# Chapter 4

# ANAPHYLAXIS

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## Introduction

Anaphylaxis is an acute syndrome resulting from the release of mast cell- and basophil-derived mediators into the circulation. In this review, we will focus on anaphylaxis.

**Pathophysiology of anaphylaxis:** The World Allergy Organization (WAO) categorizes anaphylaxis as either immunologic or nonimmunologic (1,2).

Immunologic anaphylaxis : IgE-mediated reactions, Immunoglobulin G (IgG)-mediated reactions, immune complex/complement-mediated reactions.

Nonimmunologic anaphylaxis: Nonimmunologic anaphylaxis is caused by agents or events that induce sudden, massive mast cell or basophil degranulation in the absence of immunoglobulins.

IgE-mediated:Allergic disease is initiated by an antigen (allergen) interacting with allergen-specific immunoglobulin E (IgE) bound to the receptor Fc-epsilon-RI on mast cells and/or basophils. B cells are driven to differentiate into IgE-producing cells via the activity of the type 2 subset of CD4-bearing helper T cells (Th2 cells). The cytokines interleukin-4 (IL-4) and its receptors (IL-4R-alpha/gamma-c and IL-4R-alpha/IL-13R-alpha-1) and interleukin-13 (IL-13) and its receptor (IL-4R-alpha/IL-13R-alpha-1) contribute to IgE responses. Once produced, allergen-specific IgE diffuses through the tissues and vasculature and constitutively occupies high-affinity IgE receptors (Fc-epsilon-RI) on mast cells and basophils. When allergen diffuses into the proximity of a mast cell or basophil, it interacts with any surface-bound IgE that is specific for that allergen. Certain allergens are able to interact with IgE molecules on two or more receptors of the cell surface to cause cross-linking, which in turn causes the receptors to become aggregated and initiate intracellular signaling. If signaling is sufficiently robust, the mast cell (or basophil) becomes activated and degranulates, releasing preformed mediators, enzymes, and cytokines (such as histamine, tryptase, and tumor necrosis factor [TNF], respectively) and initiating additional mediator, cytokine, and enzyme production.These mediators either act directly on tissues to cause allergic symptoms or recruit and activate additional inflammatory cells, particularly eosinophils. The recruited cells, in turn, release more mediators and propagate a fulminant “chain reaction” of allergic inflammation (1,2).

Mast cells and basophils:The degranulation of mast cells and basophils results in the systemic release of various biochemical mediators and chemotactic substances,

## Conclusion

Hymenoptera venom, foods, and pharmaceutical drugs are still among the most frequent triggers of anaphylaxis. Self-treatment of anaphylaxis is of great importance. Recent data show an increase in the use of adrenaline as recommended in the guidelines. Allergists should educate patients and provide them with action plans and tools, including auto-injectable epinephrine. Education of all specialists and health-care providers in the symptoms, presentation, and acute management of anaphylaxis is key to increasing awareness of anaphylaxis. Precision medicine requires further research on new biomarkers and exploration of new treatment modalities.

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