

### Tryptase

Allergic reactions represent the end-organ effects of the release of various chemicals from cells of the immune system. The mast cell is central to the pathology of allergy, with mast-cell-derived histamine mediating the dermal oedema, itch, vasodilatation and bronchoconstriction seen in allergic conditions, but the release of prostaglandins, leucotrienes and T-cell-derived cytokines is also important. Classic allergy (as seen in asthma, allergic rhinoconjunctivitis, atopic eczema, urticaria, and systemic anaphylaxis) reflects a tendency to produce allergen-specific IgE to innocuous agents, with IgE cross-linking then producing mast cell degranulation. Some reactions may, however, be clinically indistinguishable from IgE-mediated reactions, with symptoms provoked by direct degranulation of mast cells. Agents which can cause direct mast cell release include opiates, aspirin, and salicylates in foods. The spectrum of reactions range from urticaria through to bronchospasm and, most dramatically, anaphylaxis. Anaphylaxis refers to a life-threatening syndrome featuring hypotension, bronchospasm, angioedema and upper airway obstruction and collapse; when this occurs as a direct result of mast cell stimulation (without IgE production), it is called 'anaphylactoid'.

A history of recurrent collapse and skin swelling is strongly suggestive of episodic anaphylaxis, especially when a specific trigger can be identified and hypotension or desaturation can be documented. However, often the history is inconclusive, without any recording of objective findings such as facial swelling or hypotension. In these cases, the differential diagnosis may include cardiac arrhythmias and vasovagal events as well as anaphylaxis, but clearly the identification of an allergic reaction is important because it will prompt a search for underlying triggers which can be avoided in the future. Similar diagnostic problems may arise with intraoperative hypotensive events, where the differential diagnosis may include third-space fluid loss, drug-related vasodilatation, and allergy to general anaesthetics or latex. Again, the identification of allergy is important so that future avoidance measures may be implemented.

The common thread of all allergic reactions, whether or not they are mediated by IgE, is mast cell granule release. Tryptase is a tetrameric serine protease seen only in mast cells. When there has been extreme mast cell degranulation, as occurs in systemic anaphylaxis, tryptase levels rise within 1 hour and remain elevated for 4-6 hours. This is in contrast to histamine, levels of which peak at 5 minutes and decline rapidly within fifteen minutes.

In patients with life-threatening systemic reactions to diverse allergens (such as foods, insect venoms, latex and drugs), the finding of elevated serum tryptase levels (>1ng.mL) between 1 and 6 hours after the event is highly sensitive and specific for confirming mast-cell degranulation as the cause of the event. Because of the proliferation, activation and release of mast cells in mastocytosis, the measurement of serum tryptase levels in this condition is also useful for diagnostic purposes.

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