

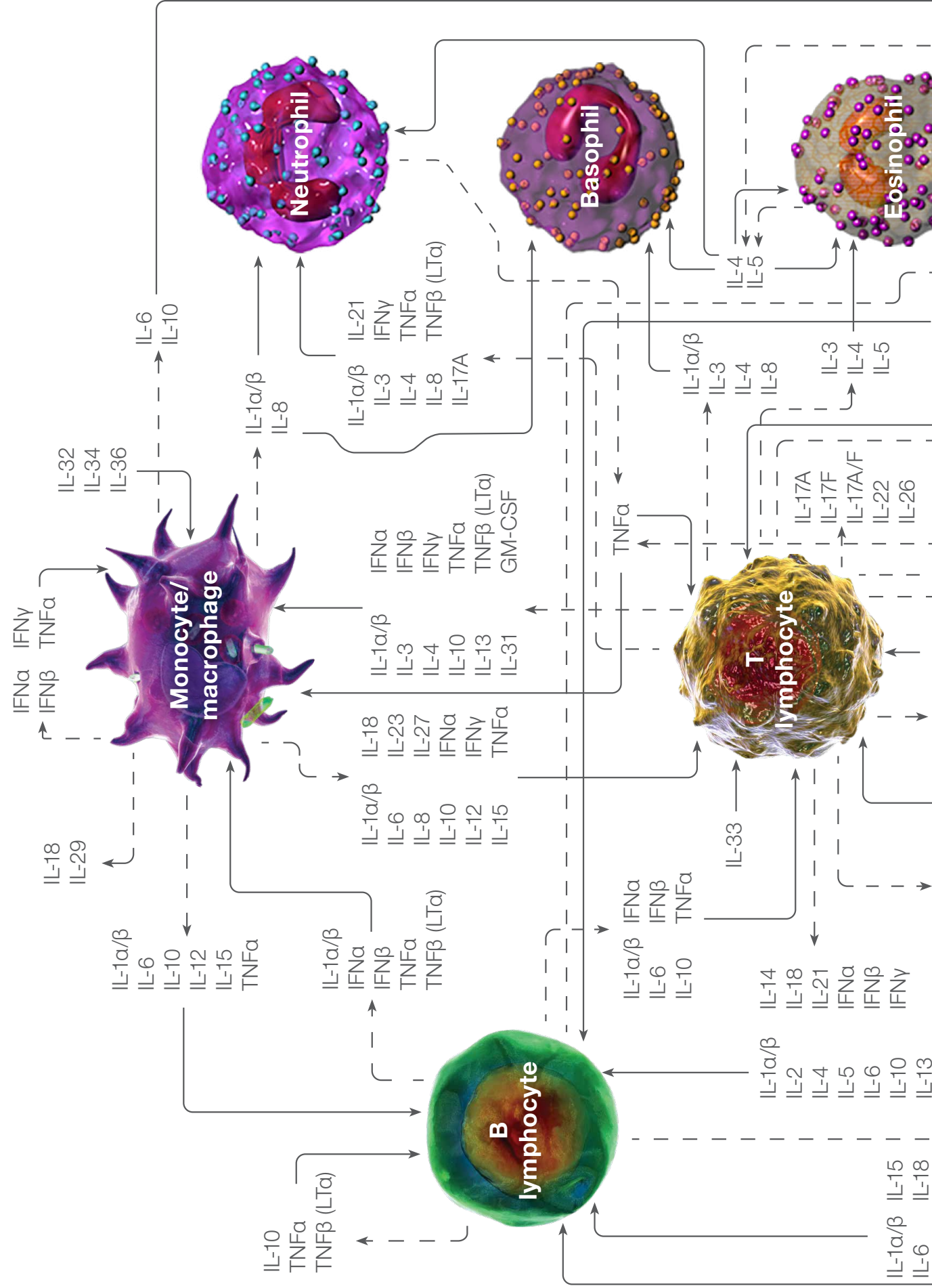


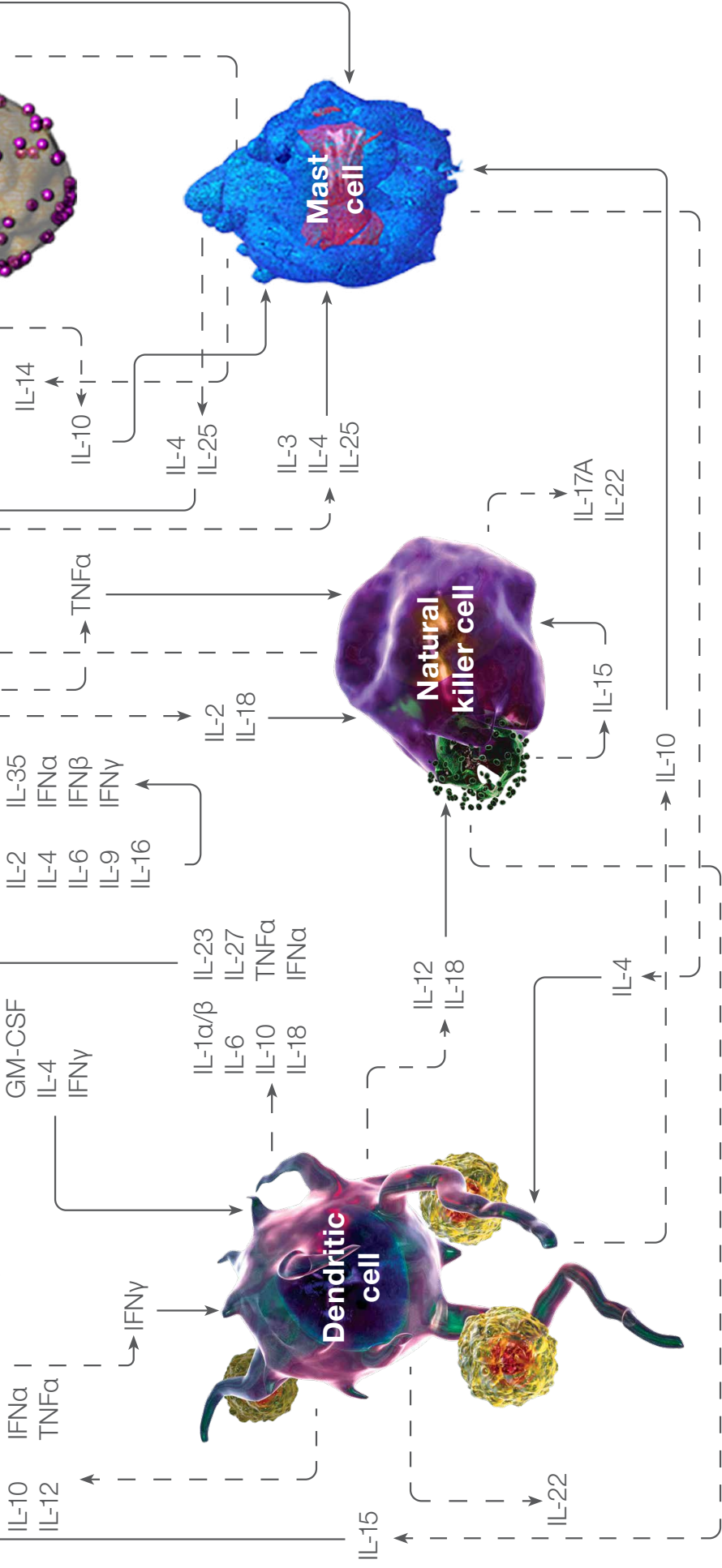
Cytokine signaling network

The immune system helps protect our bodies against pathogens. The first line of defense is the innate immune system, where macrophages or cells like dendritic cells and neutrophils attack and destroy the invading pathogen. The second line of defense is the adaptive immune system, where B cells and T cells are deployed in a more sophisticated attack. These cells use past encounters with specific antigens as memory to recognize threats and attack when they reappear. B cells make and secrete antibodies that can lock onto the surface of invading cells and mark them for destruction by other immune cells. T cells include two major types: helper T cells stimulate B cells to make antibodies, and cytotoxic T cells directly

kill cells that have already been infected by a pathogen. T cells also use cytokines as messenger molecules to send chemical instructions to the rest of the immune system to ramp up its response. Activating T cells against cancer cells is the premise behind checkpoint inhibitors. CAR T cell therapy is another method in which T cells are engineered to attack specific cancer cells.

Cytokine signaling network





Cell type	Function
Dendritic cell	Presents antigens to T cells
Mast cell	Releases histamines during allergic and inflammatory response
B lymphocyte (B cell)	Secretes antibodies against foreign substances
T lymphocyte (T cell)	Finds and destroys foreign substances
Monocyte/macrophage	Aids in phagocytosis to eliminate foreign substances
Natural killer cell	Contains viral infections while T cells work to eliminate them
Granulocytes	White blood cells (leukocytes) characterized by the presence of granules (small particles) containing enzymes that are released during allergy and infection
	- Neutrophil (most abundant)
	- Basophil (least abundant)
	- Eosinophil

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