

P: In patient with an acute reaction  
 I: does the measurement of serum tryptase  
 C: compared with clinical evaluation only  
 O: provide greater accuracy in diagnosing anaphylaxis?

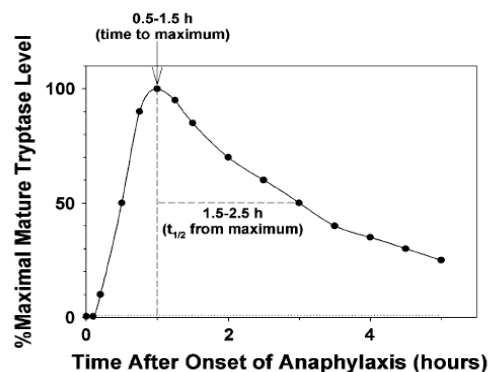
**Definition of Anaphylaxis – Ann Emerg Med. 2006;47:373-380**

Anaphylaxis is highly likely when any one of the following 3 criteria are fulfilled:

1. Acute onset of an illness (minutes to several hours) with involvement of the skin, mucosal tissue, or both (eg, generalized hives, pruritus or flushing, swollen lips-tongue-uvula) **AND AT LEAST ONE OF THE FOLLOWING**
  - a. Respiratory compromise (eg, dyspnea, wheeze-bronchospasm, stridor, reduced PEF, hypoxemia)
  - b. Reduced BP or associated symptoms of end-organ dysfunction (eg, hypotonia [collapse], syncope, incontinence)
2. Two or more of the following that occur rapidly after exposure to a likely allergen for that patient (minutes to several hours):
  - a. Involvement of the skin-mucosal tissue (eg, generalized hives, itch-flush, swollen lips-tongue-uvula)
  - b. Respiratory compromise (eg, dyspnea, wheeze-bronchospasm, stridor, reduced PEF, hypoxemia)
  - c. Reduced BP or associated symptoms (eg, hypotonia [collapse], syncope, incontinence)
  - d. Persistent gastrointestinal symptoms (eg, crampy abdominal pain, vomiting)
3. Reduced BP after exposure to known allergen for that patient (minutes to several hours):
  - a. Infants and children: low systolic BP (age specific) or greater than 30% decrease in systolic BP
  - b. Adults: systolic BP of less than 90 mm Hg or greater than 30% decrease from that person's baseline

**Facts about Tryptase:**

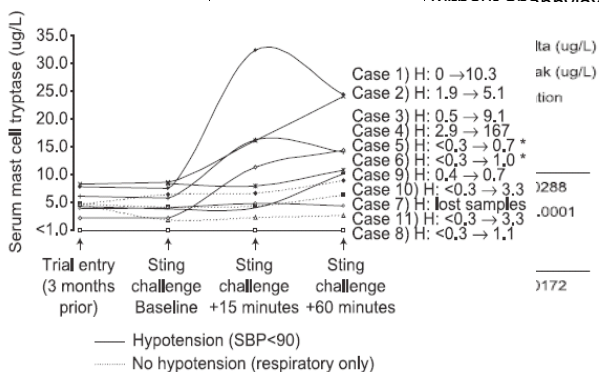
- Protein in high concentration in mast cells, released with anaphylaxis. Half life 2 hours.
- Present in trace amounts in basophils, 1/500 of mast cells
- Alpha/beta-tryptase precursor continuously secreted by mast cells.
- Mature beta-tryptase is stored in secretory granules of mast cells
- Can be elevated at baseline in patients with mastocytosis.
- Measuring s-tryptase is recommended by UK Resuscitation council for confirmation of anaphylaxis.



**Search strategy:**

PubMed, Ovid, Search for clinical statements by AAAAI, ACAAI, ACEP, SAEM websites.

Study	Type	Patients and methods	Results	Conclusions	Graphs and limitations
<p><i>Brown GA, Blackman KE, Heddle RJ. Emergency Medicine Australasia (2004) 16, 120–124 Can serum mast cell tryptase help diagnose anaphylaxis?</i></p>	Observational cohort study.	64 patients with history of anaphylactic reactions to jack jumper ant undergoing sting challenge and randomized to venom specific IgE or placebo. 11 patients developed anaphylaxis compared to patients without anaphylaxis	<p>Peak tryptase readings had sensitivity of 0.36 and specificity of 0.93 cut-off range (&lt; 12.0 µg/L). ROC analysis: cut-off of 9.0 µg/L would improve diagnostic performance (sensitivity 0.55, specificity 0.93). An increase in tryptase of 2.0 µg/L or greater had a sensitivity of 0.73 and specificity of 0.98.</p>	Clinicians should use caution when using serum tryptase to refute or support a diagnosis of anaphylaxis. Serial tryptase measurement increases sensitivity and specificity.	Anaphylaxis poorly defined.



Study	Type	Patients and methods	Results	Conclusions	Graphs and limitations
Lin RY, Schwartz LB, Curry A <i>et al.</i> Histamine and tryptase levels in patients with acute allergic reactions: An emergency department-based study. <i>J. Allergy Clin. Immunol.</i> 2000; 106: 65–71.	Case series - Multivariate analysis of symptoms	97 adult ED patients with acute reactions <12 hours from exposure to allergens.	Elevated levels of plasma histamine (>10 nmol/L) and serum total tryptase (>15 ng/mL) were observed in 42 and 20 patients, respectively.	Raised histamine and, less commonly, raised tryptase levels are observed in almost 50% of patients presenting to emergency departments with acute allergic reactions.	Tryptase cut off 15ng/mL, recommended 13.5 by producer.. 9 patients had symptoms over 12 hours, still included. Many patients likely not in anaphylaxis.
Enrique E., Garc�a-Ortega P., Sotorra O., Gaig P. & Richart C. Usefulness of UniCAP-Tryptase fluoroimmunoassay in the diagnosis of anaphylaxis. <i>Allergy</i> 1999, 54, 602±606.	Case series	30 patients presenting to the ED with a clinical reaction of less than 6-h. Clinical criteria applied for anaphylaxis and stabilized in ED. F/u by allergist in 2-8 weeks.	The 17 patients with anaphylaxis had higher tryptase levels than nonanaphylaxis patients (mostly urticaria or angioedema) (P,0.001). ROC established the best cutoff of tryptase levels at 8.23 ng/ml with a 94.1% sensitivity and 92.3% specificity, whereas the 13.5 ng/ml cutoff recommended by the manufacturers showed 35.3% sensitivity and 92.3% specificity.	Serum tryptase levels of .8.23 ng/ml identify anaphylaxis in patients with symptoms of less than 6-h duration. The usefulness of this determination is higher if baseline tryptase levels are available.	Diagnostic criteria for anaphylaxis not reported

	Anaphylaxis		Nonanaphylaxis	
	Acute episode	Baseline	Acute episode	Baseline
No. patients	17	12	13	9
Mean ±SD	16.87 ± 14.18 <sup>a,b</sup>	4.87 ± 2.43	5.96 ± 2.98	4.79 ± 1.64
Range	6.15–61.30	1.52–9.50	2.32–14.20	2.54–6.92

<sup>a</sup>P<0.01 versus baseline.  
<sup>b</sup>P<0.001 versus acute episode of nonanaphylaxis patients.

### Clinical bottom line:

- Measuring serum tryptase can provide additional information regarding work up of acute reactions.
- Diagnostic performance is increased by measuring baseline serum tryptase at follow up.
- Serum tryptase over 14 is highly likely to be caused by anaphylaxis.