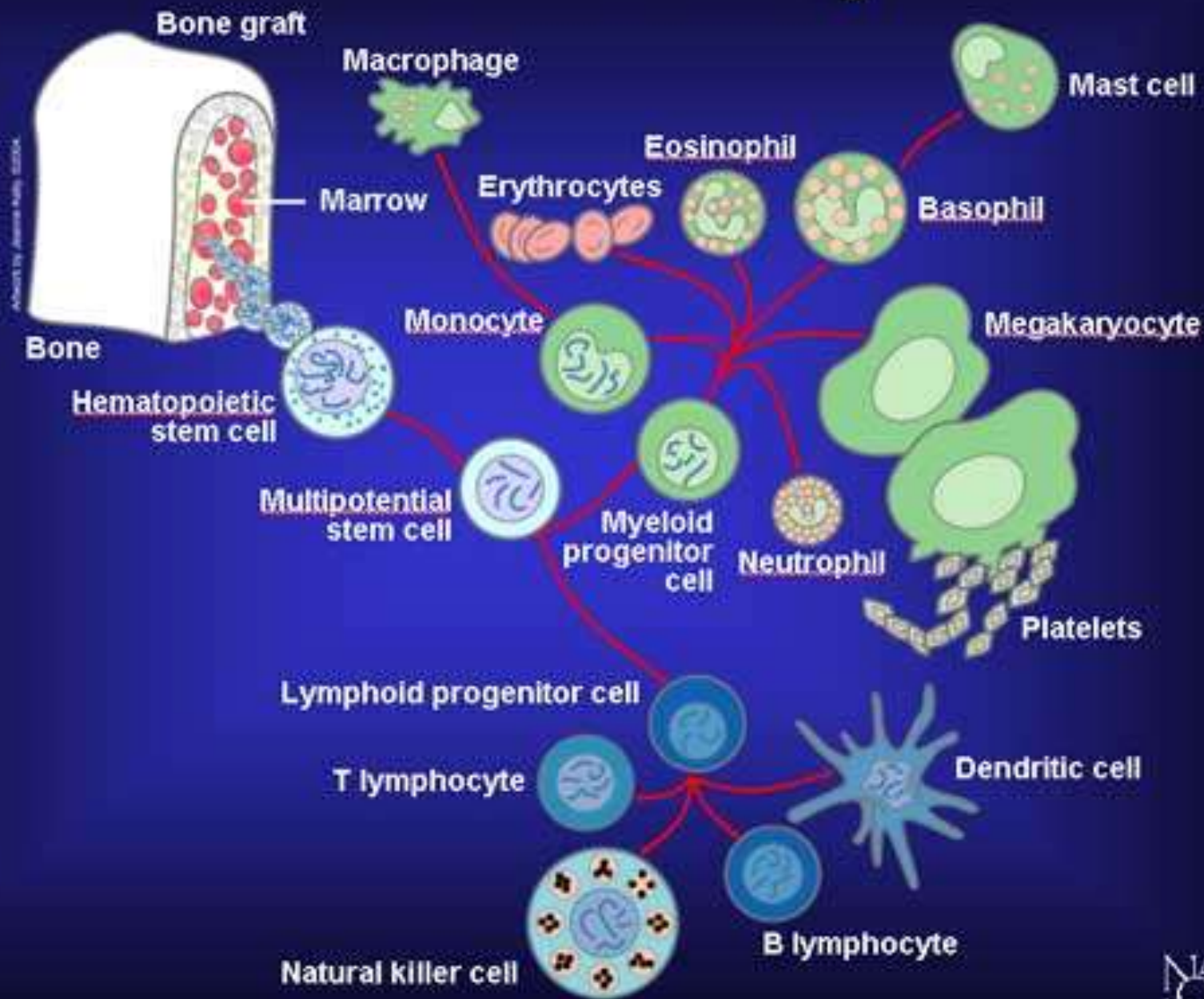
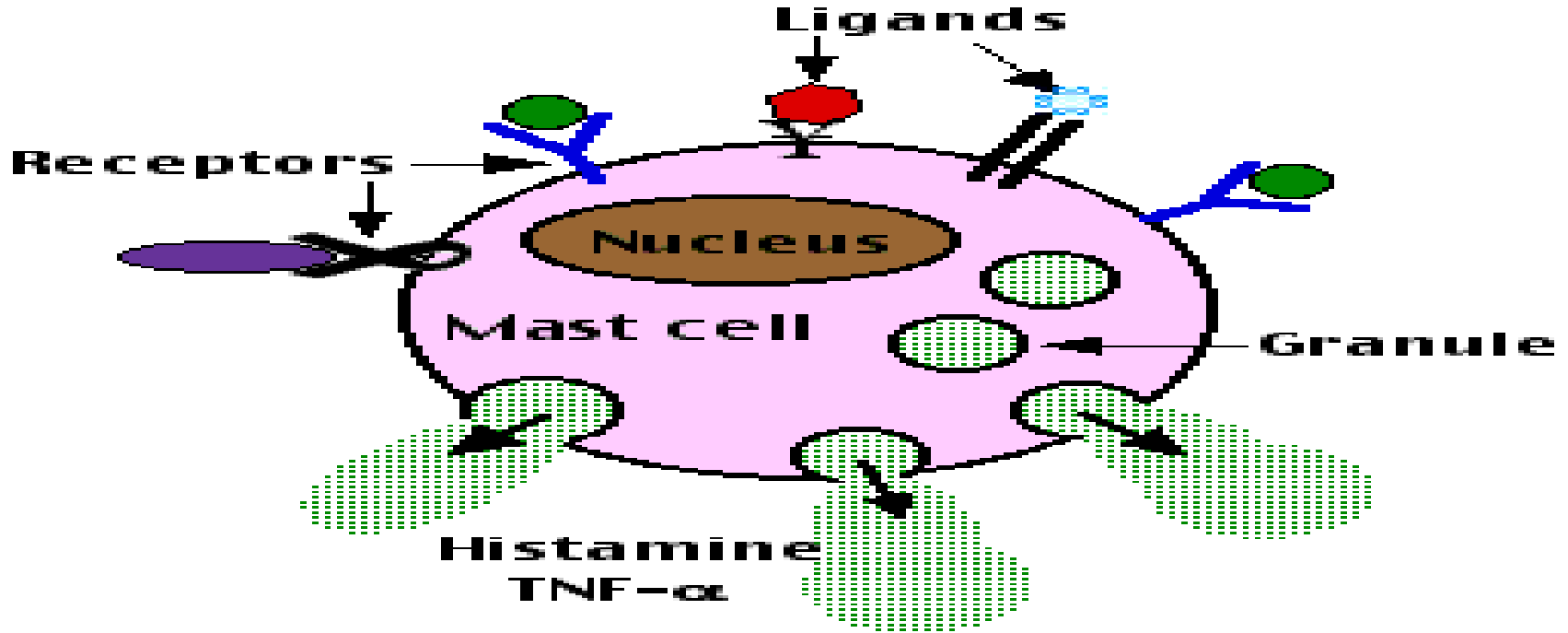


Cells of the Immune System

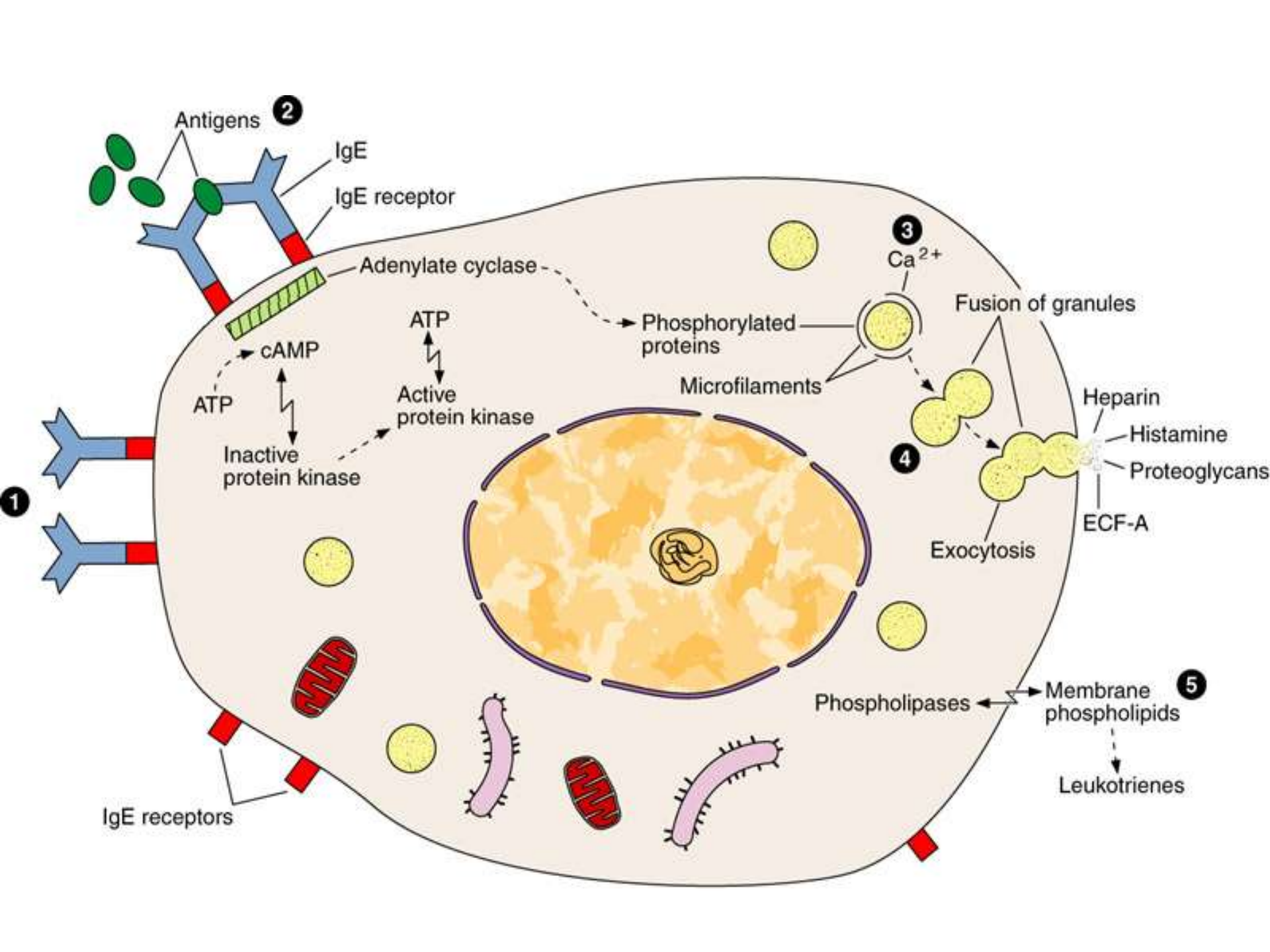


Mast Cells



- Are the key players in the initiation of inflammation. Mast cells are found in the tissues. Their cytoplasm is loaded with granules containing mediators of inflammation.
 - Their surface is coated with a variety of receptors which, when engaged by the appropriate ligand(signaling molec) trigger (activate) exocytosis of the granules.
 - Activated mast cells release dozens of potent mediators .
 - These mediators are active in recruiting all the types of WBCs to the site of injury to produce their own mediators of inflammation.
- The mediator forms are:

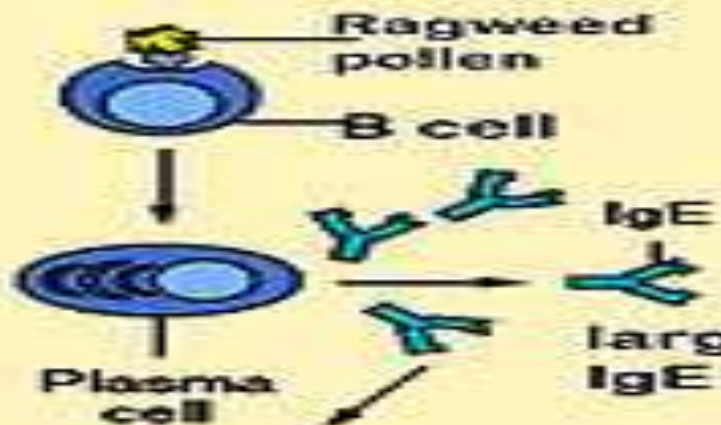
- **i-Histamine** causes:
 - a-Vasodilatation & increase local blood flow (**redness**) attracting neutrophils and macrophages to damaged area to destroy any bacteria present. The rising temperature (**heat**) caused by the increased blood flow increases the metabolism of phagocytes.
 - b-Capillary permeability ,leading to the leakage of fluid into the tissues, causing swelling(**Tumor**).This brings in cellular defenders and carries away toxins and debris.Clotting factors and complement proteins leave the blood and enter the infected area to destroy pathogens and perform other functions_.
- **ii- Heparin** :prevents clotting from occurring immediately within the area, but a clot will form around the damaged area. This "walls off" the area and limits pathogen spread. **Sum**: Cellular events work to engulf, kill, and digest the stimulus so the area can be cleared for repair process **RESULT**: Component events of acute inflam work together to alleviate the noxious stimulus and promote healing. Even with relatively minor & apparently localized problems, there are whole-body responses.



Mast-cell secretion :

- 1: IgE molecules are bound to the surface receptors.
- 2: After a second exposure to an **antigen** (eg, bee venom), IgE molecules bound to surface receptors are cross-linked by the **antigen**. This activates **adenylate cyclase** and results in the **phosphorylation** of certain proteins.
- 3: At the same time, **Ca²⁺ enters the cell**.
- 4: These events lead to intracellular fusion of specific granules and exocytosis of their contents.
- 5: In addition, **phospholipases** act on membrane phospholipids to produce **leukotrienes**(Leukotrienes are **immune-system chemicals** that will be lacking in compromised individuals and overly abundant during allergic and asthmatic bouts). They are named after the word "leukocyte," or white blood cell, and from their characteristic three conjugated double bonds, "trienes."

- . The process of extrusion does not damage the cell, which remains viable and synthesizes new granules.



The first time an allergy prone person runs across an allergen such as ragweed

he or she makes large amounts of ragweed IgE antibody.

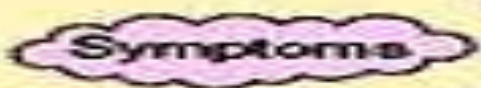
These IgE molecules attach themselves to mast cells.



The second time that person has a brush with ragweed,



the IgE primed mast cells release granules and powerful chemical mediators, such as histamine and cytokines, into the environment.



These chemical mediators cause the characteristic symptoms of allergy.

Mast cells

- Mast cells are found resident in tissues throughout the body(in the lungs, nose, skin, gut, heart and other organs), particularly in association with structures such as blood vessels and nerves, and in proximity to surfaces that interface the external environment. Usually do not circulate in the blood stream. Unlike basophils.

- Activation through various receptors leads to distinct signaling pathways.

Role: They form part of an early warning system, when stimulated, they immediately release chemicals that signal either injury or infection and cause an inflammation in the area.

- Mast cell activation may also be followed by the synthesis of chemokines and cytokines that occurs hours later, may contribute to chronic inflammation. Mast cells like basophils play a central role in inflammatory and immediate allergic reactions. They are able to release potent inflammatory mediators, such as histamine, proteases, chemotactic factors, cytokines and metabolites of arachidonic acid that act on the vasculature, smooth muscle, connective tissue, mucous glands and inflammatory cells. Both basophils and mast cells have highly specific receptors for IgE produced in response to various allergens.