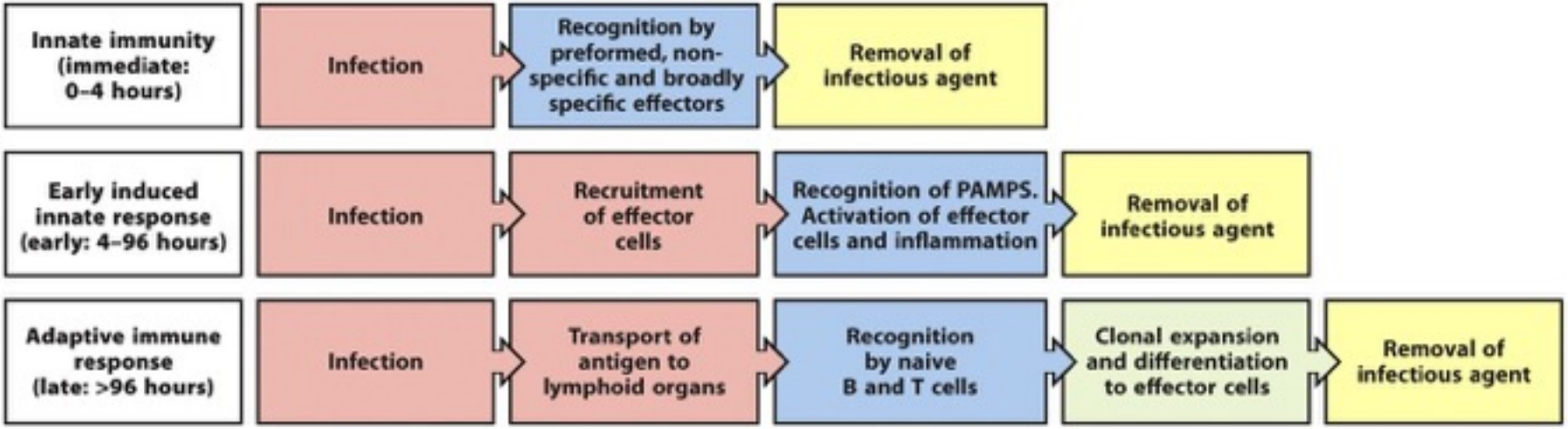
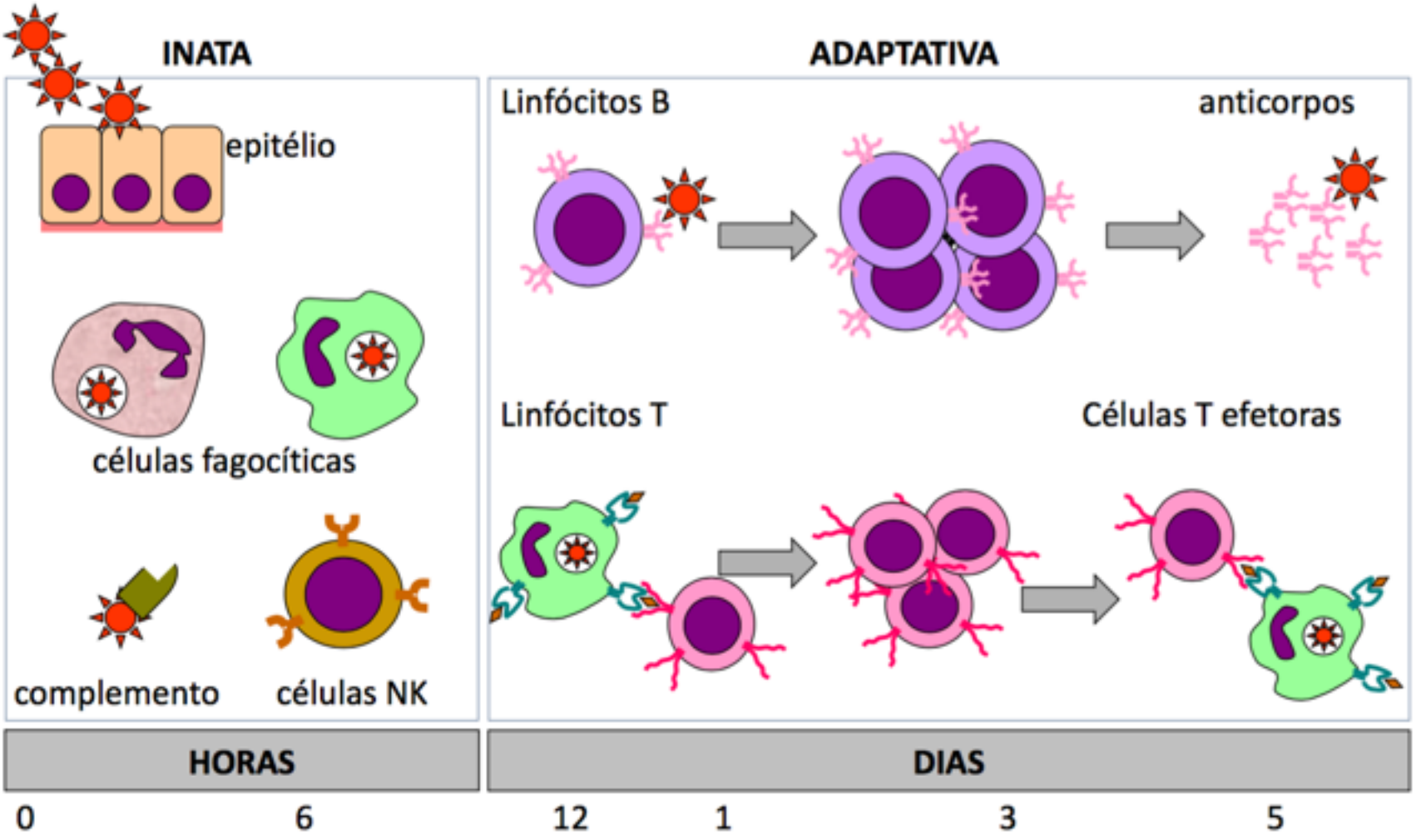



Figure 2.1 Janeway's Immunobiology, 8ed. (© Garland Science 2012)

conceito importante!

# TIPOS DE RESPOSTA



# As moléculas do Complexo de Histocompatibilidade Principal (MHC) identificam as “famílias"

# O MHC é polimórfico e poligênico

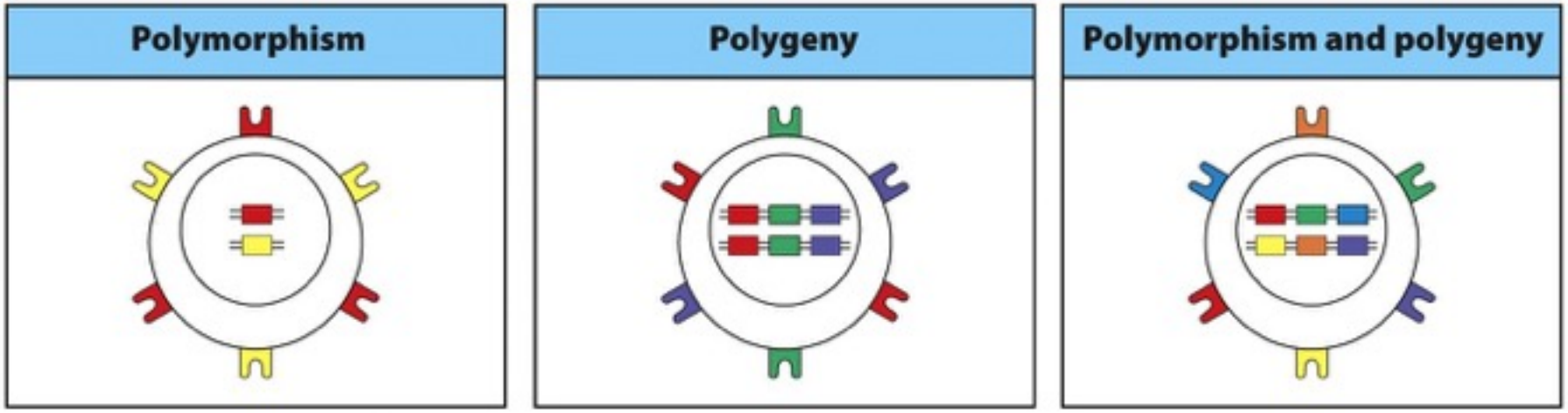



Figure 6.17 Janeway's Immunobiology, 8ed. (© Garland Science 2012)

# MHC classe I

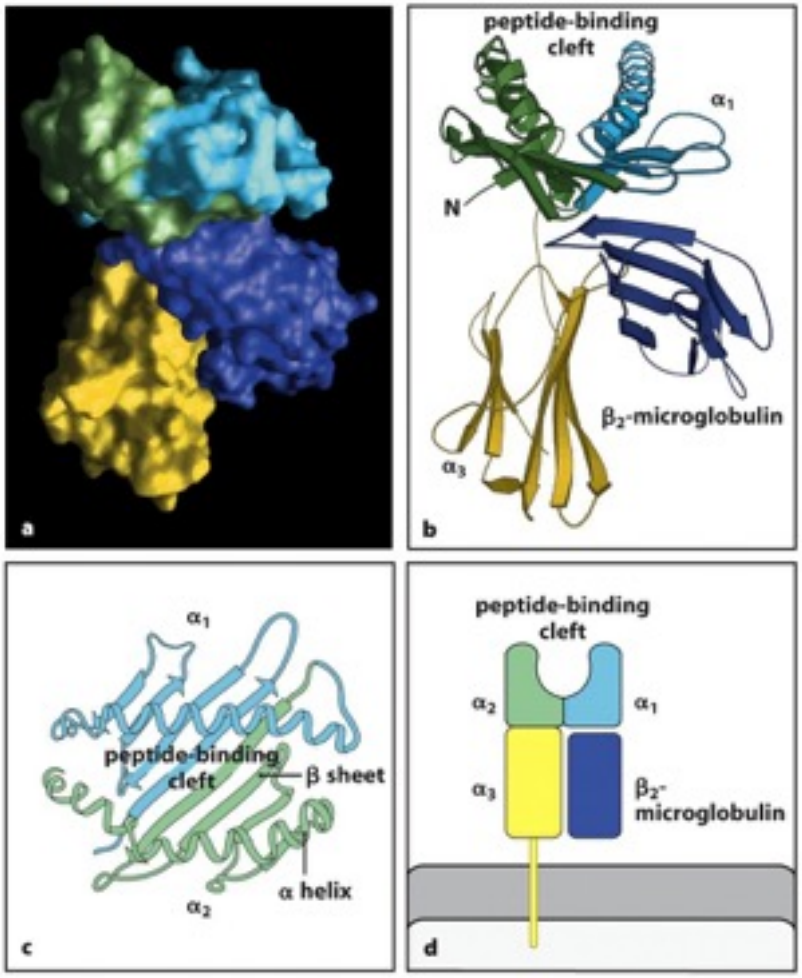
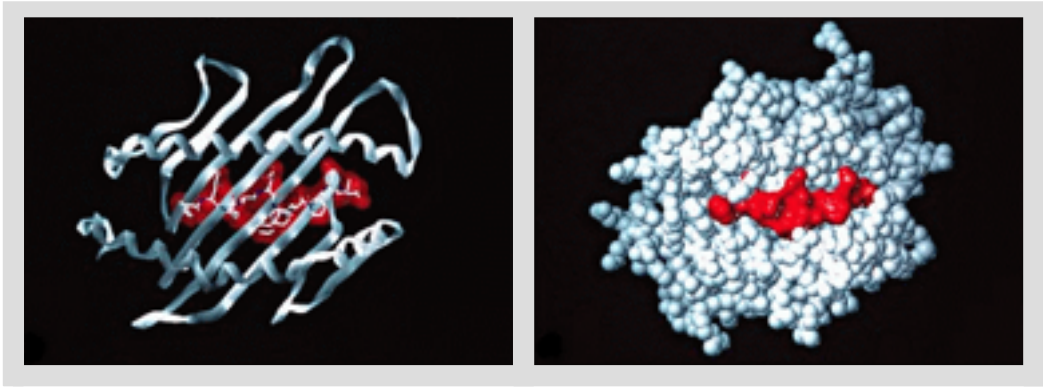
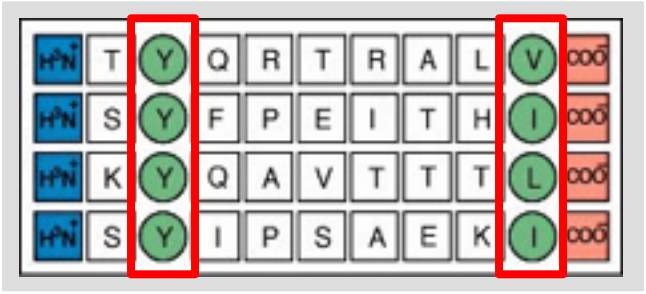
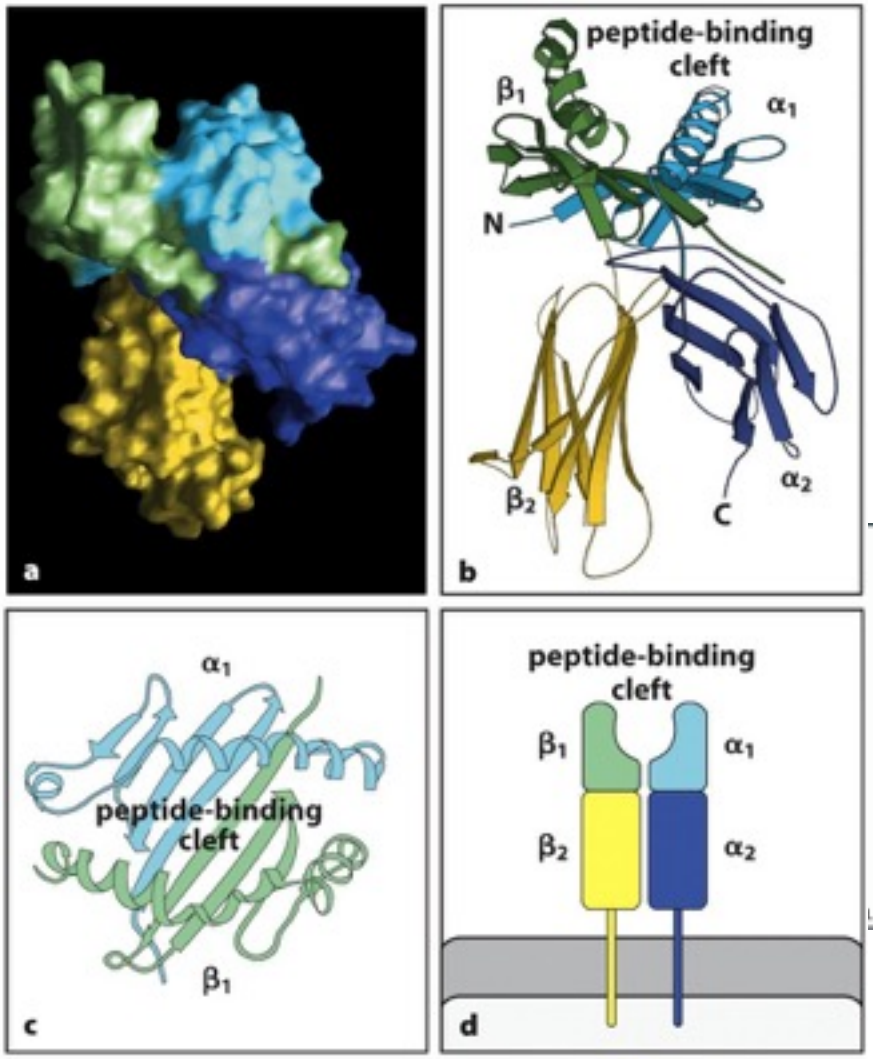



Figure 4.15 Janeway's Immunobiology, 8ed. (© Garland Science 2012)





# MHC classe II



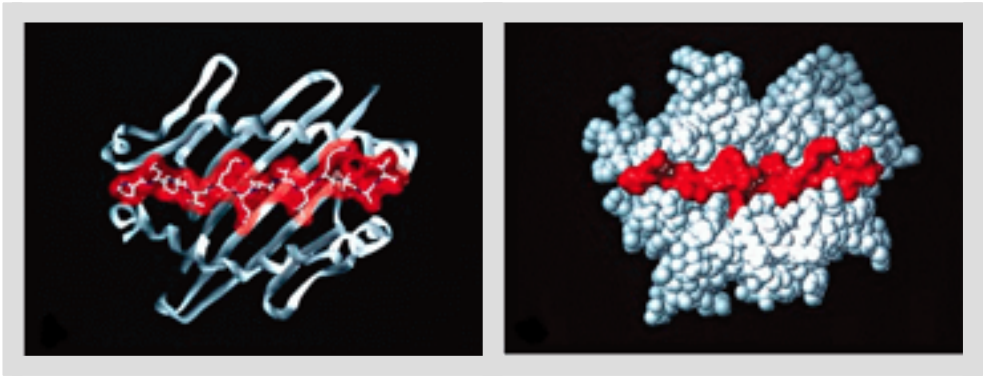




Figure 4.16 Janeway's Immunobiology, 8ed. (© Garland Science 2012)

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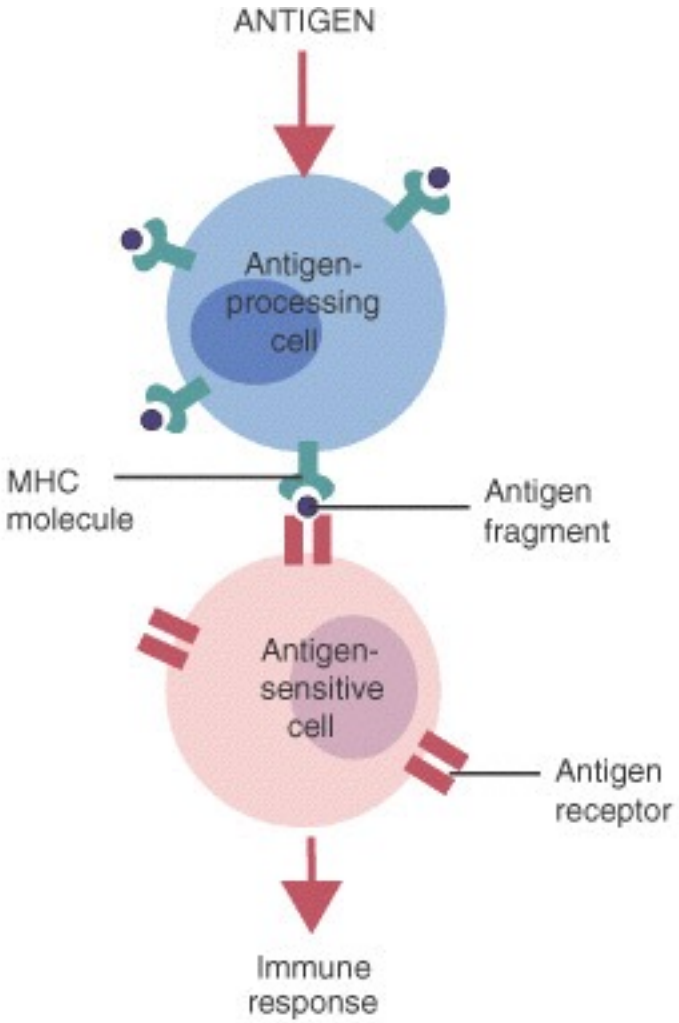


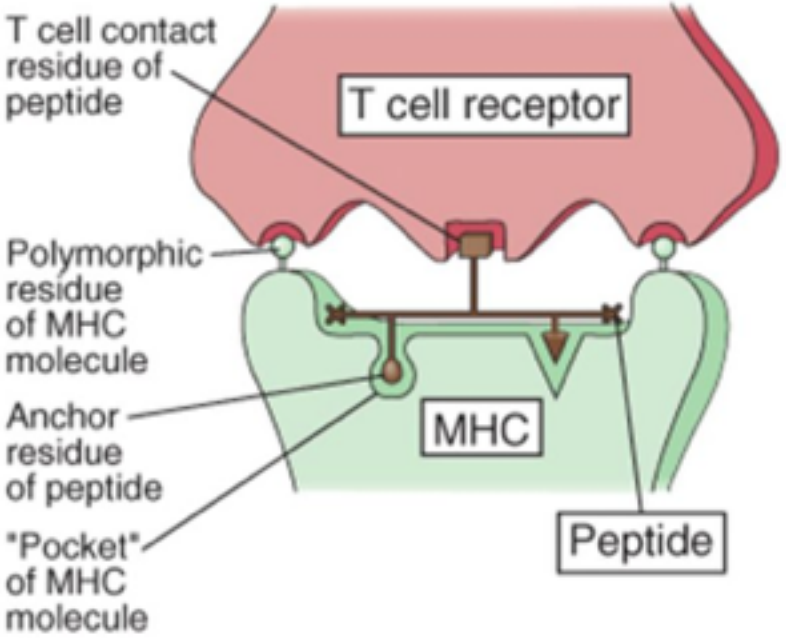




**FIGURE 9-1** The key initial step in any immune response is the presentation of antigens by antigen-processing cells to antigen-sensitive cells. This step is performed by major histocompatibility complex *(MHC)* molecules located on the surface of antigen-processing cells.

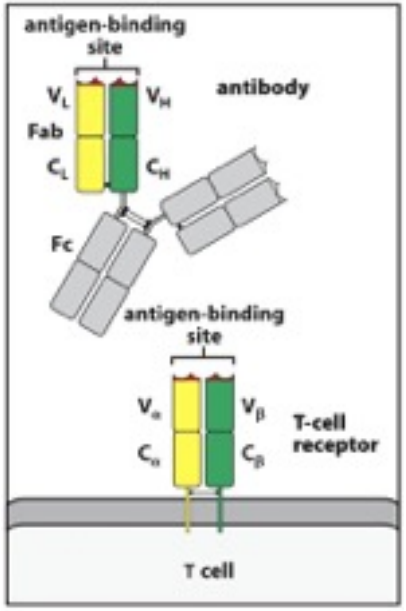



Figure 4.11 Janeway's Immunobiology, 8ed. (© Garland Science 2012)

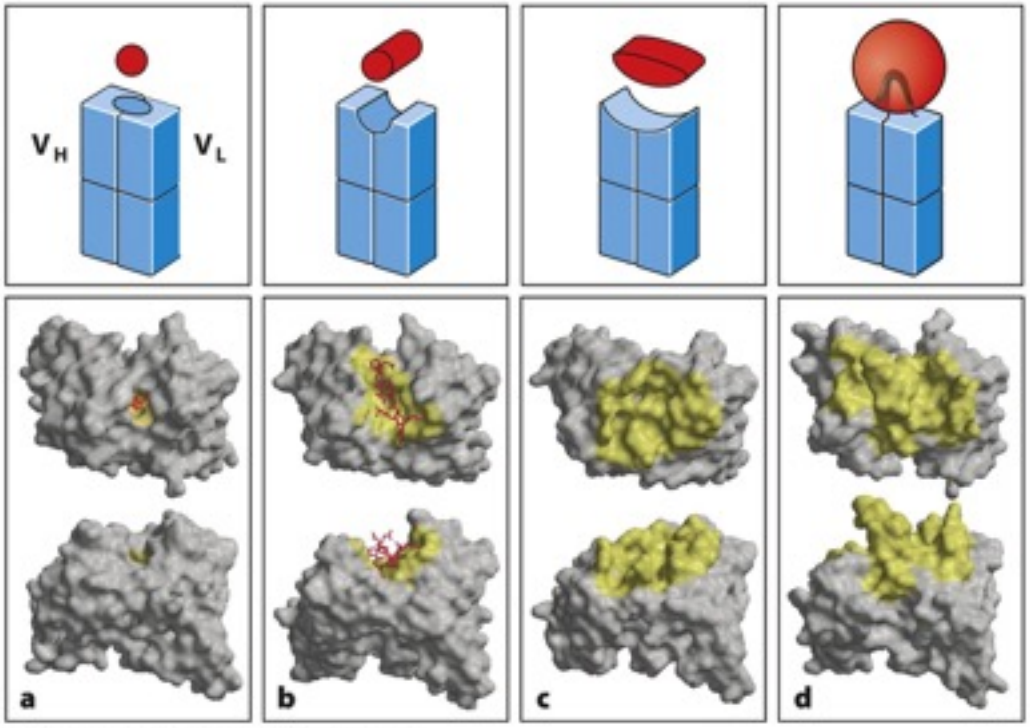
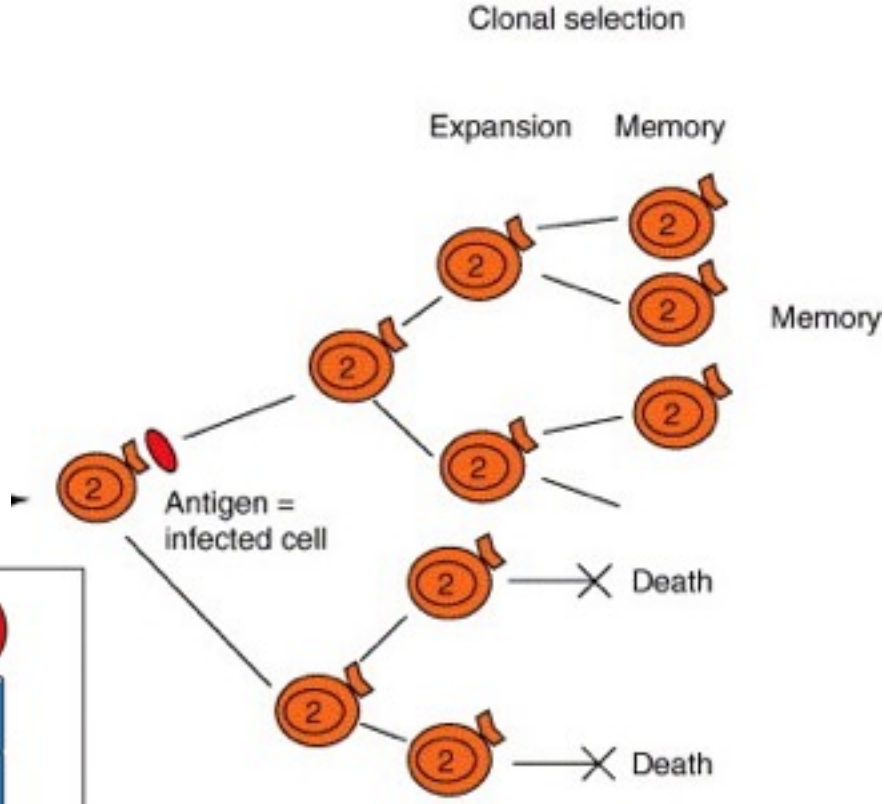



Figure 4.8 Janeway's Immunobiology, 8ed. (© Garland Science 2012)




TRENDS in Ecology & Evolution

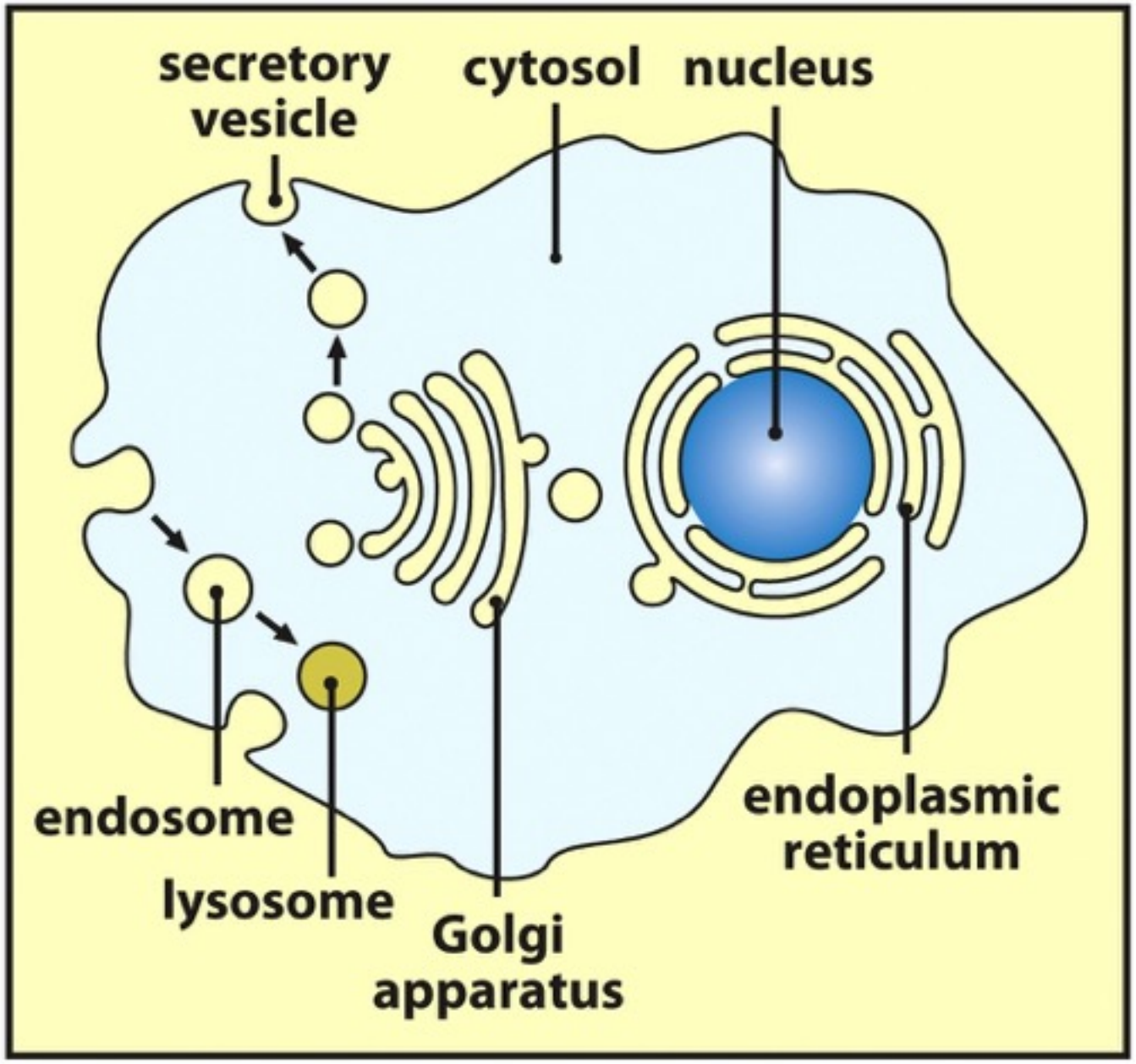



Figure 6.1 Janeway's Immunobiology, 8ed. (© Garland Science 2012)

# Apresentação de Antígeno via MHC classe I

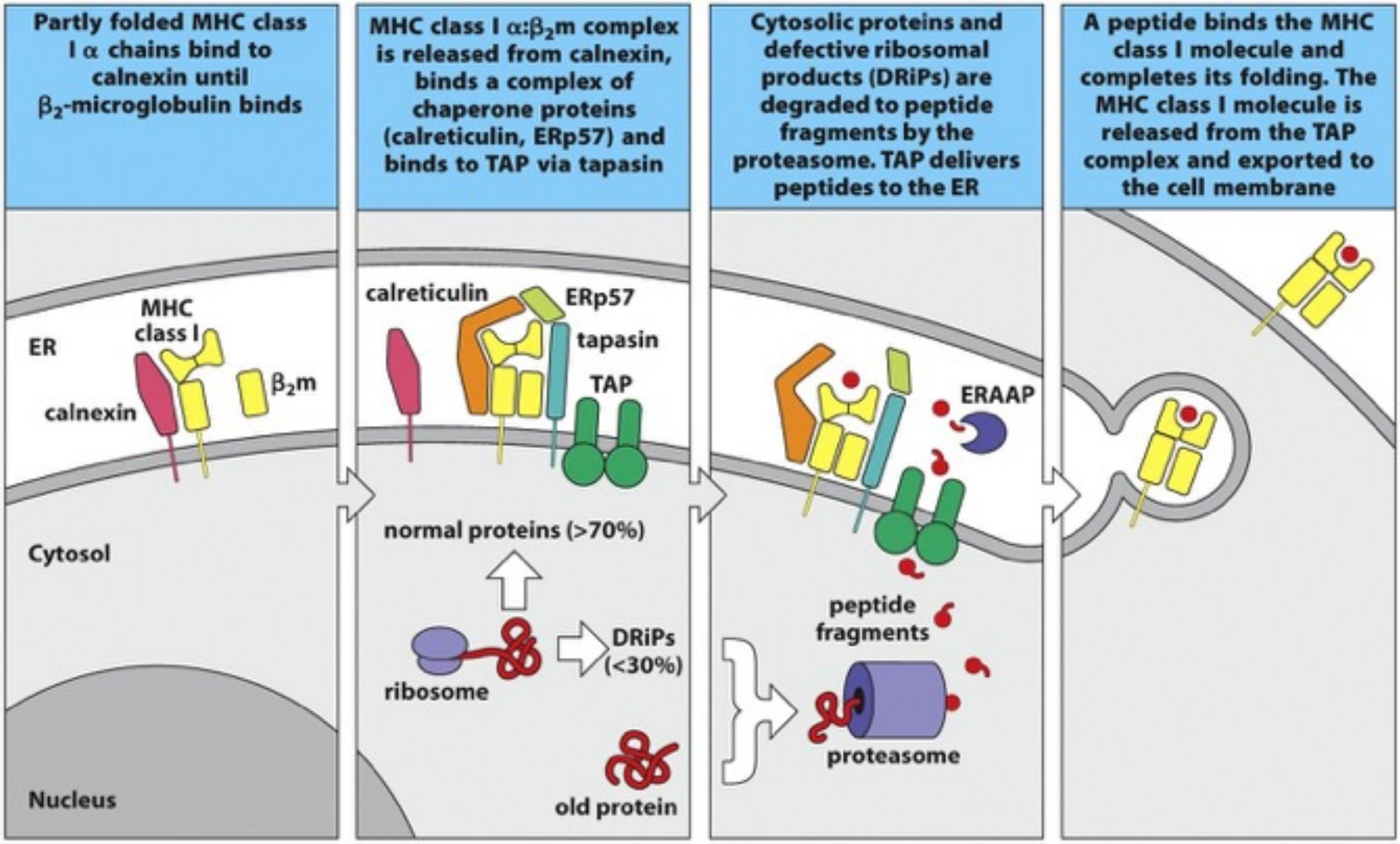



Figure 6.5 Janeway's Immunobiology, 8ed. (© Garland Science 2012)

# Apresentação de Antígeno via MHC classe II…

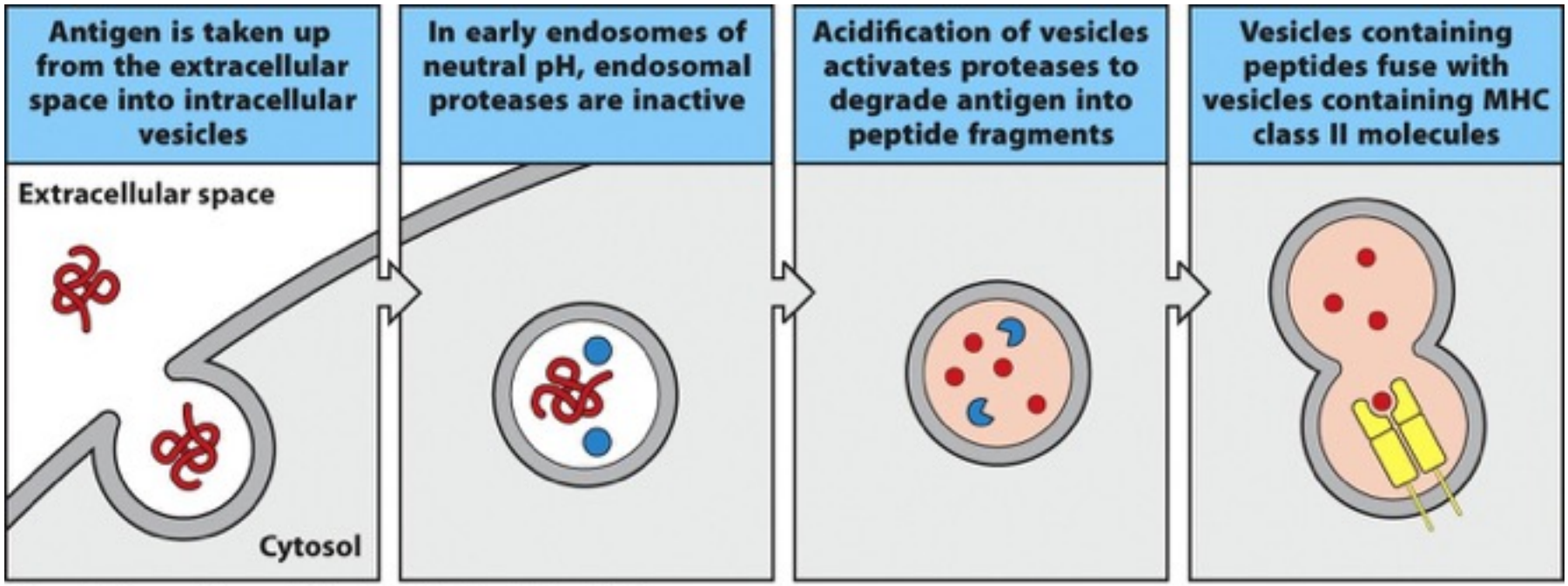



Figure 6.9 Janeway's Immunobiology, 8ed. (© Garland Science 2012)

# … apresentação de Antígeno via MHC classe II

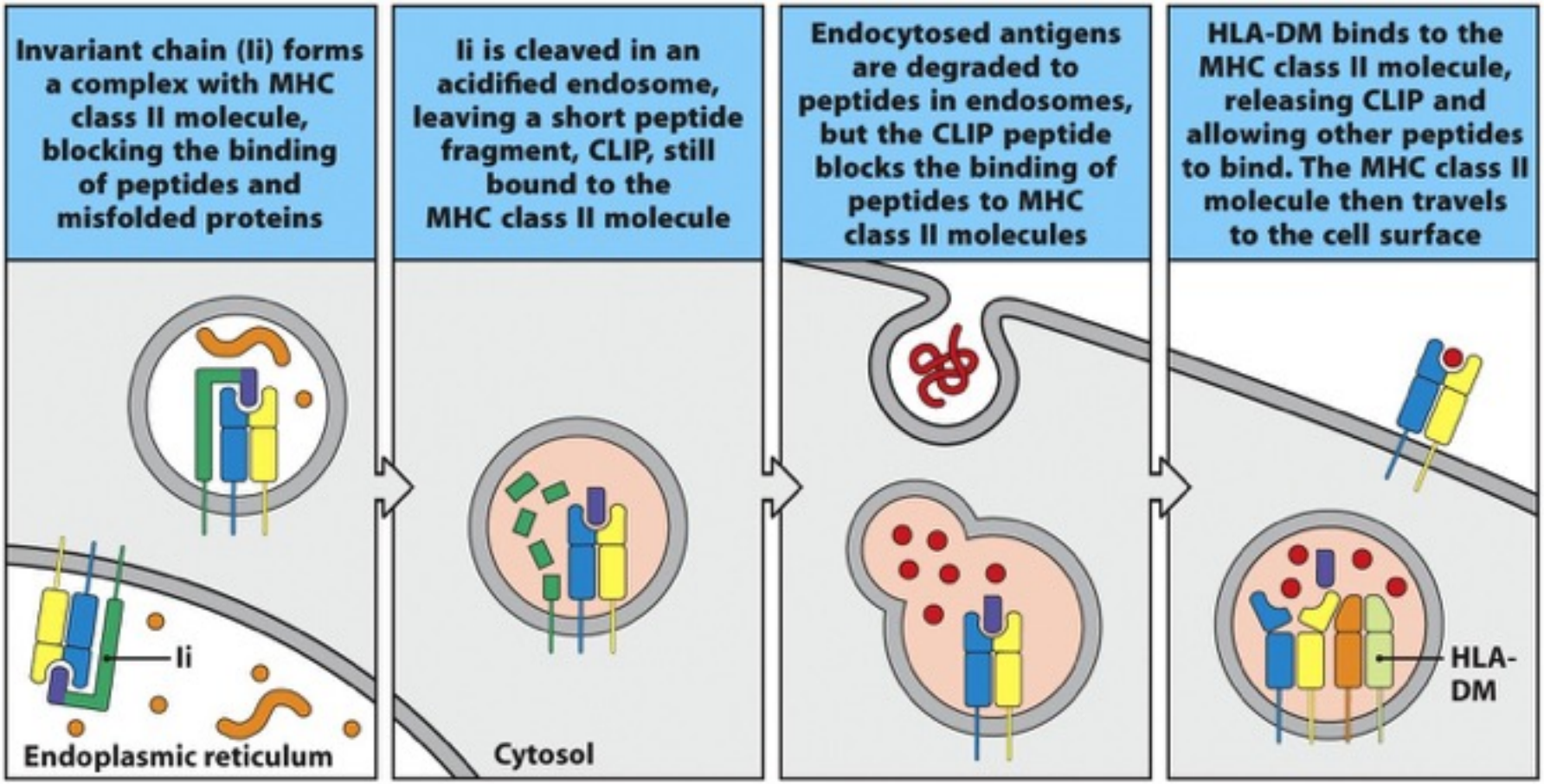



Figure 6.12 Janeway's Immunobiology, 8ed. (© Garland Science 2012)

# Apresentação Cruzada

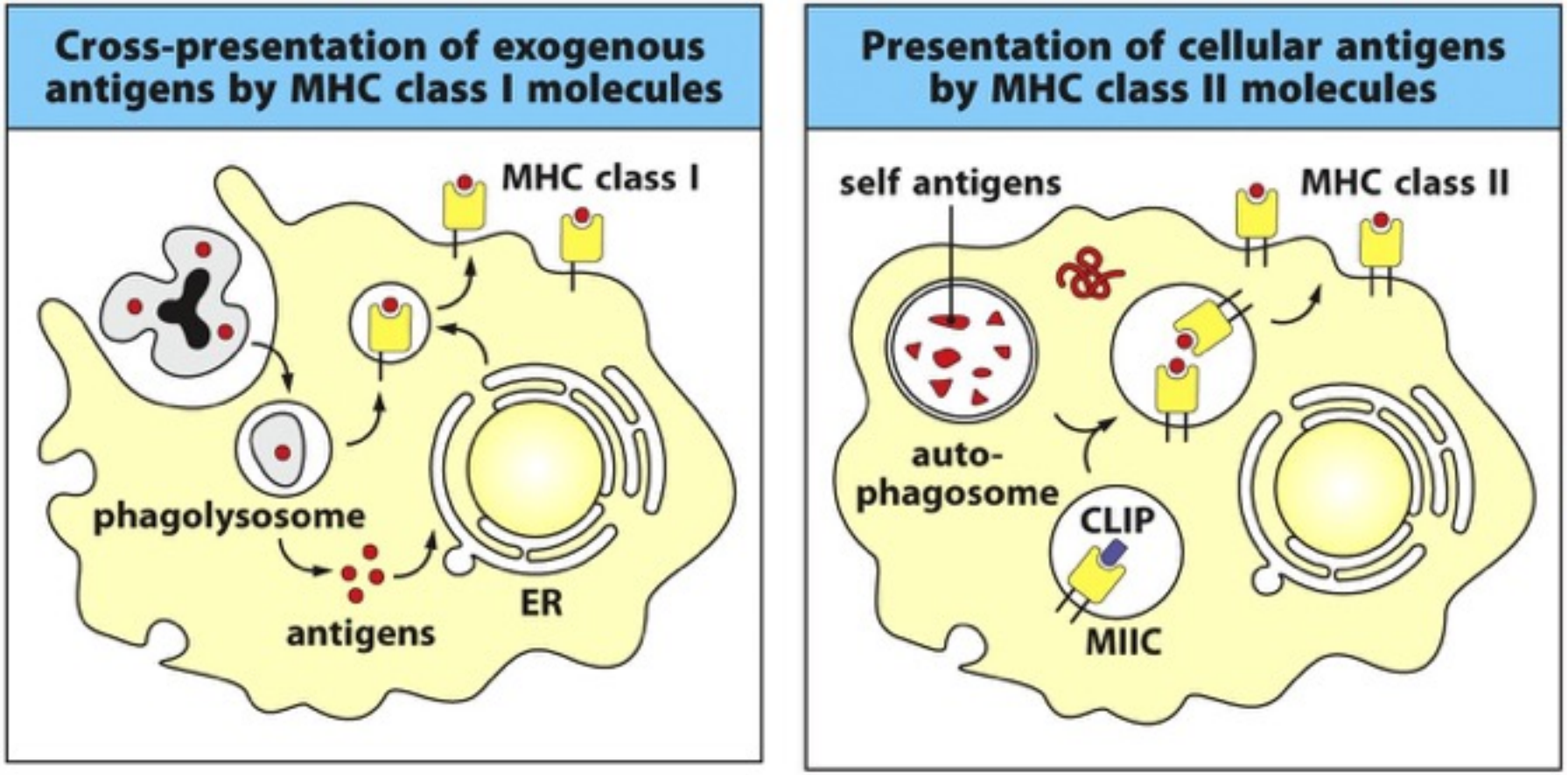



Figure 6.13 Janeway's Immunobiology, 8ed. (© Garland Science 2012)

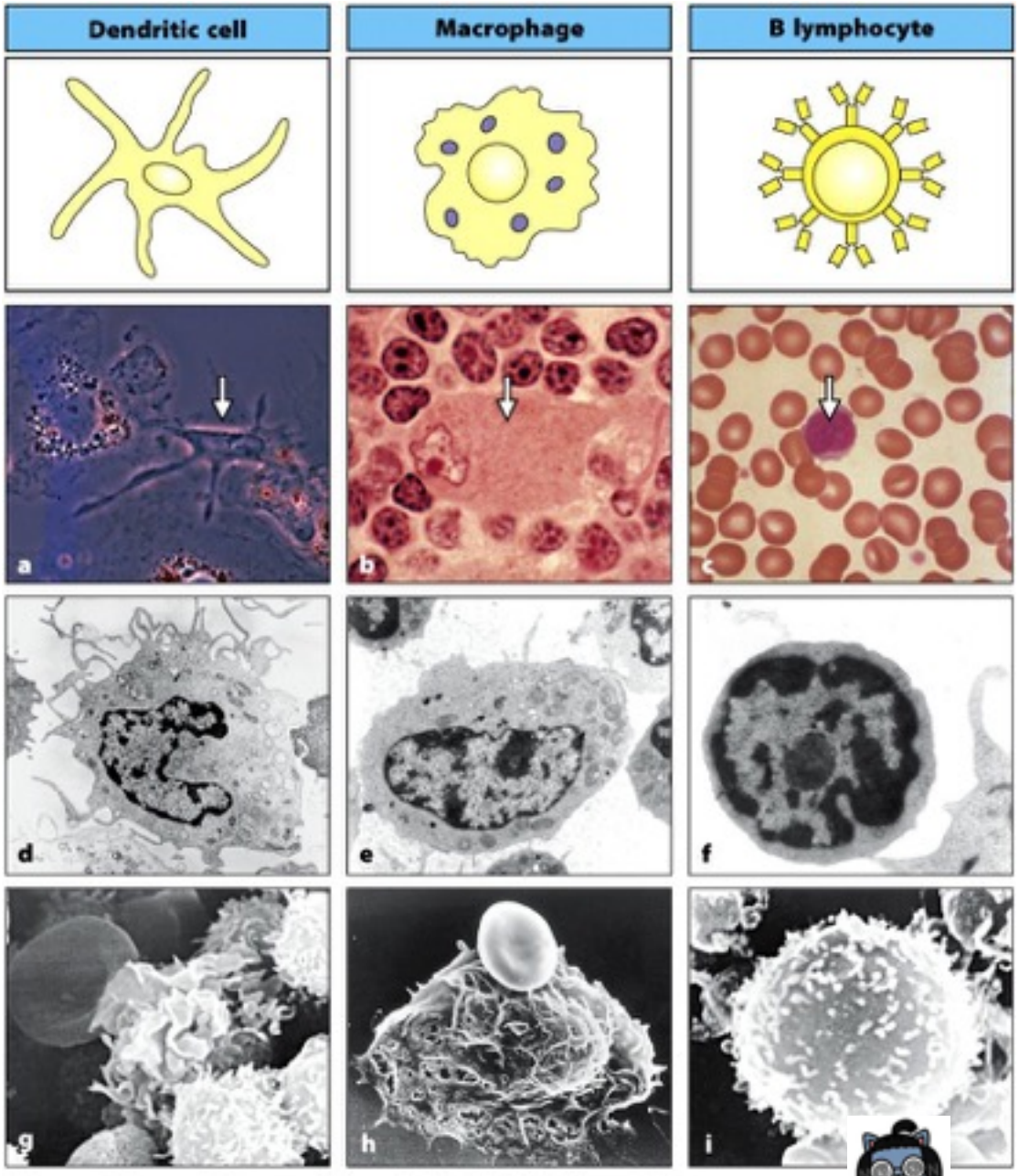



Figure 1.22 Janeway's Immunobiology, 8ed. (© Garland Science 2012)

Antigen
Presenting
Cell

conceito importante!

profissional

semi-profissional

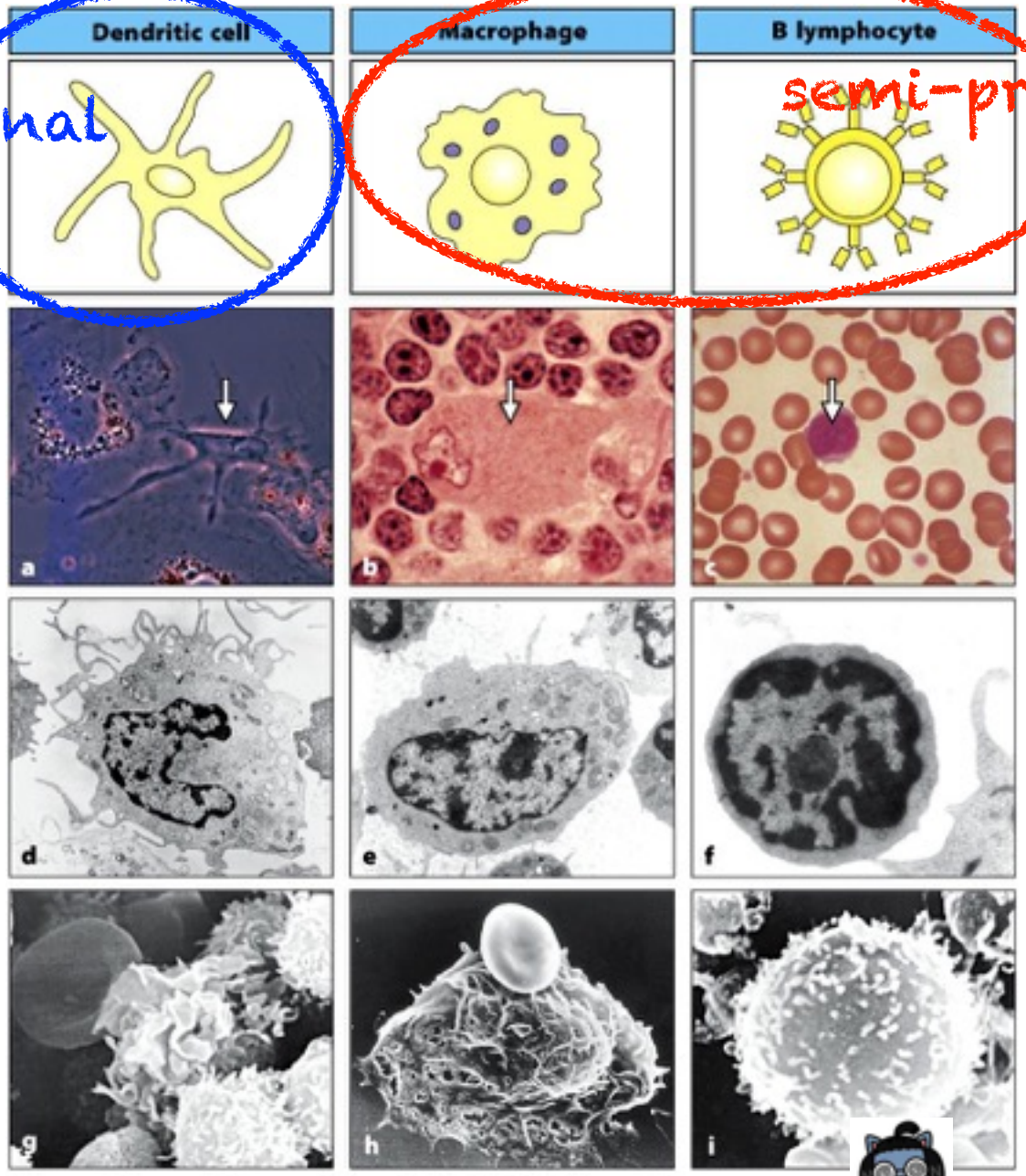



Figure 1.22 Janeway's Immunobiology, 8ed. (© Garland Science 2012)

**lisossomos pH alcalino**

**proteases ineficientes**

**proteólise incompleta**

Antigen Presenting Cell

**lisossomos pH ácido**

**proteases eficientes**

**proteólise completa**

conceito importante!

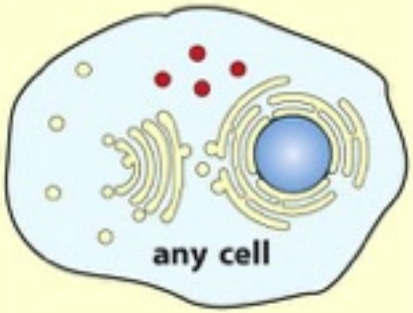
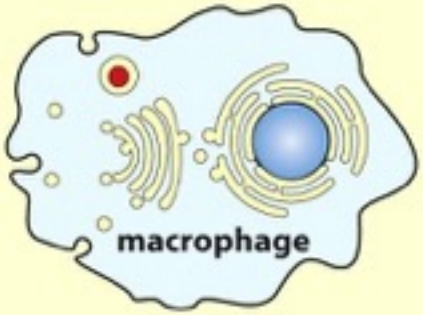
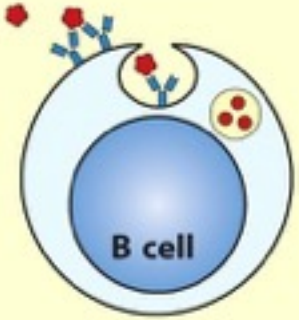
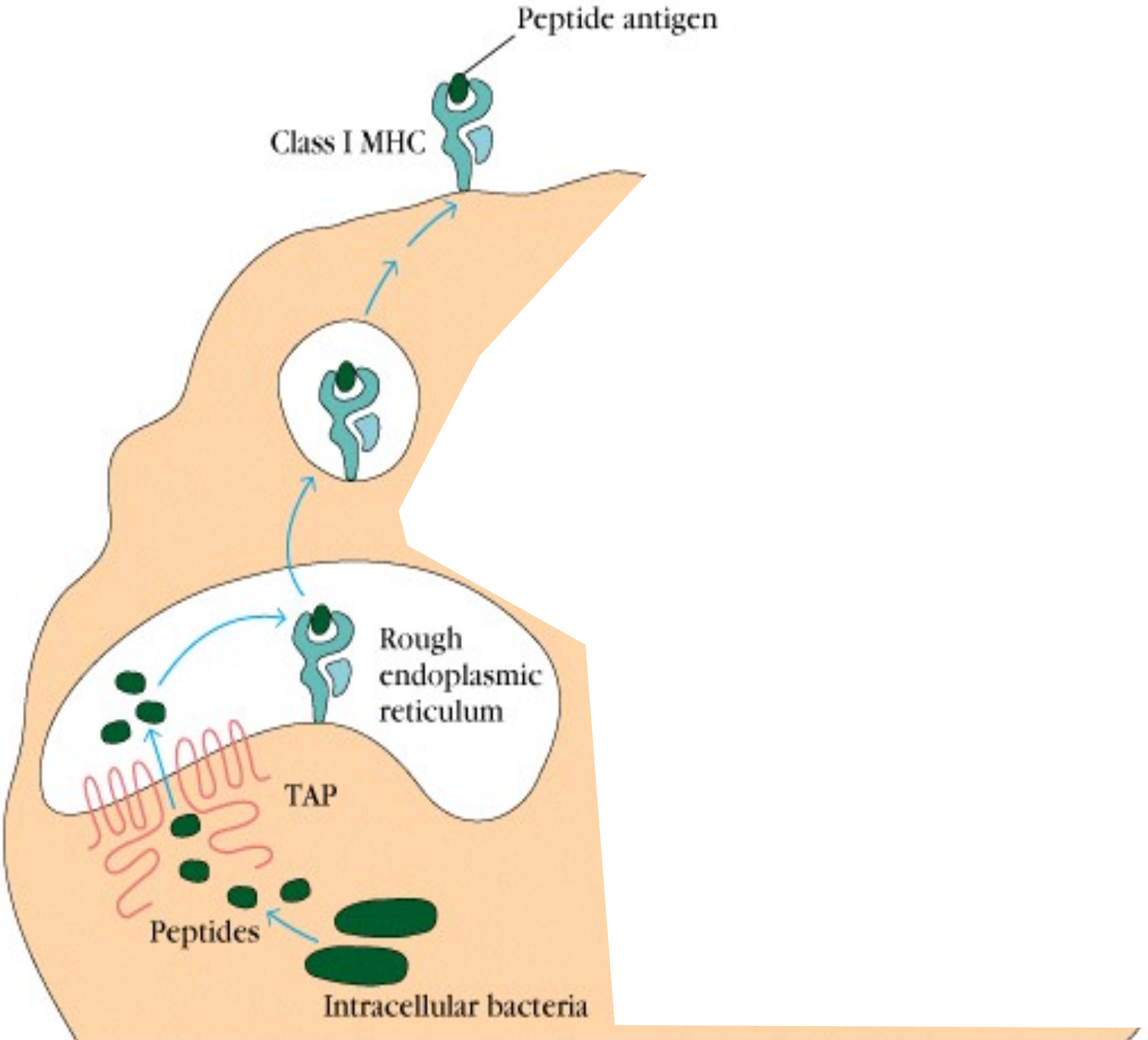
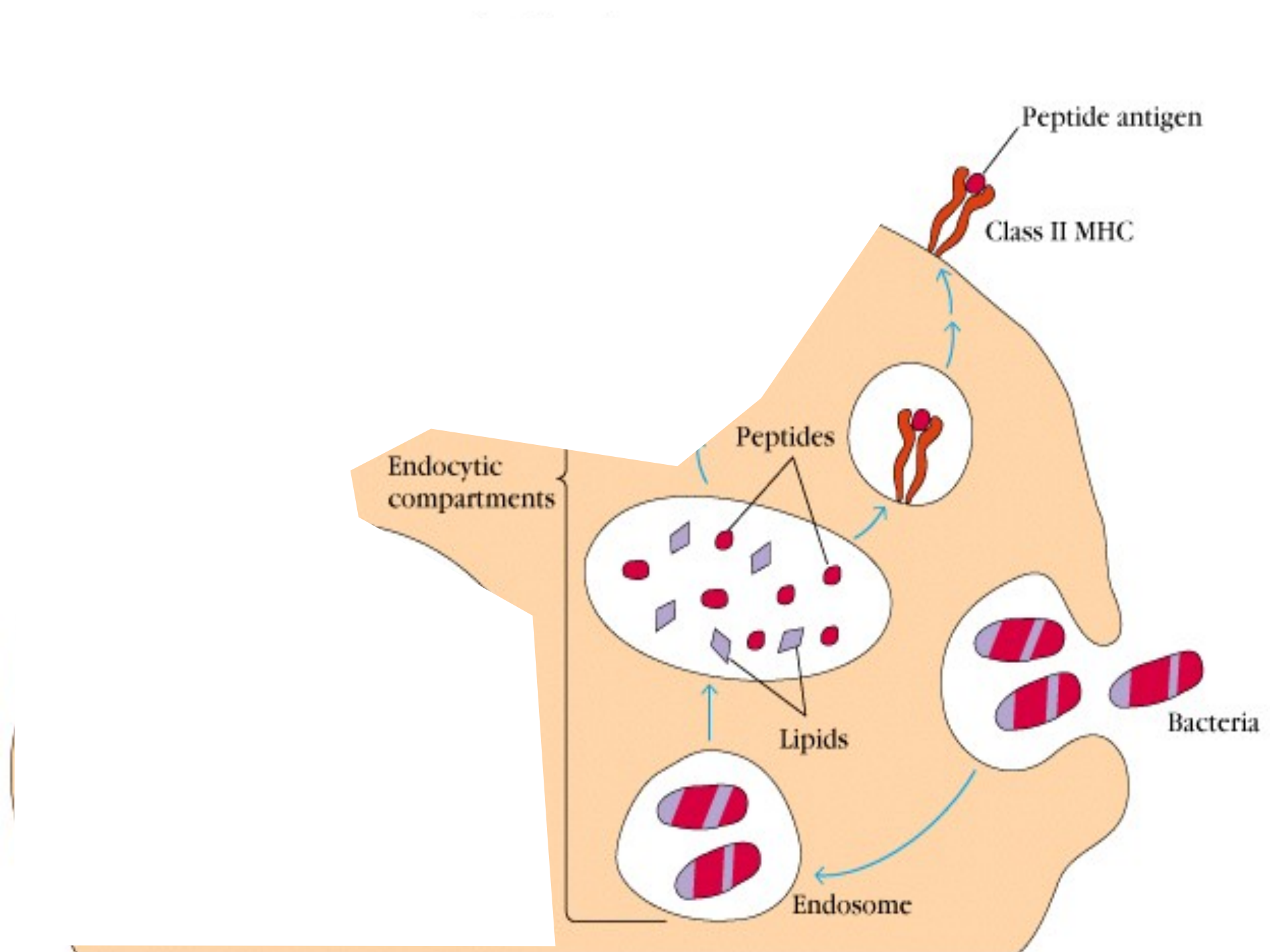
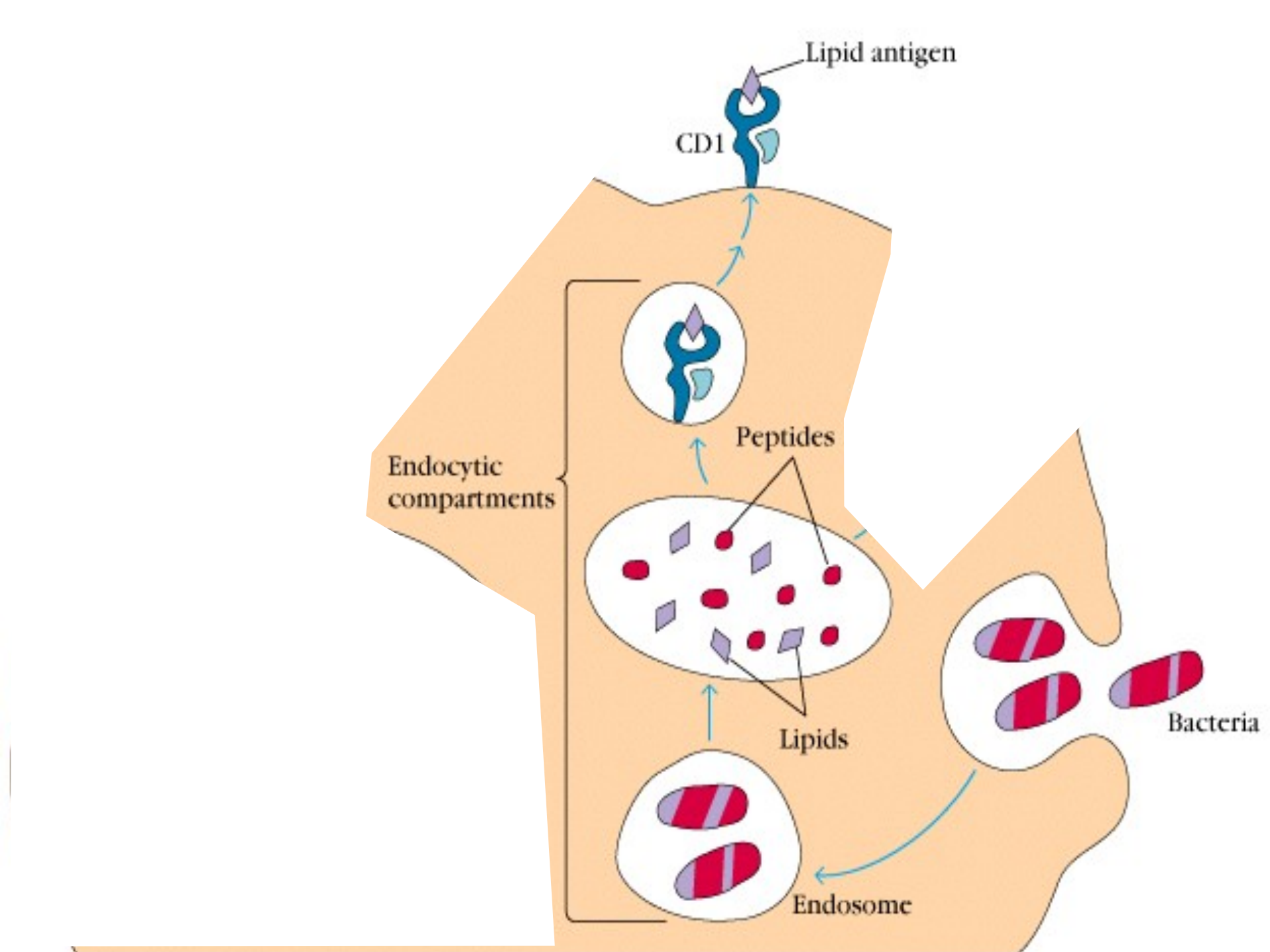
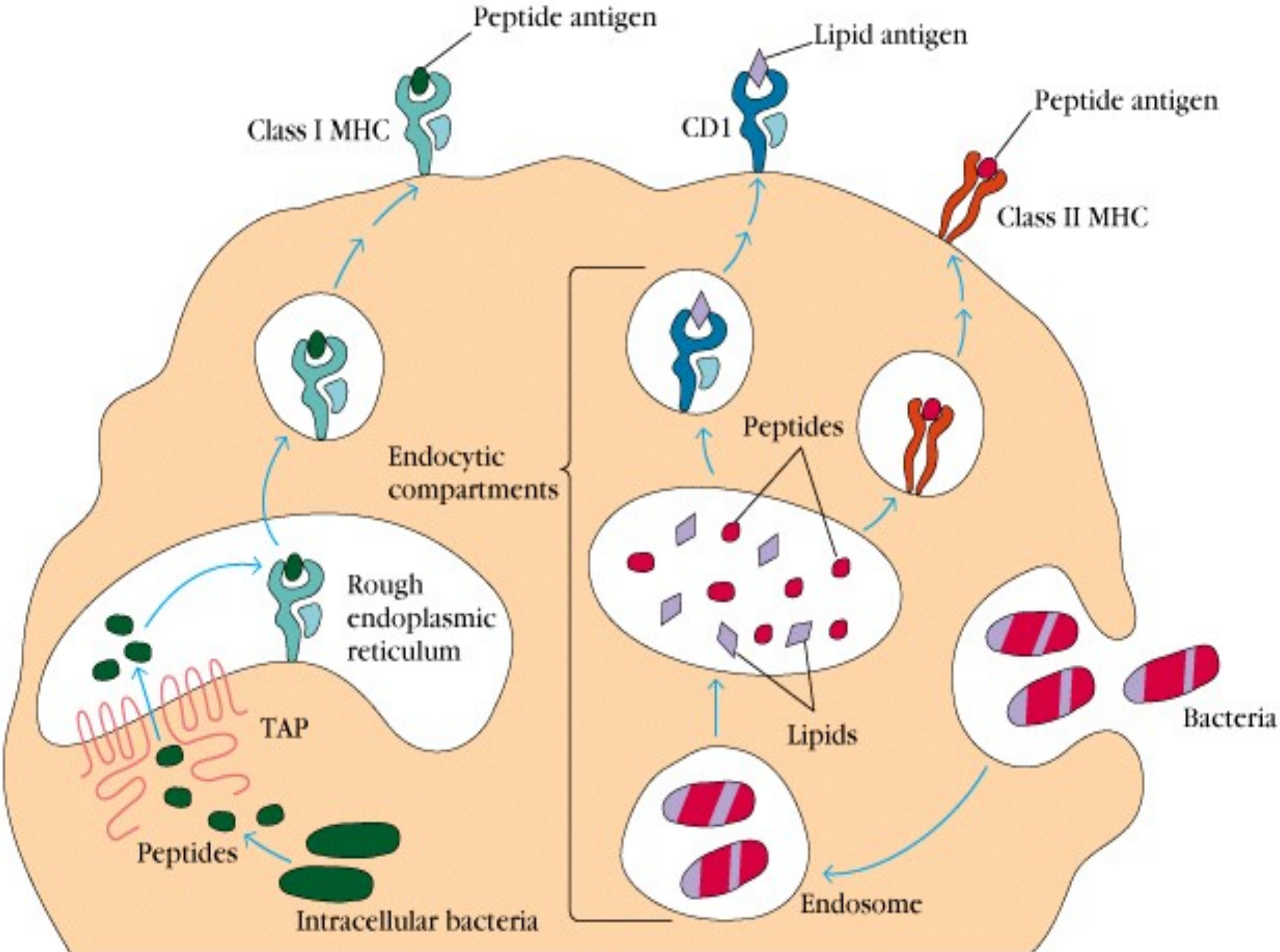
| | Cytosolic pathogens | Intravesicular pathogens | Extracellular pathogens and toxins |
|---|---|---|---|
| |   |   |   |
| Degraded in | Cytosol | Endocytic vesicles (low pH) | Endocytic vesicles (low pH) |
| Peptides bind to | MHC class I | MHC class II | MHC class II |
| Presented to | Effector CD8 T cells | Effector CD4 T cells | Effector CD4 T cells |
| Effect on presenting cell | Cell death | Activation to kill intravesicular bacteria and parasites | Activation of B cells to secrete Ig to eliminate extracellular bacteria/toxins |

Figure 6.2 Janeway's Immunobiology, 8ed. (© Garland Science 2012)


Peptide antigen
Class I MHC
Rough endoplasmic reticulum
TAP
Peptides
Intracellular bacteria


Peptide antigen
Class II MHC
Peptides
Endocytic compartments
Lipids
Bacteria
Endosome


Lipid antigen
CD1
Peptides
Endocytic compartments
Lipids
Bacteria
Endosome


Peptide antigen
Lipid antigen
Peptide antigen
Class I MHC
CD1
Class II MHC
Endocytic compartments
Peptides
Rough endoplasmic reticulum
TAP
Lipids
Bacteria
Peptides
Intracellular bacteria
Endosome


PLAYTIME
RULES
SHARE YOUR TOYS
MAKE NEW FRIENDS
TAKE TURNS
LAUGH AND GIGGLE
TIDY UP AFTER YOURSELF
PLAY FUN GAMES
SAY PLEASE AND THANK YOU
NO FIGHTING
BE NICE TO EACH OTHER
HAVE FUN!

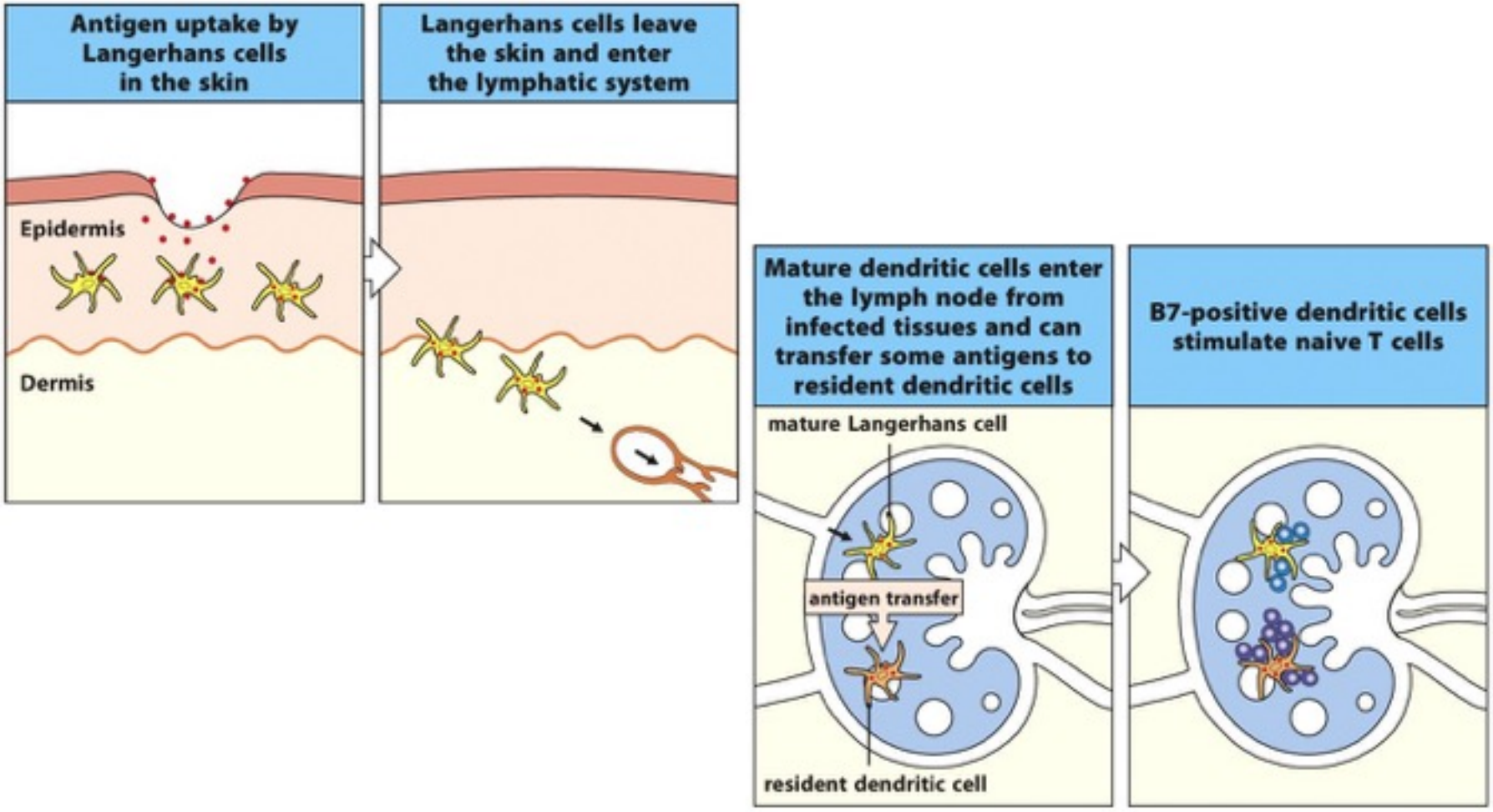



Figure 9.13 Janeway's Immunobiology, 8ed. (© Garland Science 2012)

RP

O tecido linfóide **secundário**

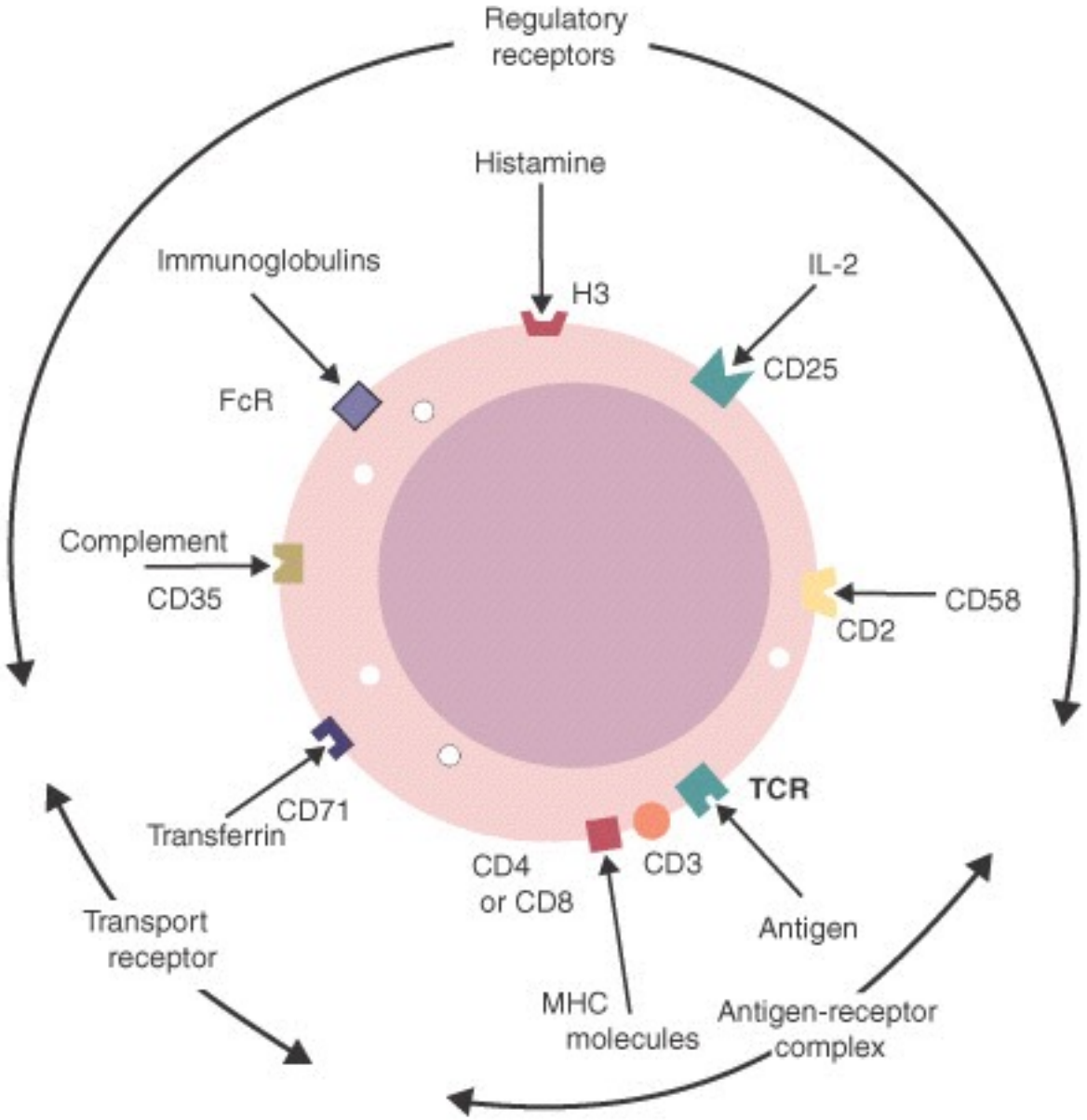



**FIGURE 11-8** Major surface receptors of T cells, their ligands, and their functions.

conceito importante!

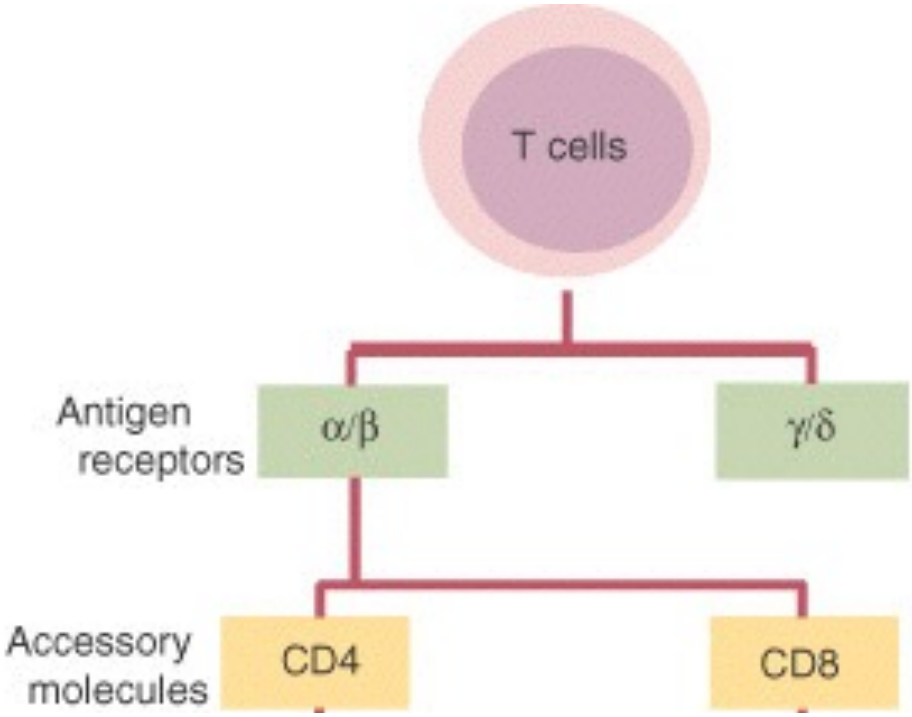



**FIGURE 12-2** T cells can be divided into many different subpopulations based on the antigen receptors they employ, on the accessory molecules that support their activity, and ultimately on their functions.

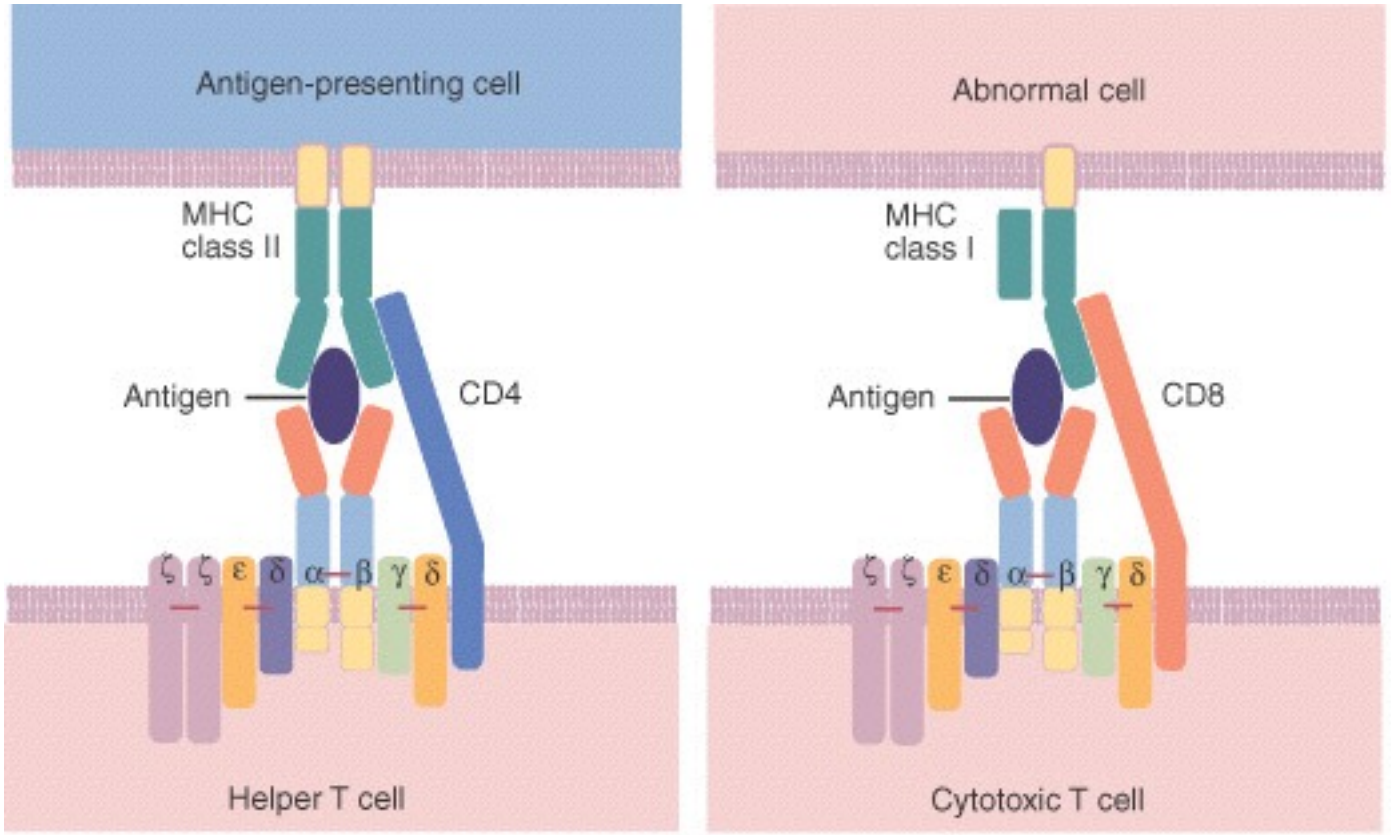
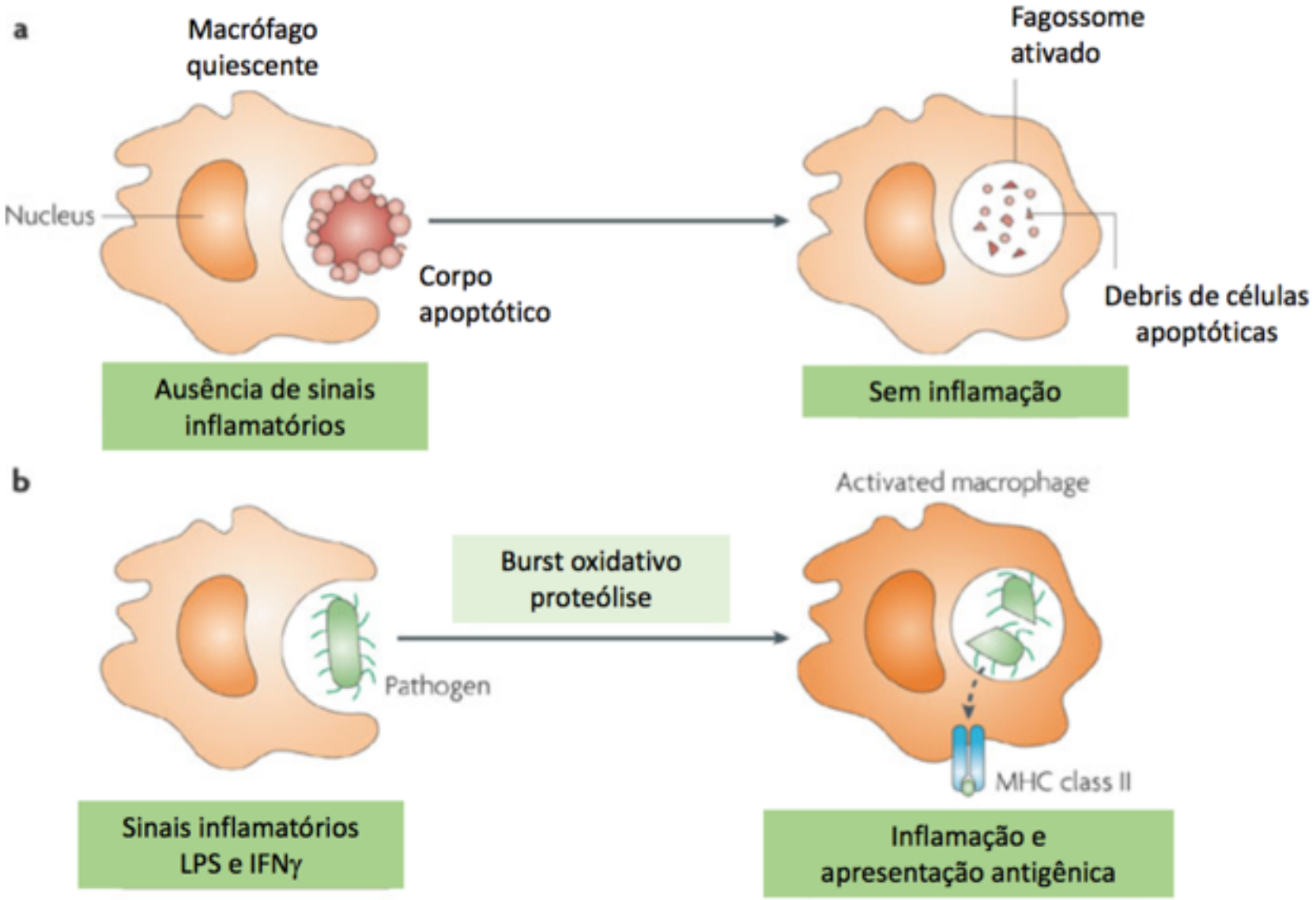



**FIGURE 12-5** Role of CD4 and CD8 in promoting T cell responses. These molecules link the T cell to the antigen-presenting cell, binding the two cells together and ensuring that an effective signal is transmitted between them. CD4 binds to major histocompatibility complex *(MHC)* class I molecules. This interaction is seen in Chapter 8, Figure 8-6, *A*.

# MACRÓFAGOS

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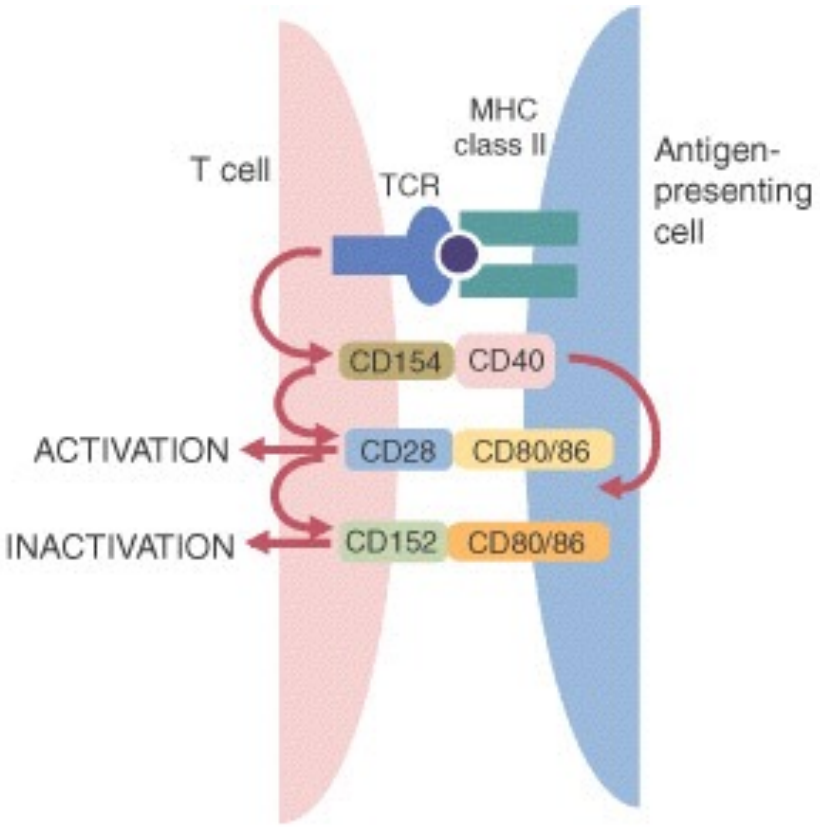


**FIGURE 12-6** Antigen-presenting cells and helper T cells engage in a dialog. Thus binding of antigen to the T cell antigen receptor *(TCR)* causes the T cell to express CD40 ligand *(CD154)*. This engages CD40 on the antigen-presenting cell. As a result, CD28 and CD152 are expressed on the T cell and CD80 or CD86 is expressed on the antigen-presenting cell. Depending on which receptors are engaged, the T cell may be stimulated or suppressed.

# Sinapse Imunológica

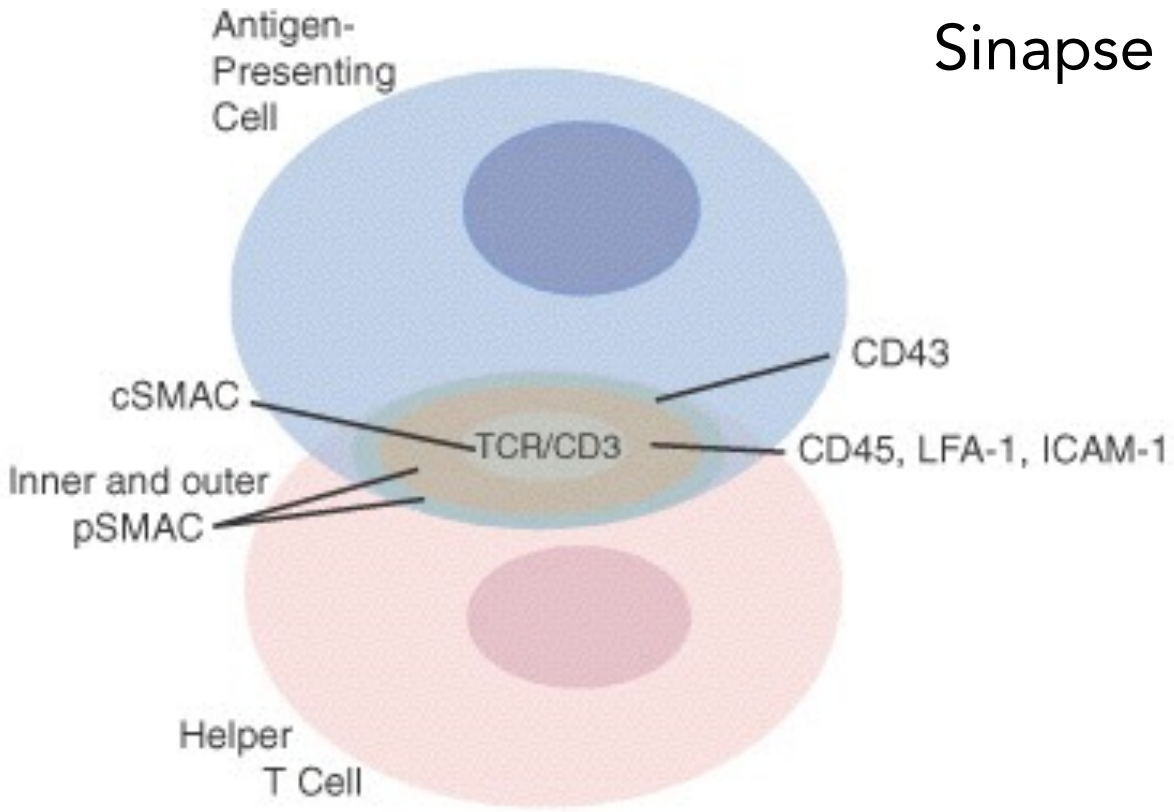


**FIGURE 12-7** Interaction between a T cell and an antigen-presenting cell generated the supramolecular structure called an immunological synapse. Thus a series of concentric rings forms around the interacting T cell antigen receptor–major histocompatibility complex. These rings contain different co-stimulating molecules.

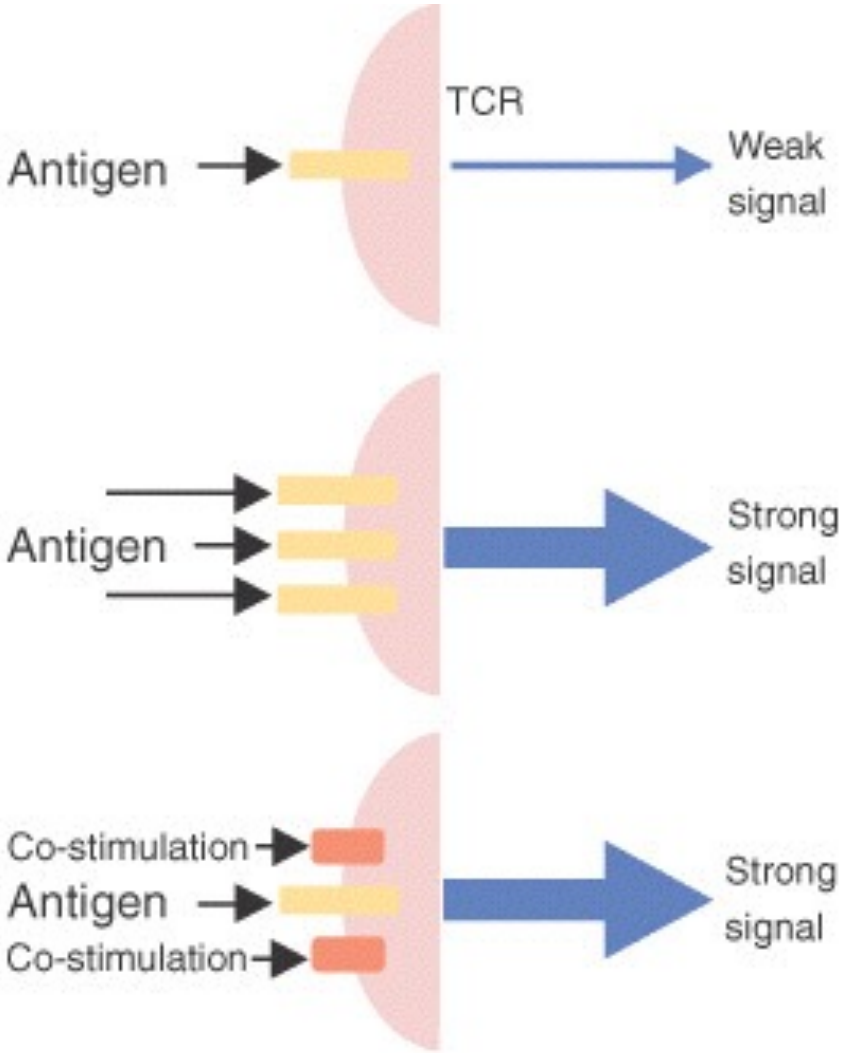


**FIGURE 12-10** Successful stimulation of a T cell requires multiple signals. Depending on the antigen, the T cell may be activated by signals from multiple T cell antigen receptors *(TCR)* or by appropriate co-stimulation.

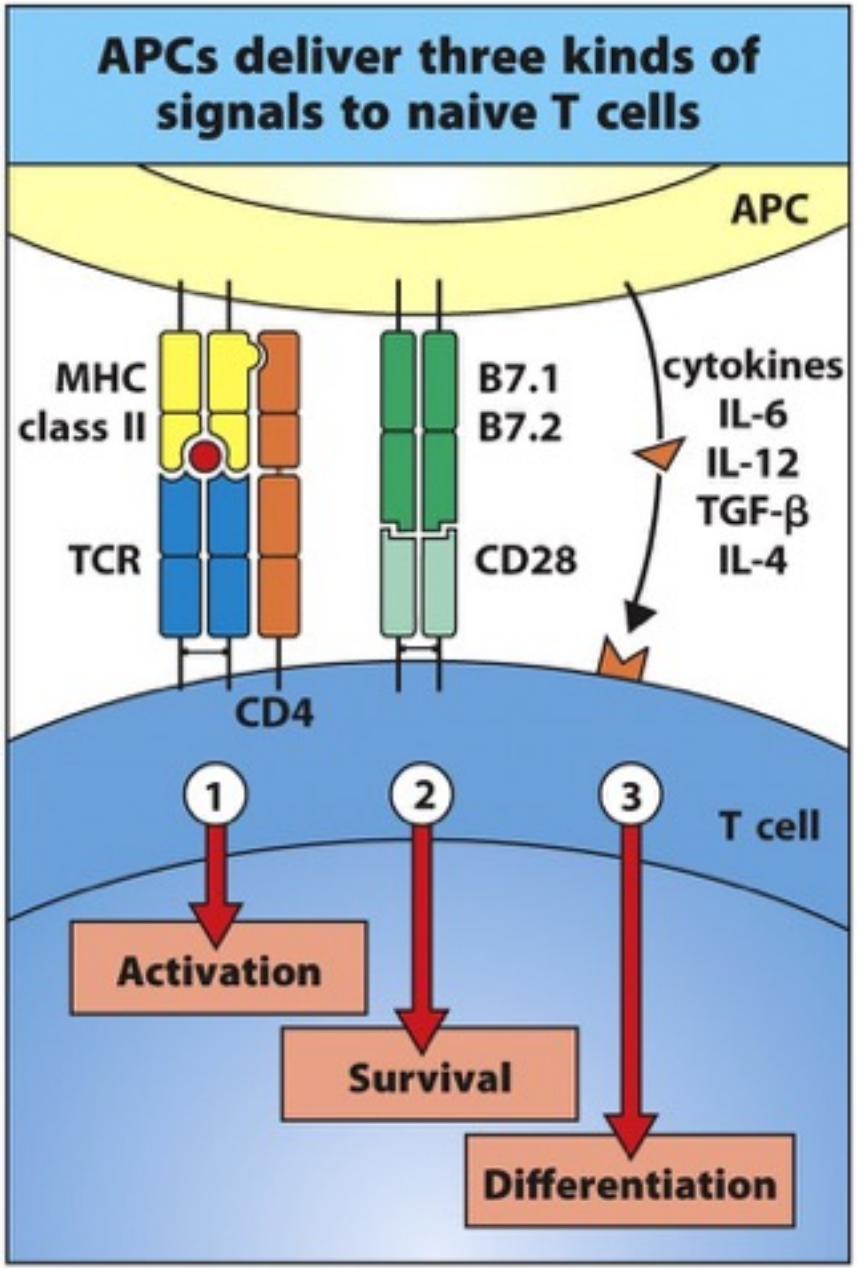


Figure 9.19 Janeway's Immunobiology, 8ed. (© Garland Science 2012)

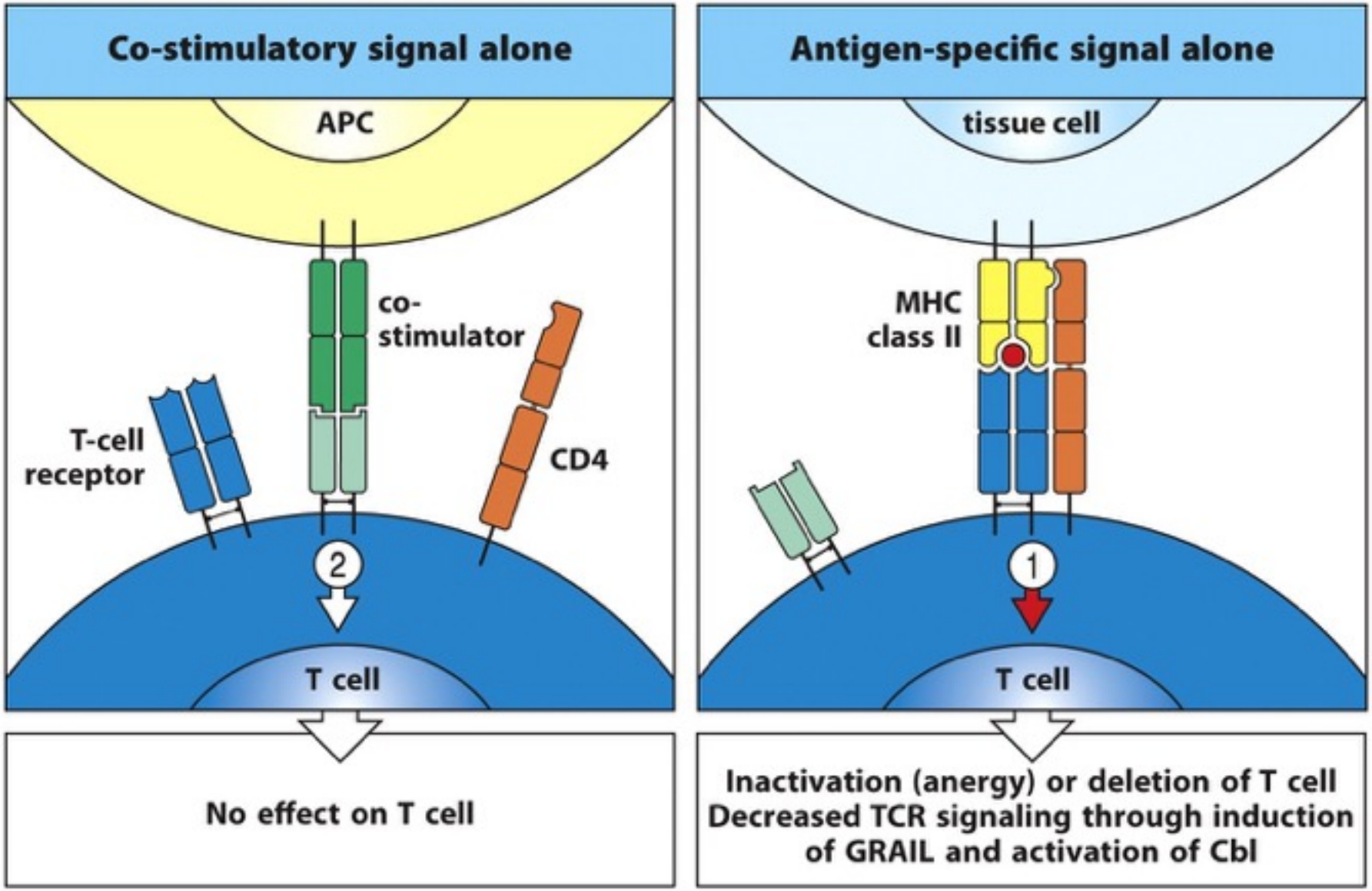


Figure 9.23 Janeway's Immunobiology, 8ed. (© Garland Science 2012)

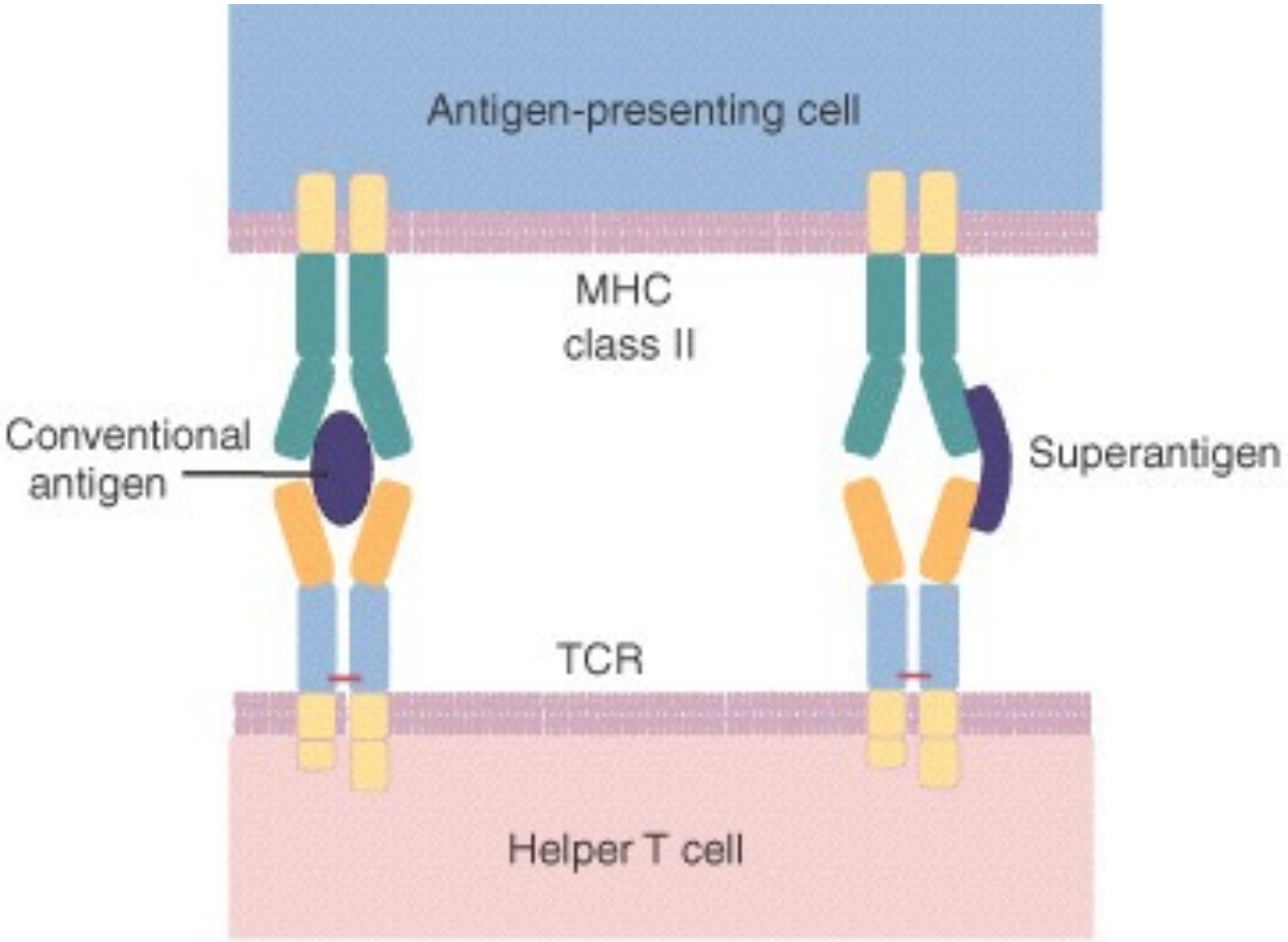


**FIGURE 12-11** Differences in binding to a T cell antigen receptor *(TCR)* between a conventional antigenic peptide that fills the groove between the α and β chains as opposed to a superantigen that binds only to the β chain.

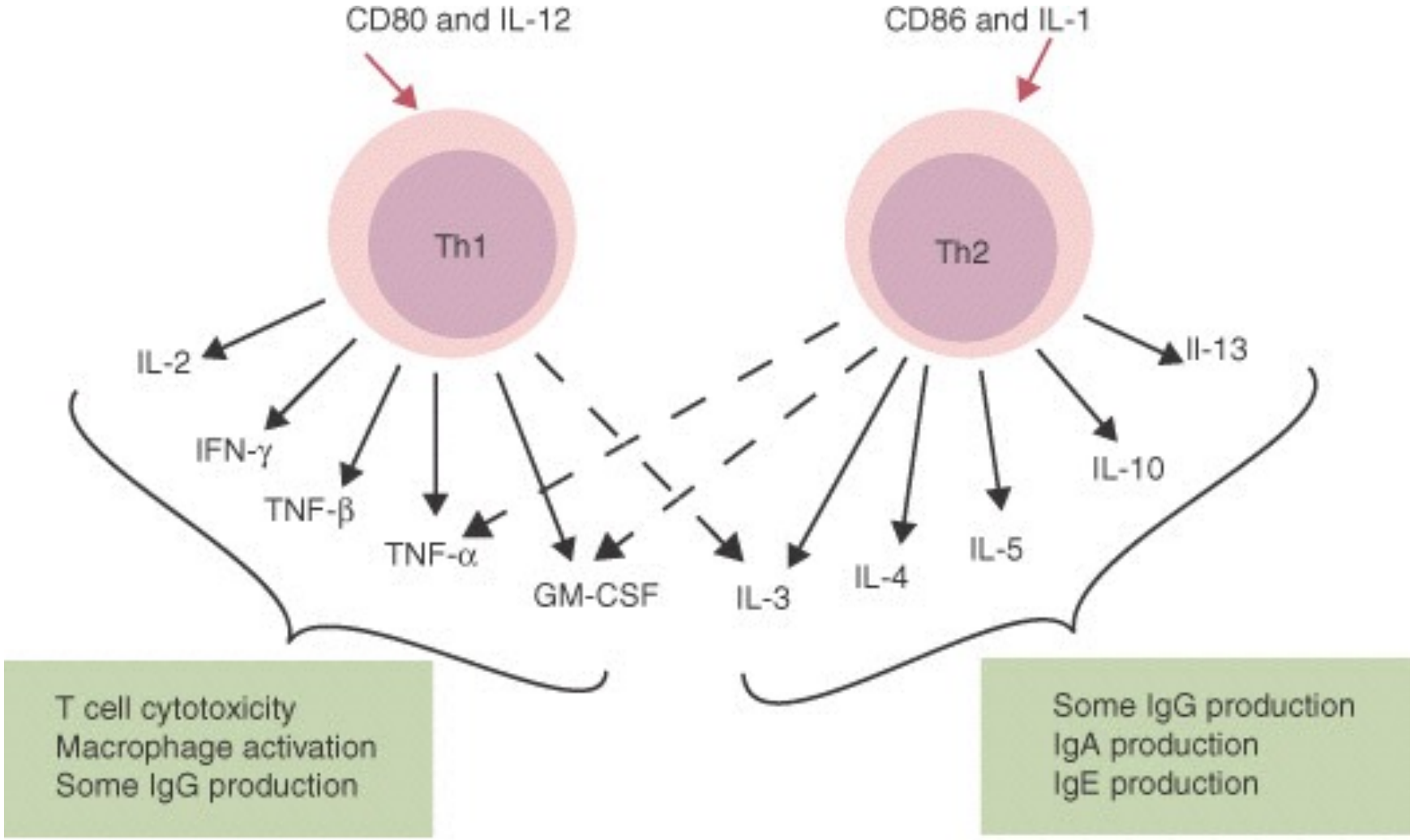


**FIGURE 12-12** Major differences between Th1 and Th2. Note that the co-stimuli that trigger them are different, as are the set of cytokines they secrete.

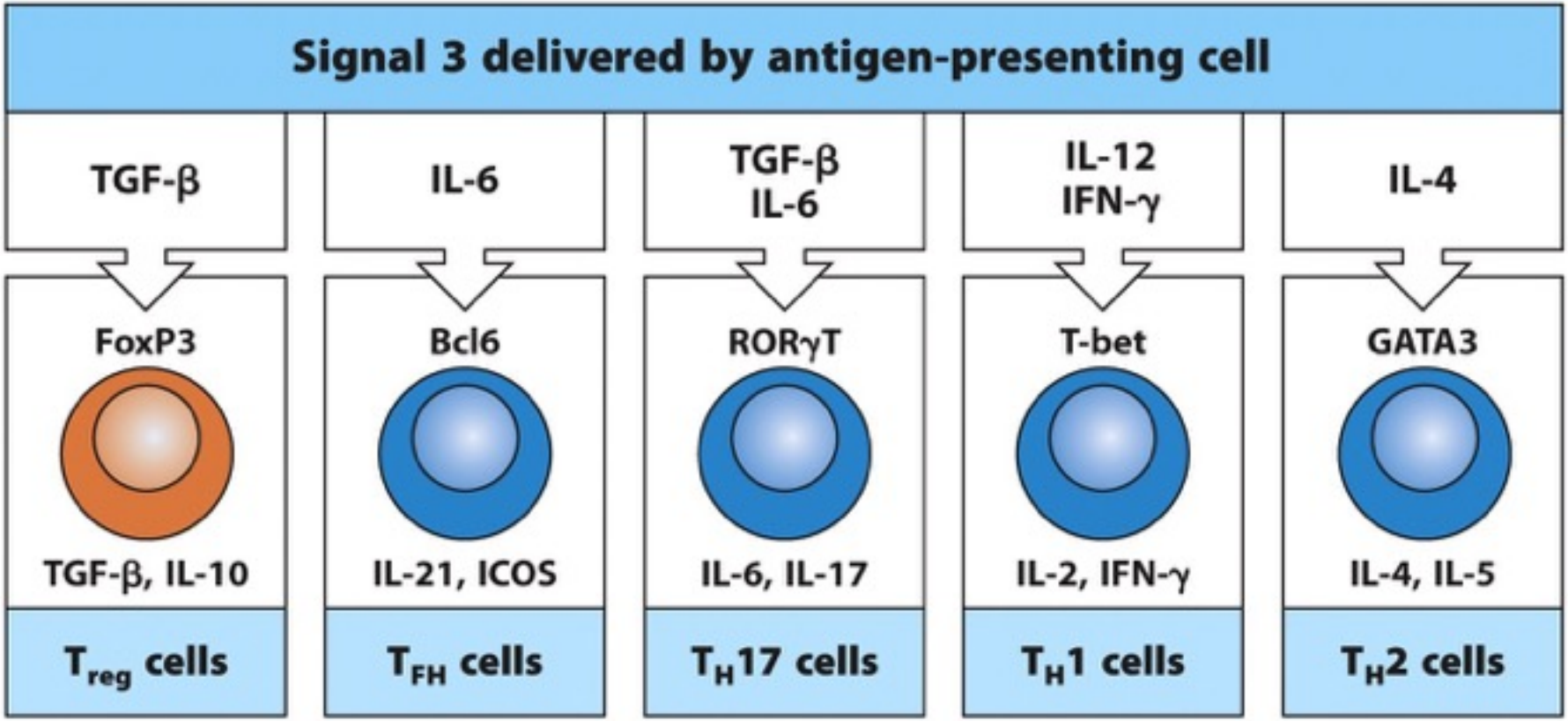


Figure 9.29 Janeway's Immunobiology, 8ed. (© Garland Science 2012)

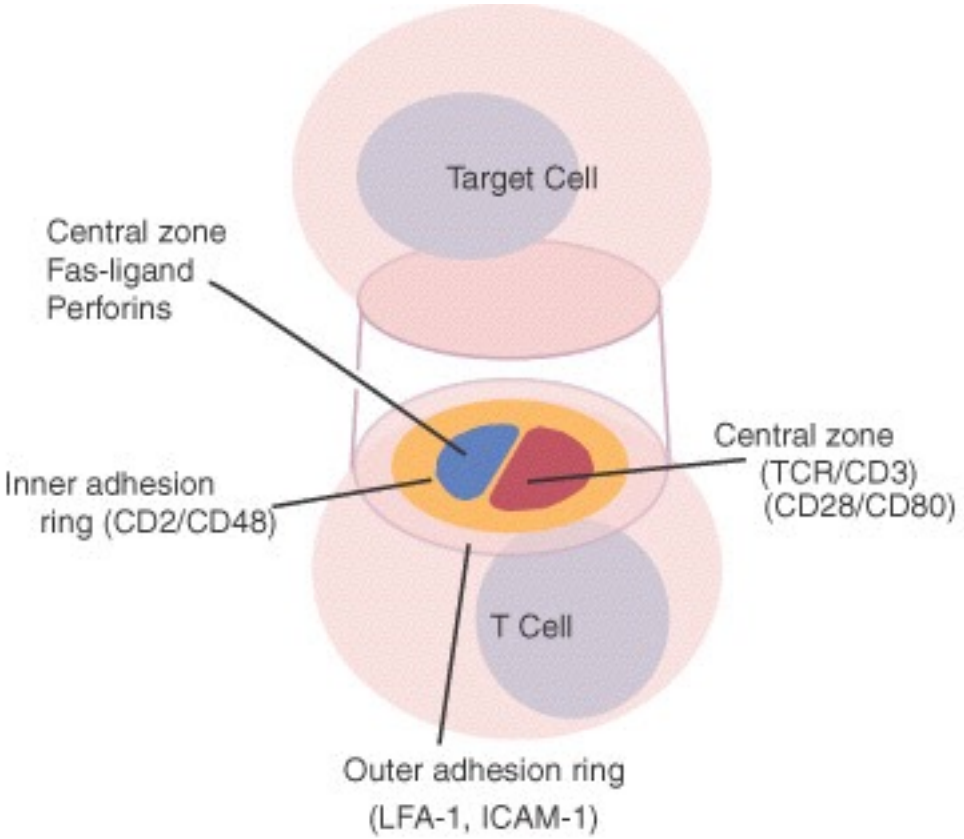


**FIGURE 16-6** Structure of the immunological synapse that forms between a cytotoxic T cell and its target. The outer ring of adhesive proteins forms an effective "gasket" that prevents leakage of cytotoxic molecules into tissue fluid. There are however two central supramolecular activation clusters (cSMACs). One is dedicated to signaling and so contains the T cell antigen receptor together with accessory molecules and co-stimulators. The other is dedicated to cytotoxic mechanisms. It is through this cSMAC that perforins, granzymes, and the Fas-FasL signals are transmitted.

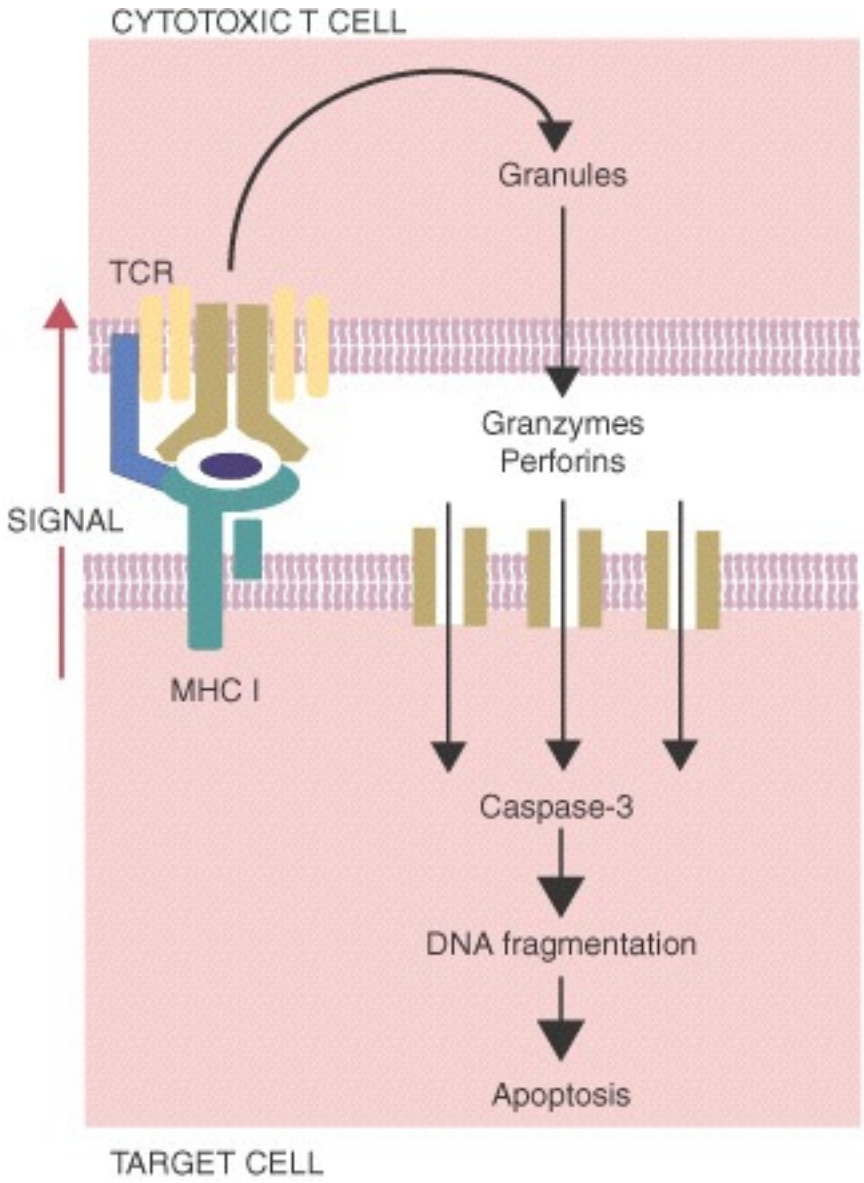


**FIGURE 16-7** The perforin pathway by which T cells kill targets.

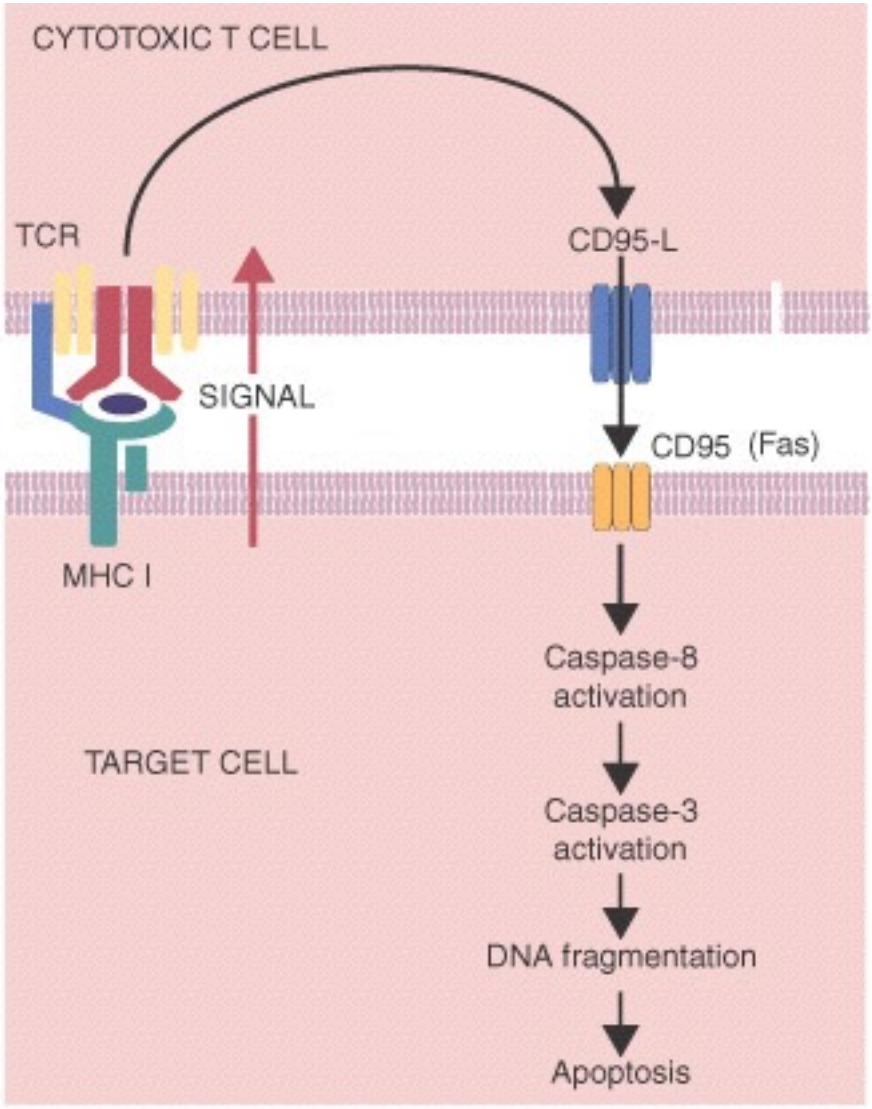


**FIGURE 16-8** The CD95 pathway of T cell–mediated cytotoxicity.

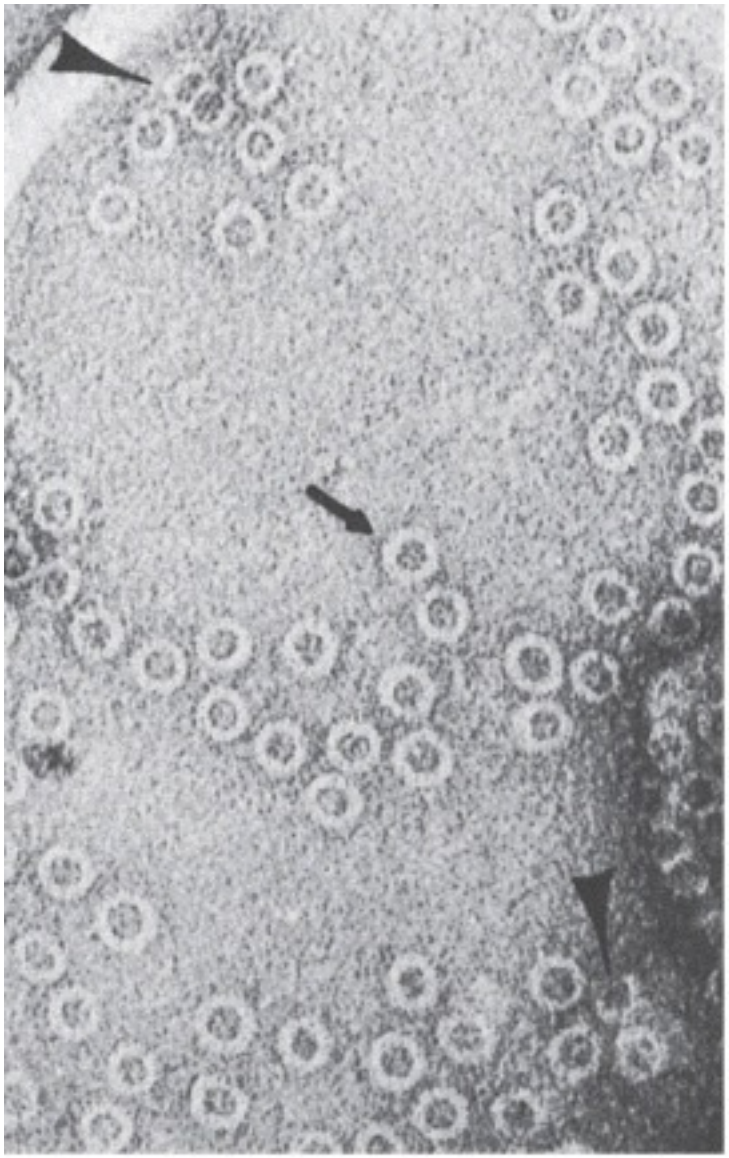

**FIGURE 16-9** Perforins from human natural killer cells on the surface of a rabbit erythrocyte target. The arrowheads point to incomplete rings and double rings.

(From Podack ER, Dennert G: *Nature* 301:44, 1983.)

| Protein in granules of cytotoxic T cells | Actions on target cells |
| --- | --- |
| Perforin | Aids in delivering contents of granules into the cytoplasm of target cell |
| Granzymes | Serine proteases, which activate apoptosis once in the cytoplasm of the target cell |
| Granulysin | Has antimicrobial actions and can induce apoptosis |

Figure 9.36 Janeway's Immunobiology, 8ed. (© Garland Science 2012)

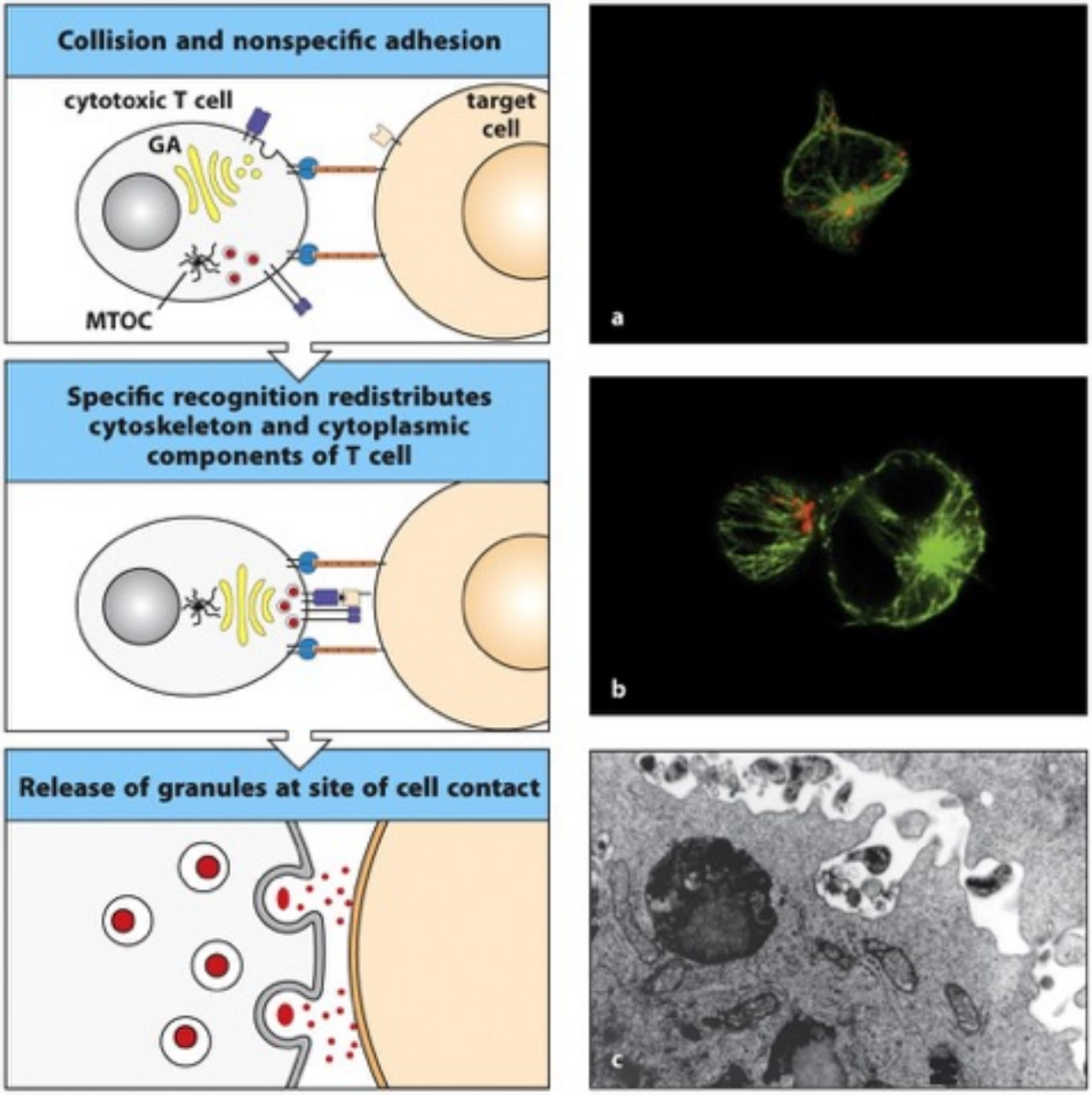


Figure 9.32 Janeway's Immunobiology, 8ed. (© Garland Science 2012)

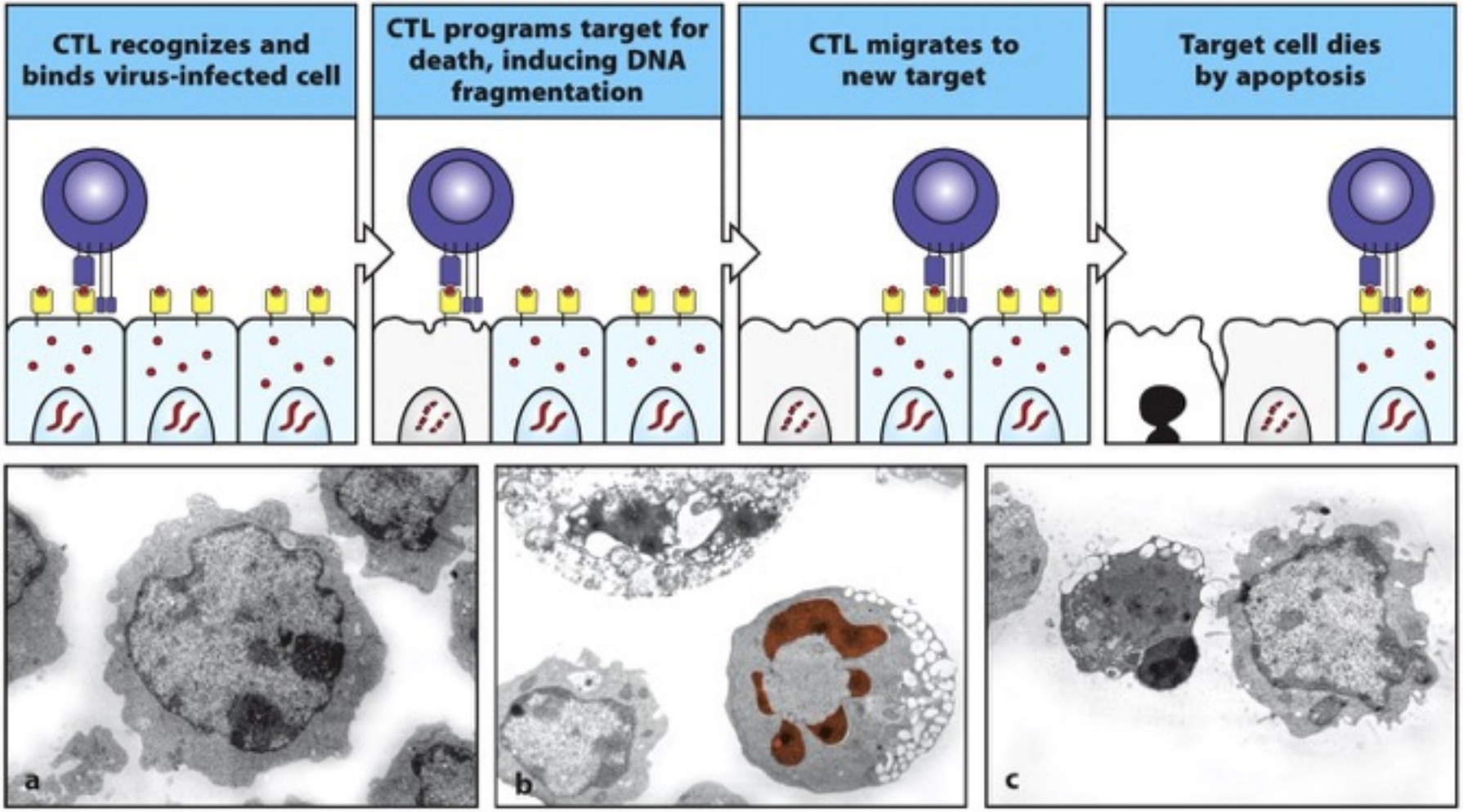


Figure 9.35 Janeway's Immunobiology, 8ed. (© Garland Science 2012)