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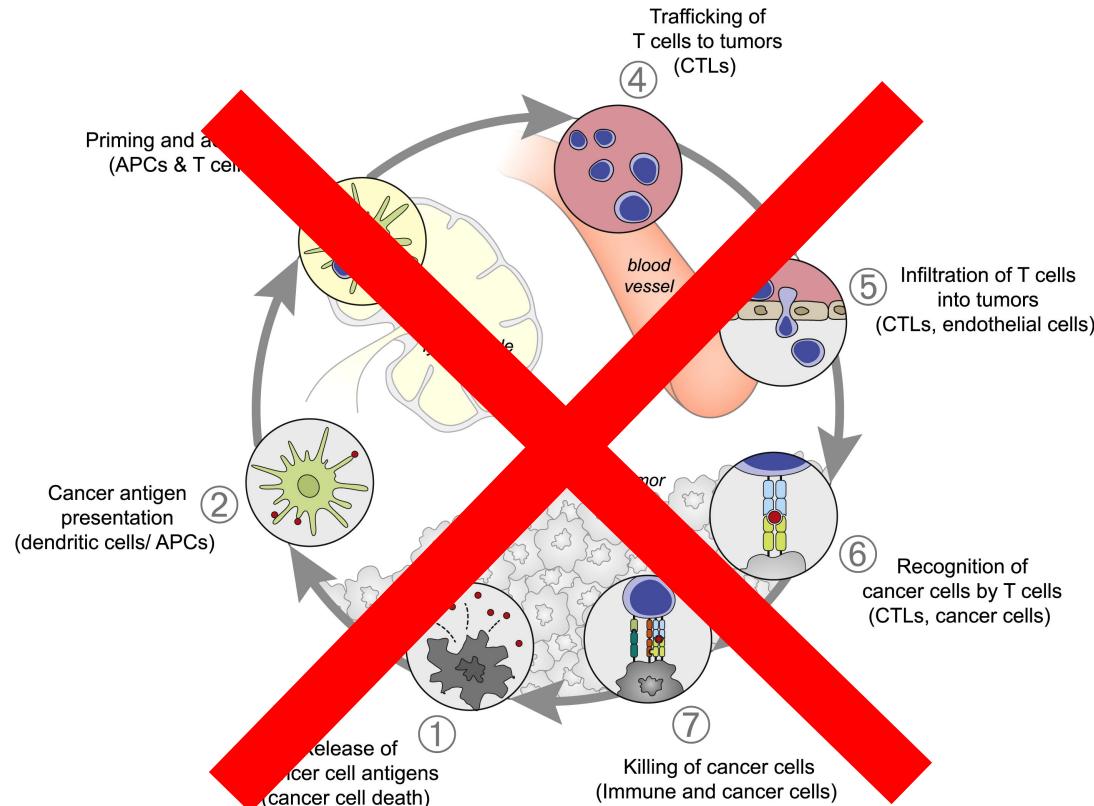
Immunoengineering

Immune Response to Cancer: Mechanisms of Immune Evasion



JOHNS HOPKINS
WHITING SCHOOL
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Cancer Immunity Cycle



Tumor Immune Escape

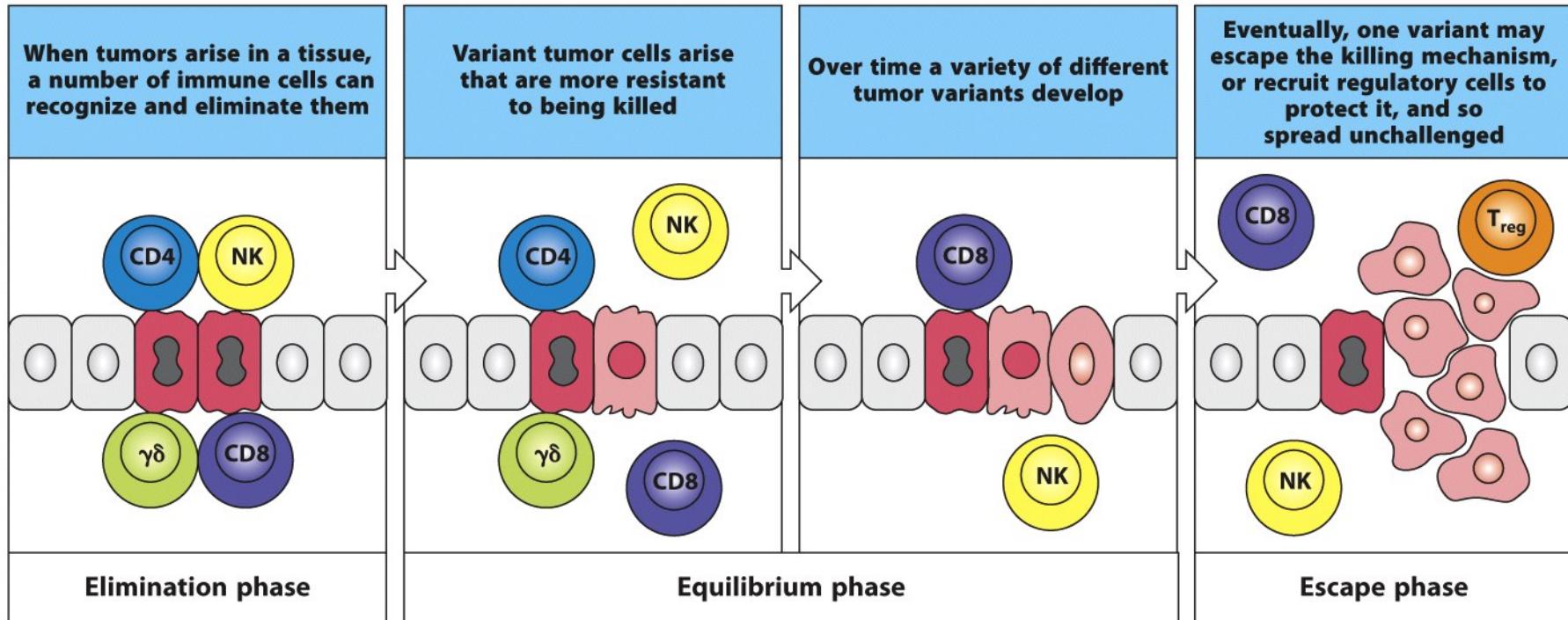


Figure 16.12 Janeway's Immunobiology, 8ed. (© Garland Science 2012)

Mechanisms of Immune Evasion

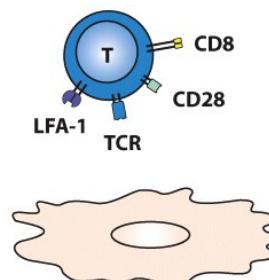
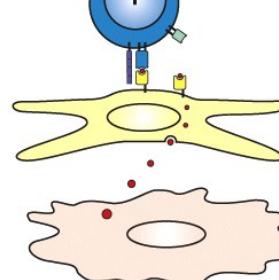
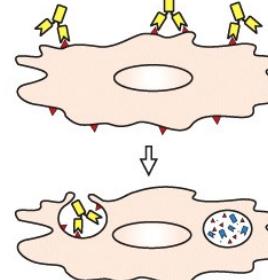
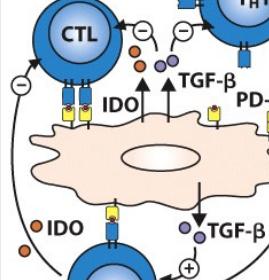
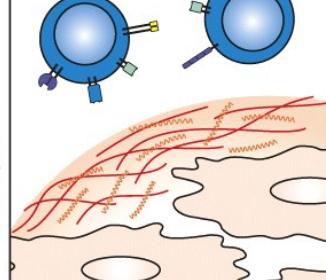
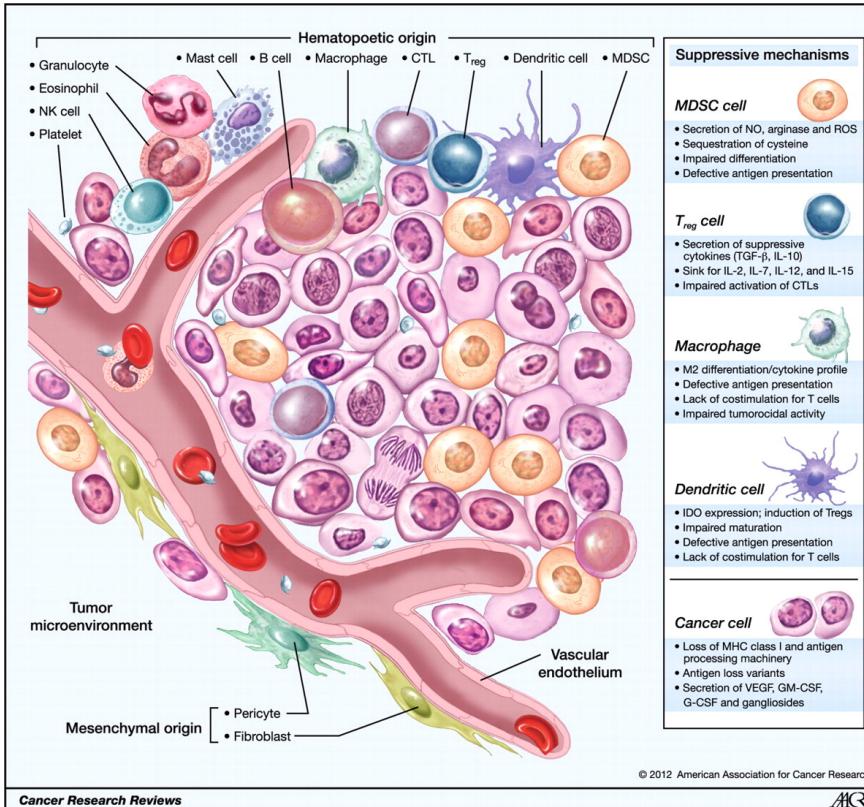
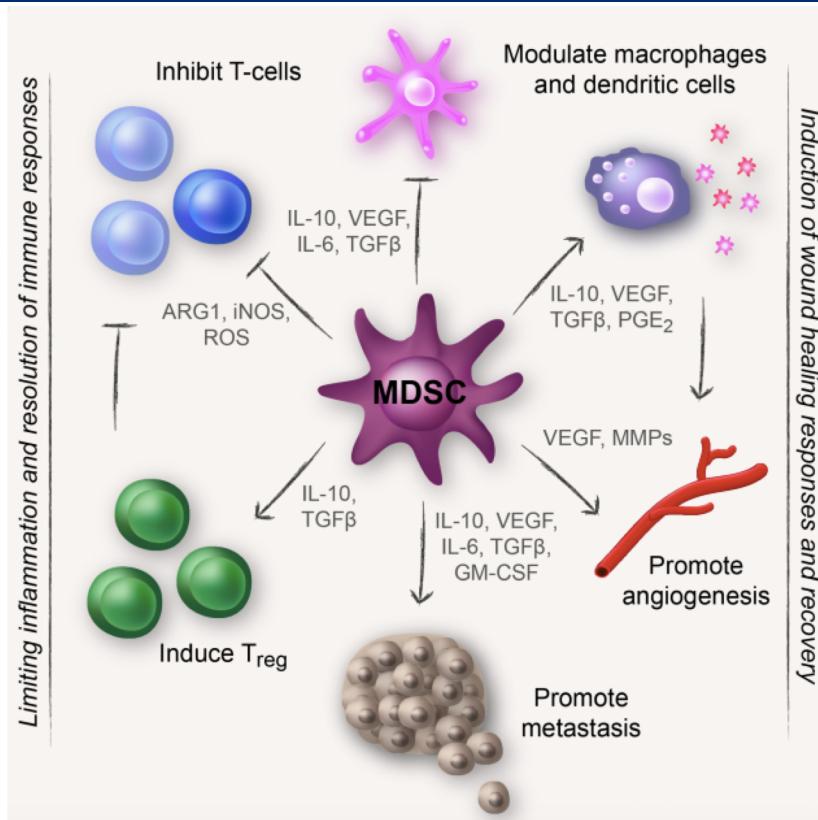
Mechanisms by which tumors avoid immune recognition				
Low immunogenicity	Tumor treated as self antigen	Antigenic modulation	Tumor-induced immune suppression	Tumor-induced privileged site
No peptide:MHC ligand No adhesion molecules No co-stimulatory molecules	Tumor antigens taken up and presented by APCs in absence of co-stimulation tolerize T cells	Antibody against tumor cell-surface antigens can induce endocytosis and degradation of the antigen. Immune selection of antigen-loss variants	Factors (e.g.TGF- β , IL-10, IDO) secreted by tumor cells inhibit T cells directly. Induction of regulatory T cells by tumors	Factors secreted by tumor cells create a physical barrier to the immune system
				

Figure 16.13 Janeway's Immunobiology, 8ed. (© Garland Science 2012)

Immunosuppressive Tumor Microenvironment



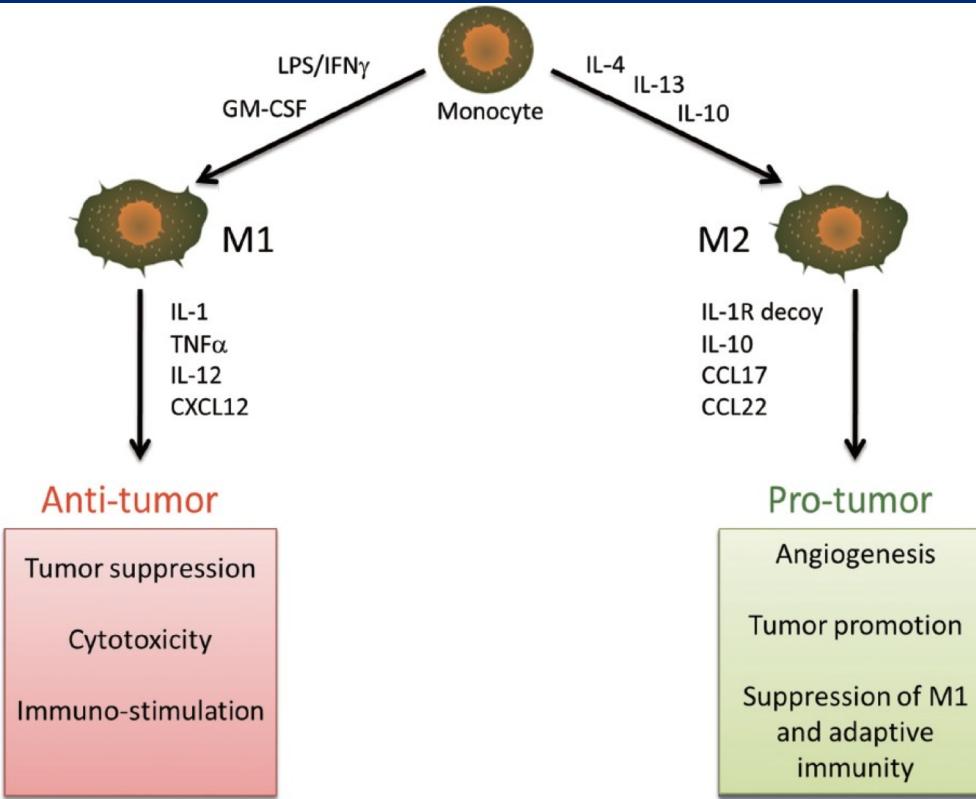
MDSCs (myeloid-derived suppressor cell)



Tregs

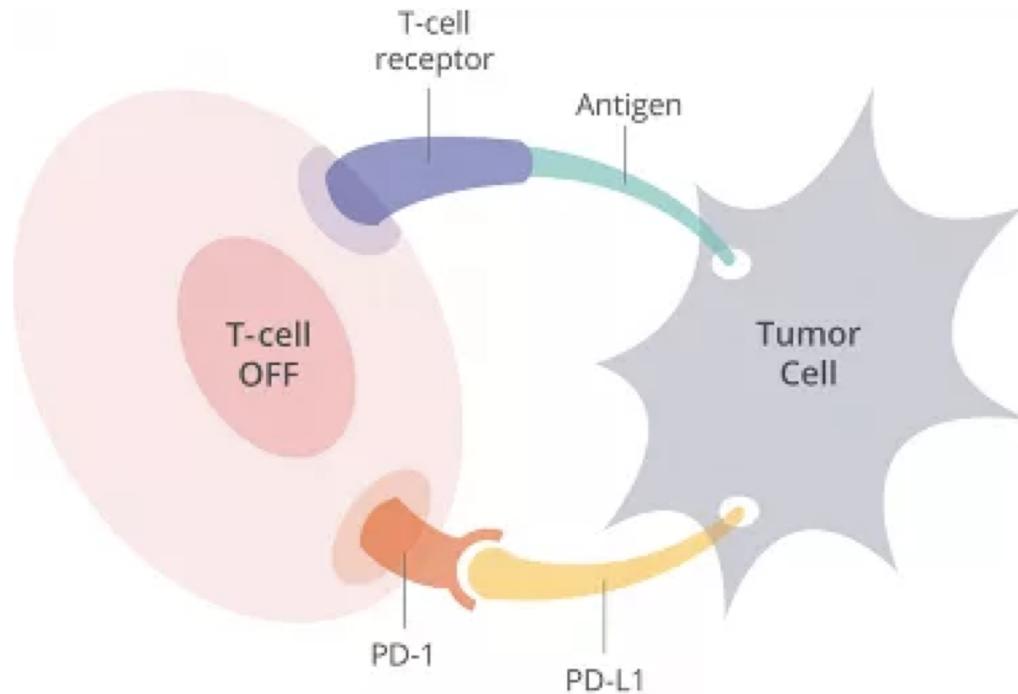
Types of effector T cell	CD8 cytotoxic T cells	CD4 T_H1 cells	CD4 T_H2 cells	CD4 T_H17 cells	T_{FH} cells	CD4 regulatory T cells (various types)
Main functions in adaptive immune response	Kill virus-infected cells	Activate infected macrophages Provide help to B cells for antibody production	Provide help to B cells for antibody production, especially switching to IgE	Enhance neutrophil response Promote barrier integrity (skin, intestine)	B-cell help Isotype switching Antibody production	Suppress T-cell responses
Pathogens targeted	Viruses (e.g. influenza, rabies, vaccinia) Some intracellular bacteria	Microbes that persist in macrophage vesicles (e.g. mycobacteria, <i>Listeria</i> , <i>Leishmania donovani</i> , <i>Pneumocystis carinii</i>) Extracellular bacteria	Helminth parasites	<i>Klebsiella pneumoniae</i> <i>Fungi (Candida albicans)</i>	All types	

M1 vs. M2 macrophages



Immune Checkpoint Molecules

PD-1 pathway suppresses T cell activity





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