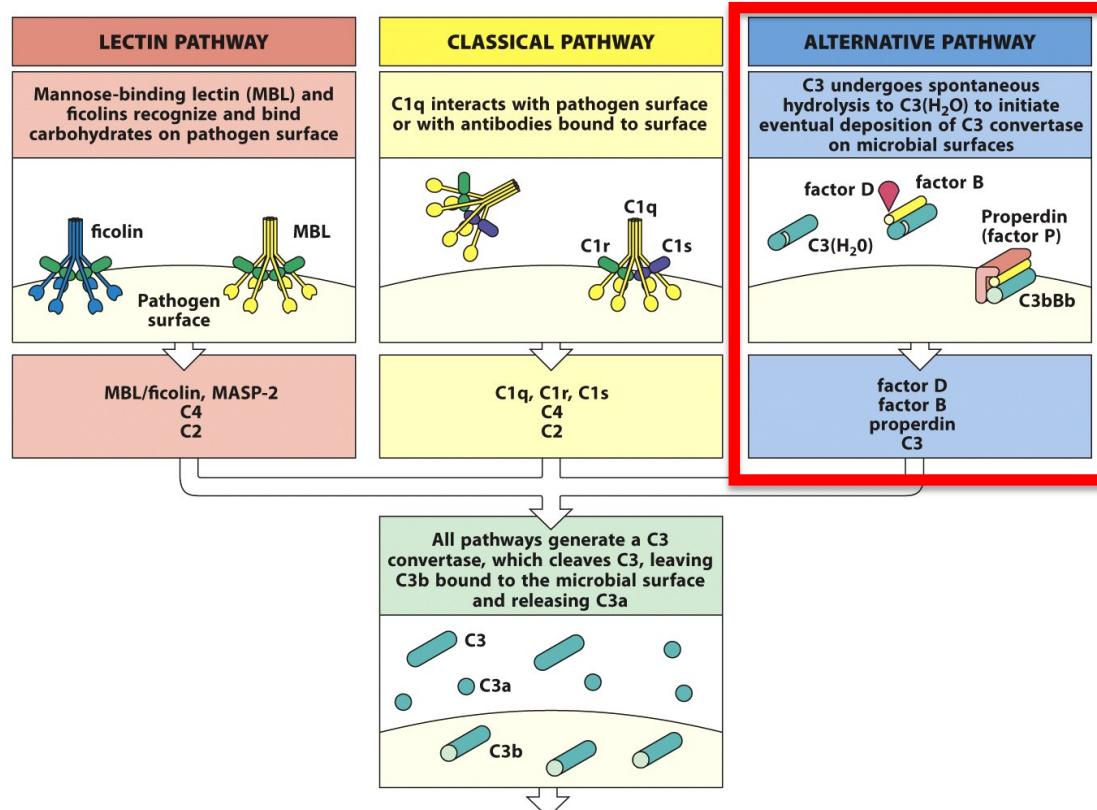


Figure 2.19 Janeway's Immunobiology, 8ed. (© Garland Science 2012)

Alternative Pathway



Alternative Pathway

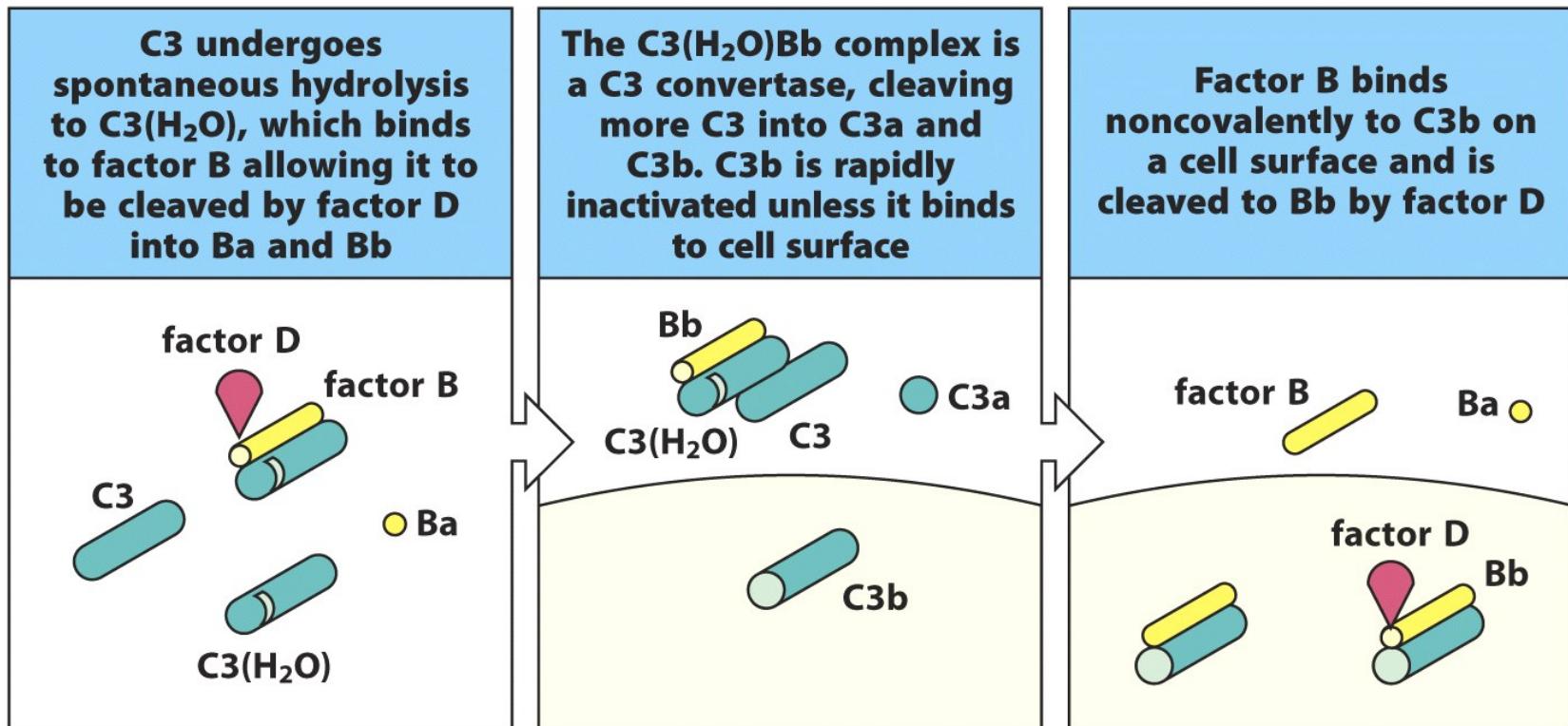


Figure 2.20 Janeway's Immunobiology, 8ed. (© Garland Science 2012)

Alternative Pathway

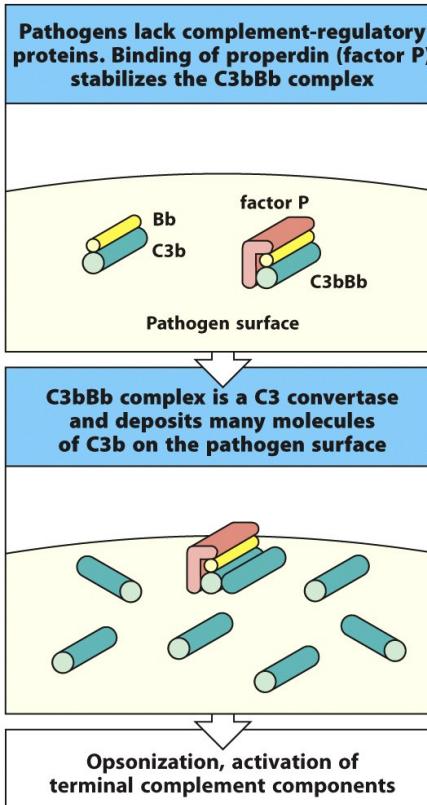


Figure 2.21 Janeway's Immunobiology, 8ed. (© Garland Science 2012)

Complement Inhibition on Host Cells

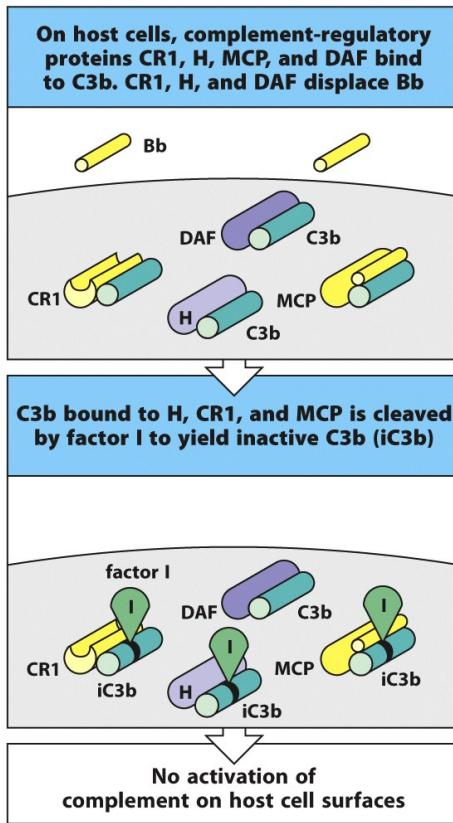


Figure 2.23 Janeway's Immunobiology, 8ed. (© Garland Science 2012)

Classical and Alternative Pathways

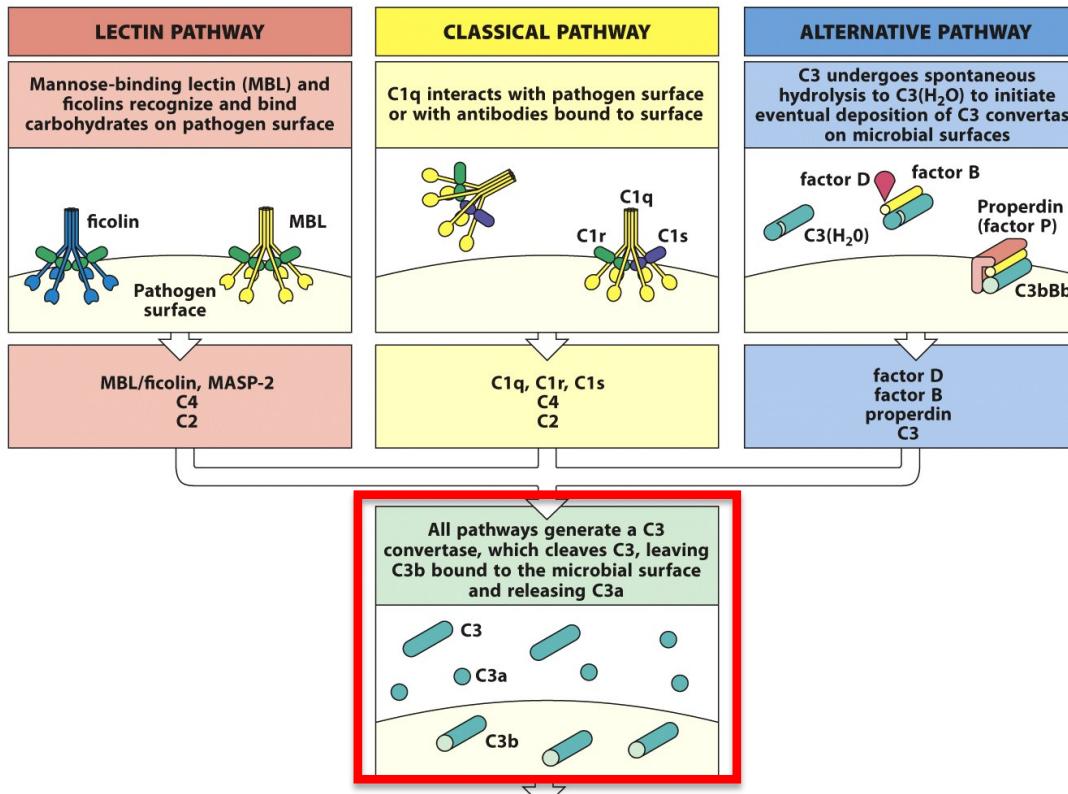
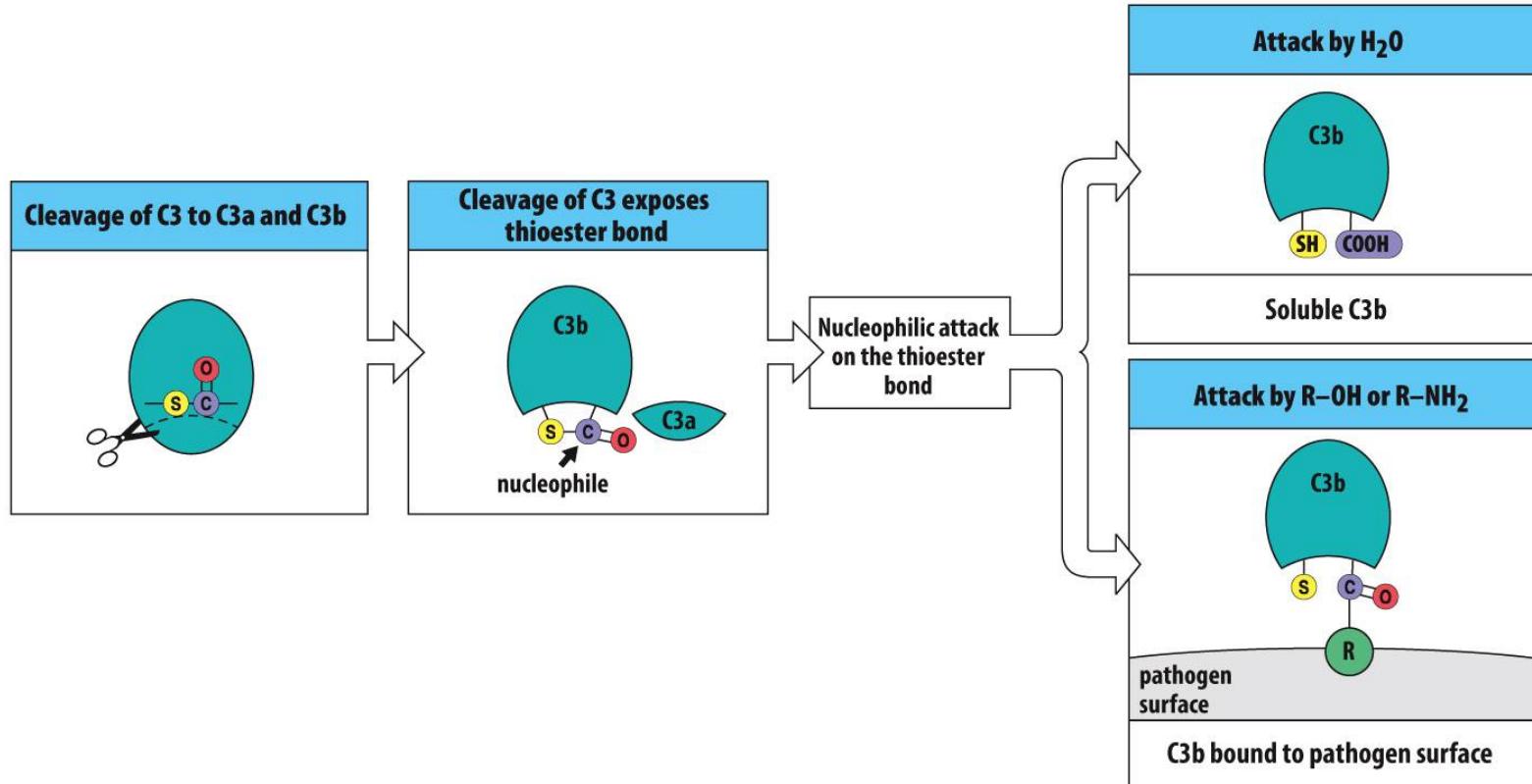


Figure 2.12 part 1 of 2 Janeway's Immunobiology, 8ed. (© Garland Science 2012)

C3b Deposition



Complement Cascade

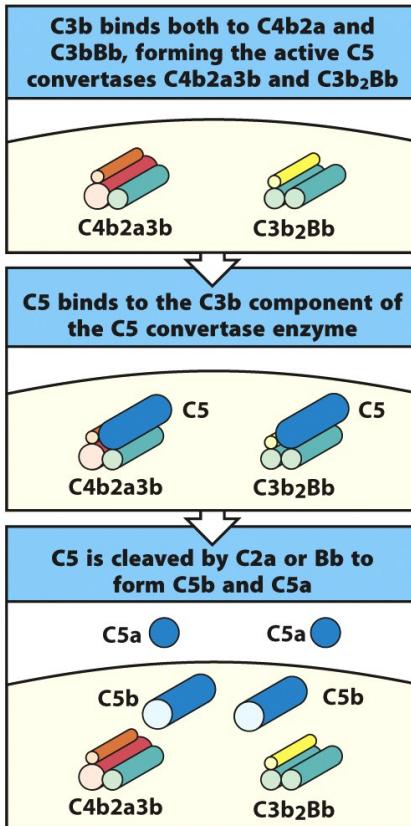
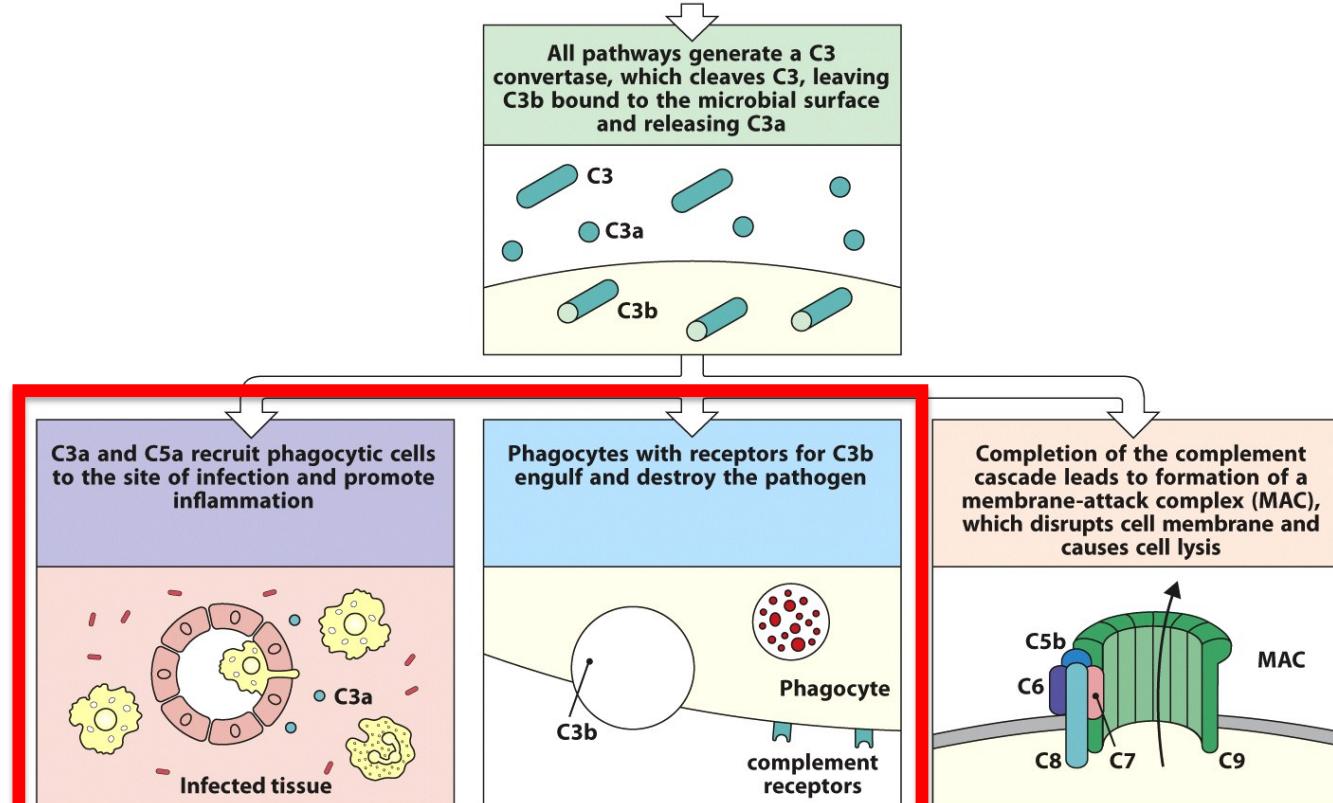


Figure 2.25 Janeway's Immunobiology, 8ed. (© Garland Science 2012)

Complement Cascade



Effects of C3a and C5a

- Anaphylotoxins and chemotactic molecules
- Induce increased vascular permeability, edema
- Induce cytokine and ROS release, expression of adhesion molecules and acute phase proteins
- C3a
 - Activate mast cells, basophils, eosinophils → histamine release
- C5a
 - Attracts and activates neutrophils, monocytes, macrophages, eosinophils

Effects of C3a and C5a

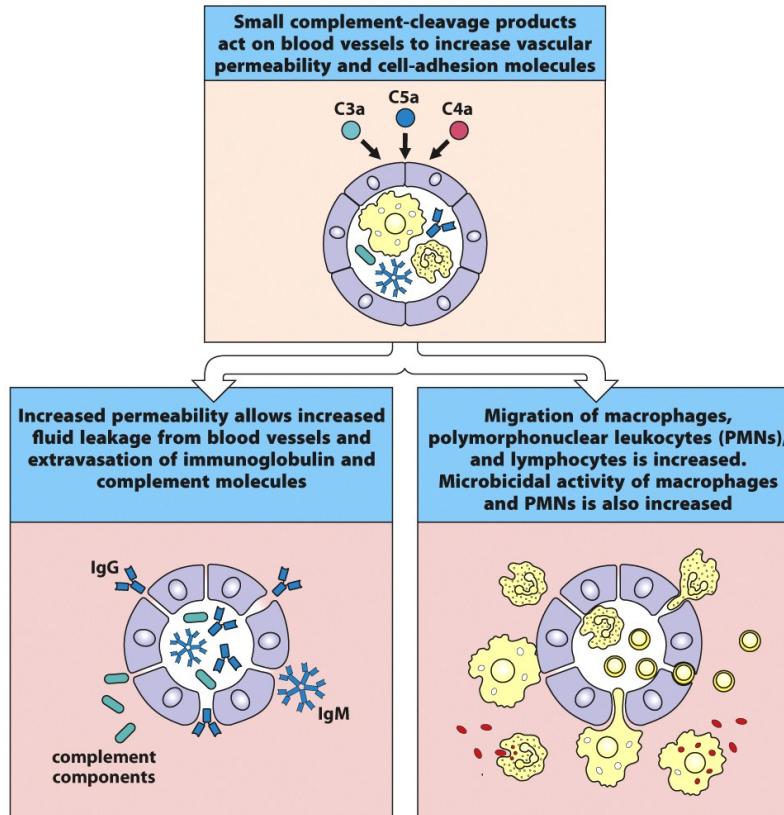
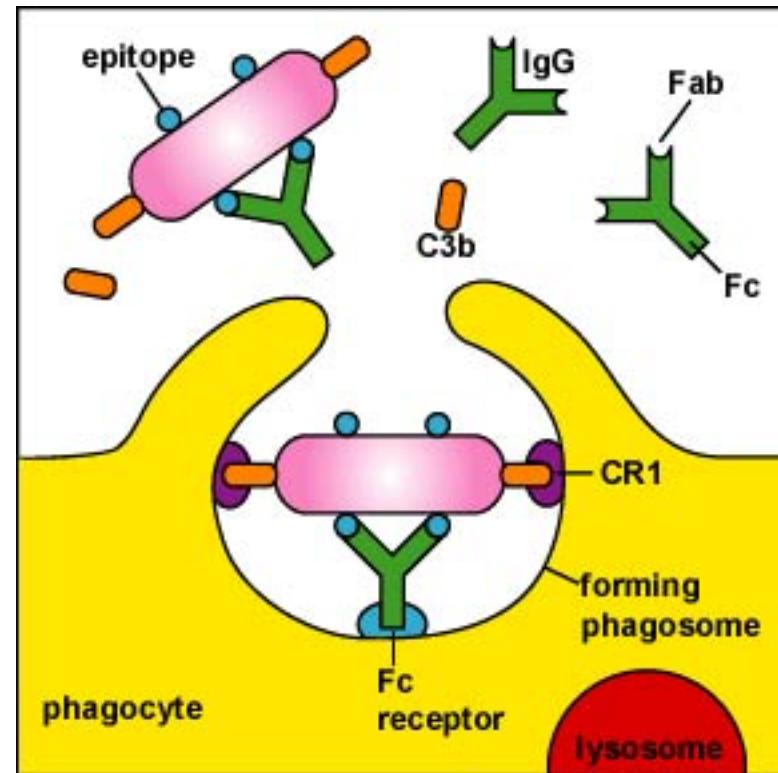
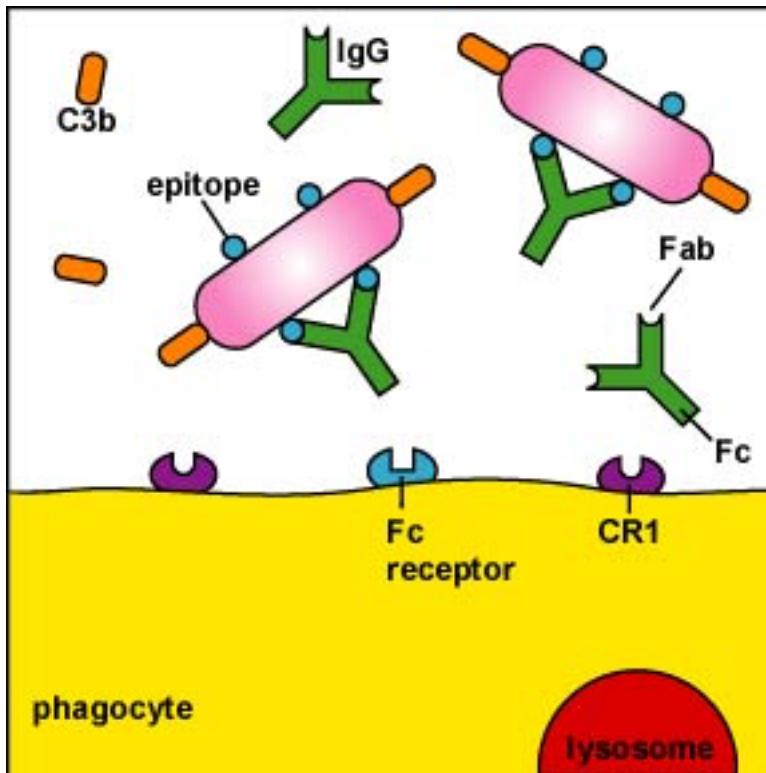


Figure 2.29 Janeway's Immunobiology, 8ed. (© Garland Science 2012)

Opsonization





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