

全身型過敏反應處置新發展

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病例報告1

- 一個兩歲大經由小兒過敏免疫學專科醫師確定為對塵蟎敏感的嬰幼兒氣喘病兒。因為被發現有腹股溝疝氣，由小兒外科醫師安排男童於日前接受外科手術治療。很不幸的是，由於病兒沒有事先給予術前的預防全身型過敏性反應藥物處理，當病兒於接受手術前的麻醉時，竟然發生全身型過敏性反應嚴重到咽喉水腫、心血管虛脫，雖然經過醫護人員的全力搶救，最後仍然造成病兒的不幸死亡。

病例報告2

- 九歲大的女童被醫師診斷有風濕性心臟病，一直在小兒心臟科門診規則地接受每四個禮拜注射一針長效型盤尼西林，預防鍊球菌感染。有一次由於病兒家屬因為家中有事情以至延遲了一個多月才直接帶病兒至醫院的急診部去注射長效型盤尼西林。沒想到病兒於接受注射的瞬間，竟然發生全身型過敏性反應造成咽喉水腫、呼吸窘迫、心血管虛脫，經過醫護人員當場給予腎上腺素的注射，全力搶救並緊急送到小兒加護病房作進一步處置，病兒方才挽回一條性命。

病例報告3

九個月女嬰在吃到雞蛋的蛋白後，竟然發生全身型過敏性反應造成全身蕁麻疹、血管性水腫、呼吸窘迫、低血壓與意識不清，經過醫院急診室醫護人員全力搶救後，才逐漸恢復正常。

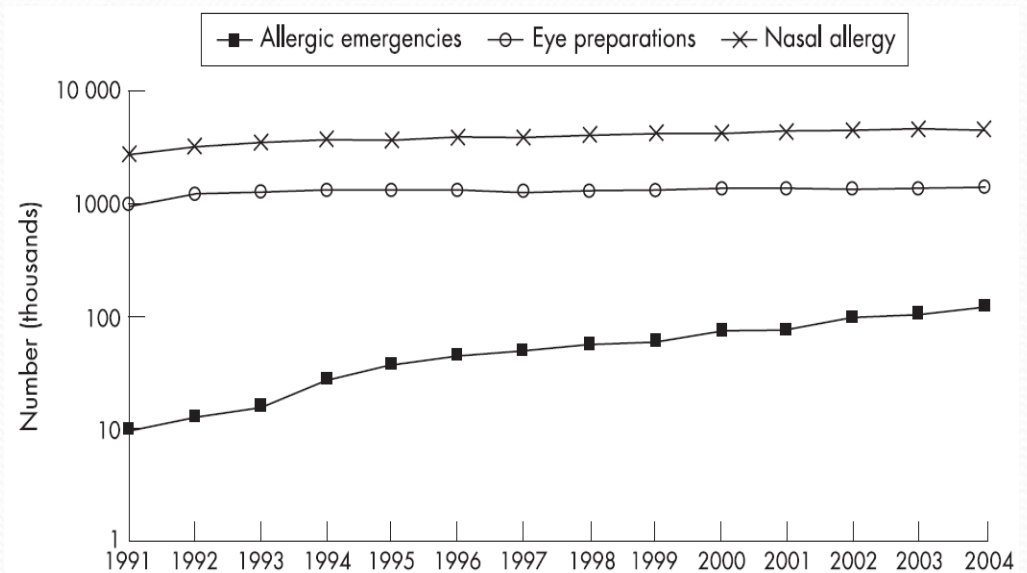
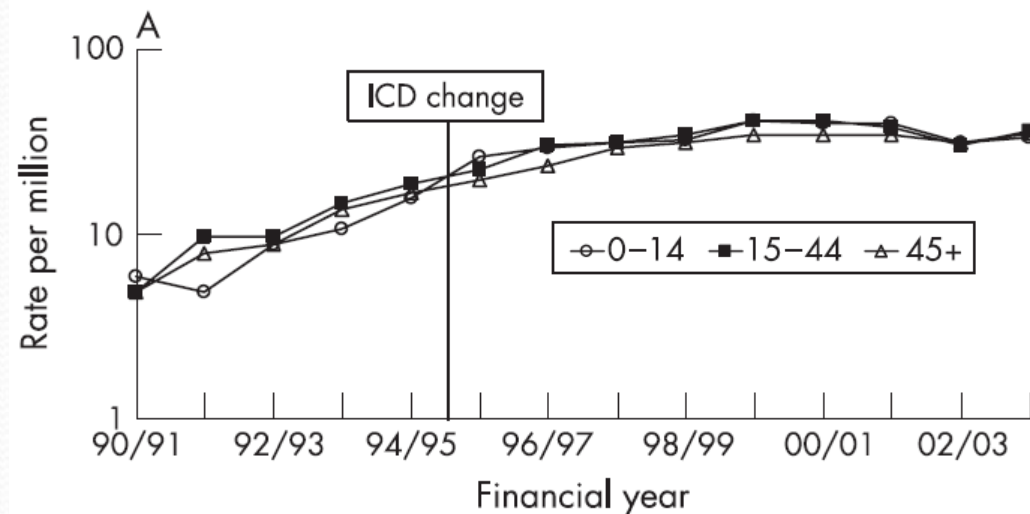
病嬰的過敏學檢查(CAP)呈現如下結果

f1	Egg white (蛋白)	0.41 kU/1	Class 1
f233	Ovomucoid (卵類黏蛋白)	0.78 kU/1	Class 2

Epidemiology of anaphylaxis

- Lifetime prevalence:
 - 1% in 1983-1987
 - ↑ to 7% in UK studies during 1990-2004

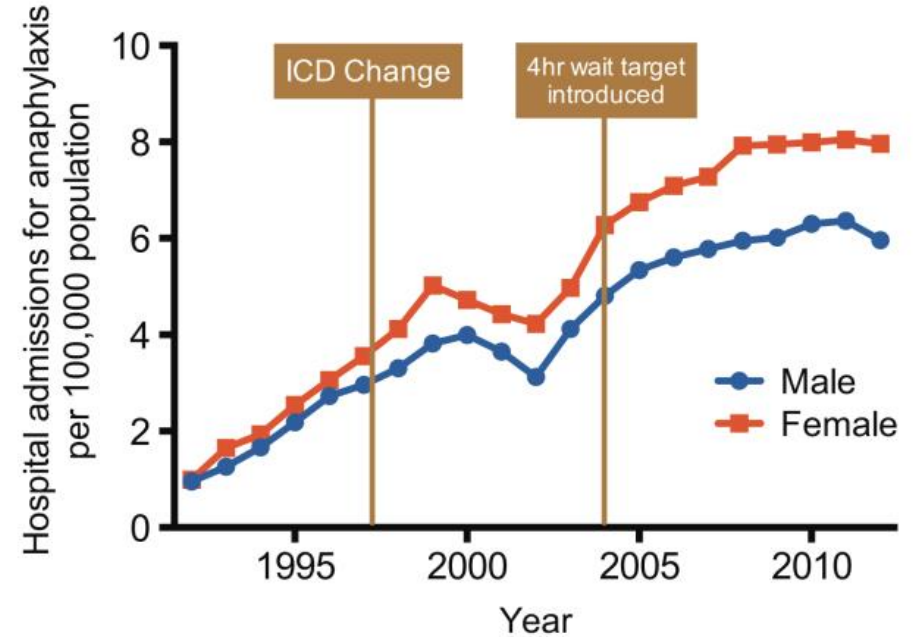
Trends in hospital admission rates for anaphylaxis



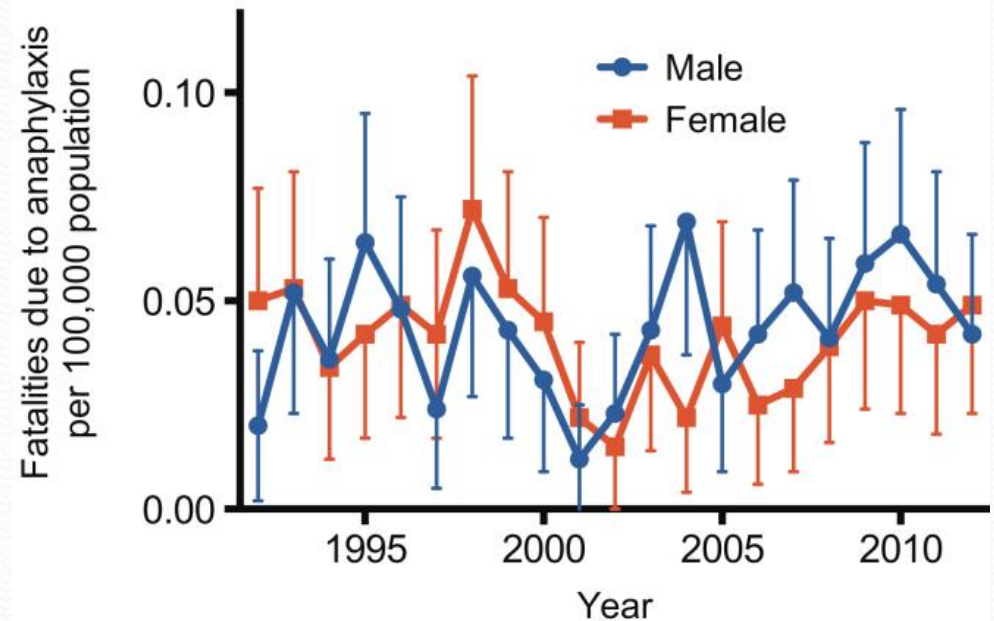
Increase in anaphylaxis-related hospitalizations but no increase in fatalities: an analysis of United Kingdom national anaphylaxis data, 1992-2012

JACI 2015;135:956-63

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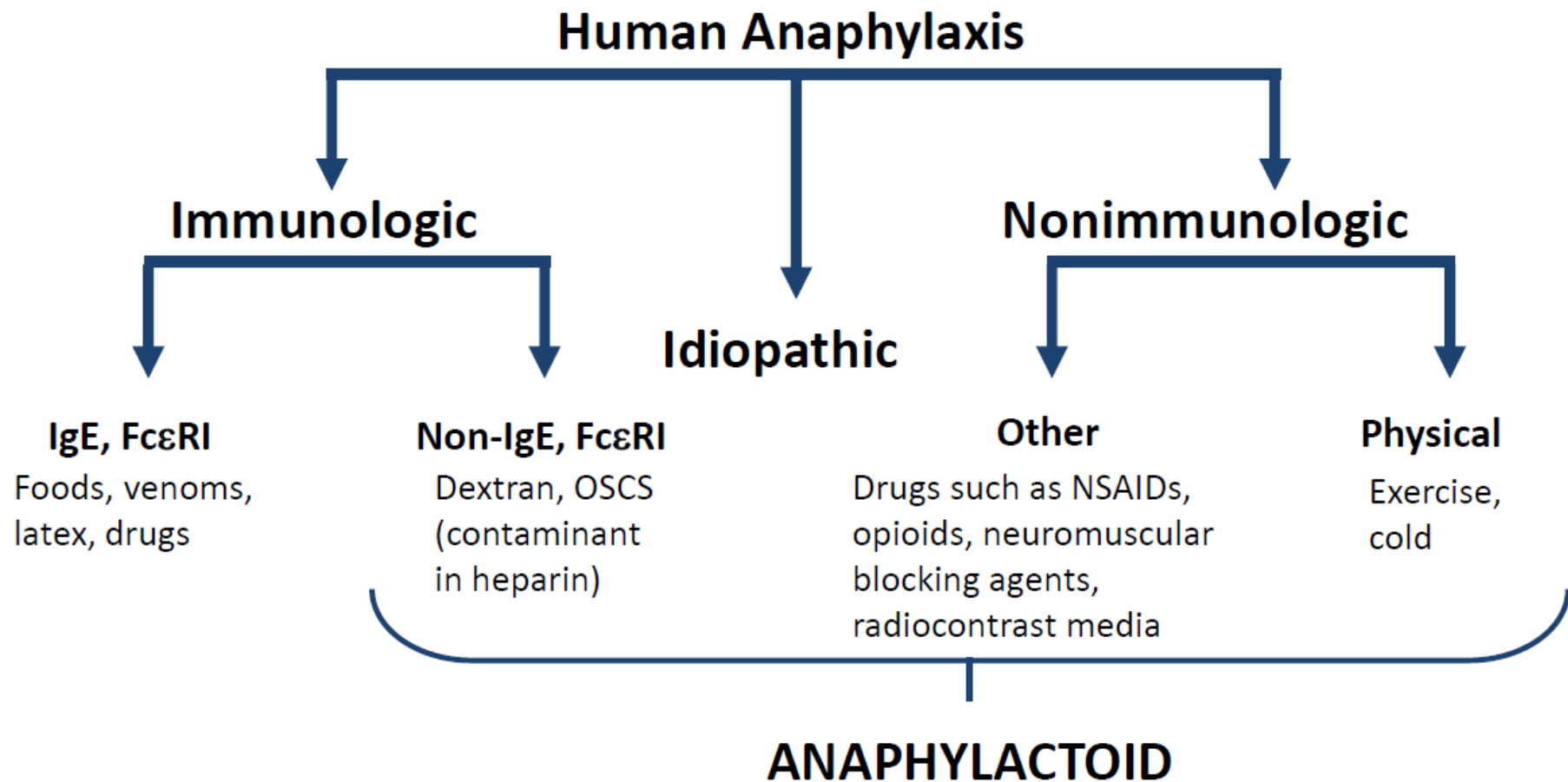
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Anaphylaxis versus Anaphylactoid reaction

- **Anaphylaxis** is a systemic, **type I hypersensitivity** reaction that occurs in sensitized individuals resulting in mucocutaneous, cardiovascular, and respiratory manifestations and can often be life threatening.
- **Anaphylactoid reactions** are identical to anaphylaxis in every way except the former are **not** mediated by immunoglobulin E (**IgE**).

Classification of Human Anaphylaxis



IgE = immunoglobulin E; FcεRI = high-affinity IgE receptor;
OSCS = over-sulfated chondroitin sulfate.

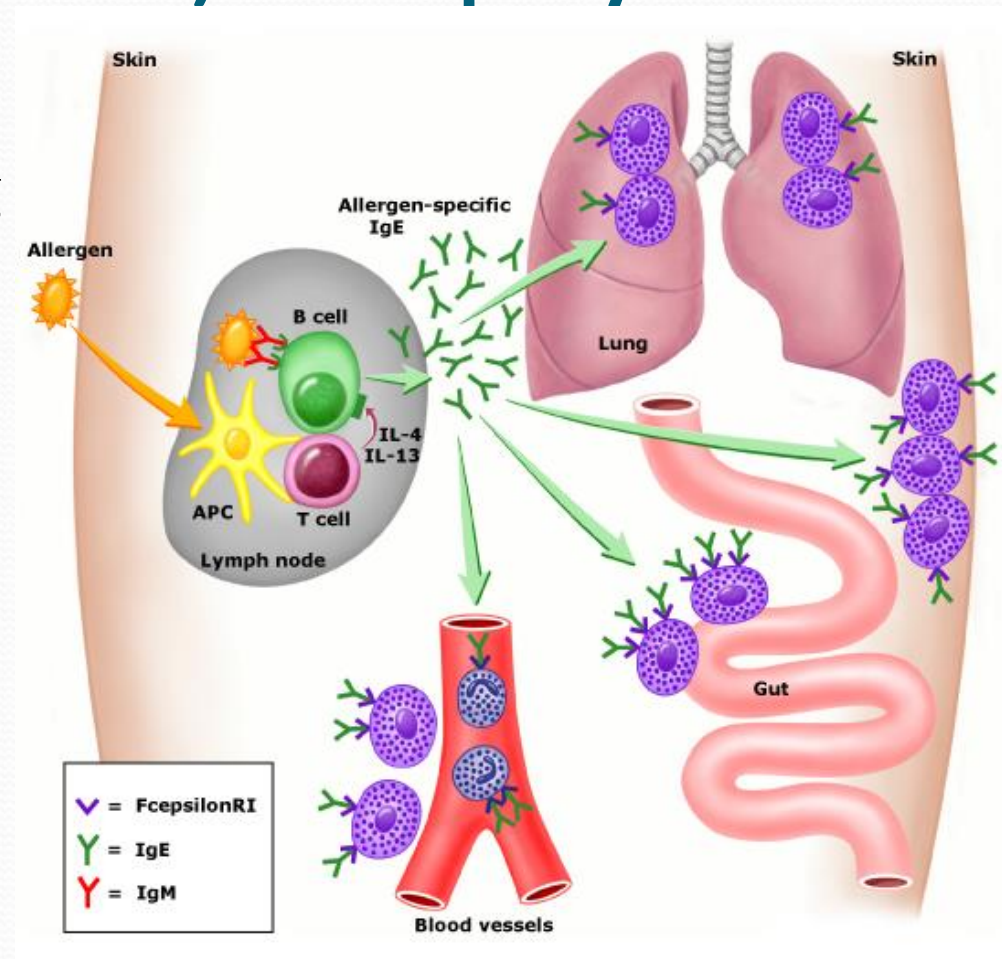
Simons FER, et al. *J Allergy Clin Immunol*. 2010;125:S161-S181.

Anaphylactic versus anaphylactoid- a dangerous distinction

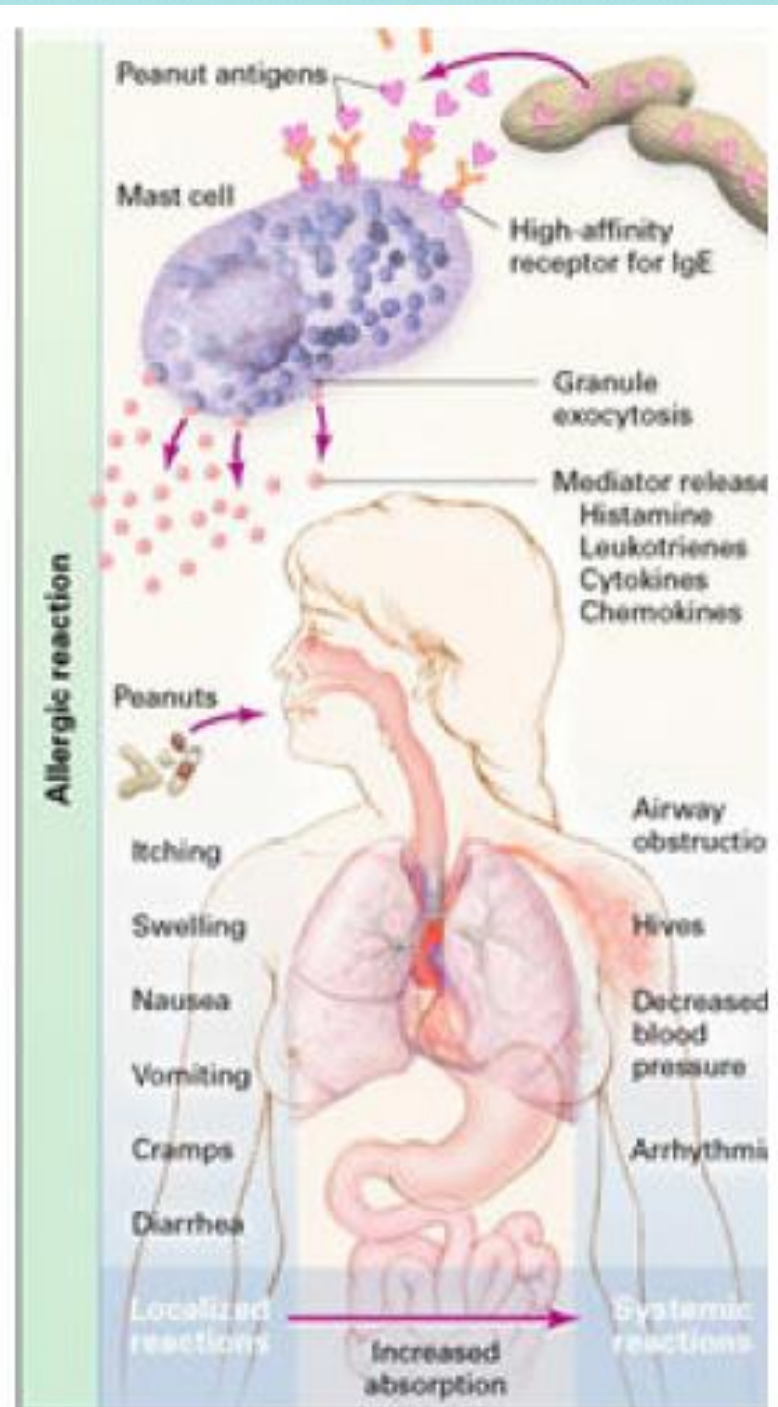
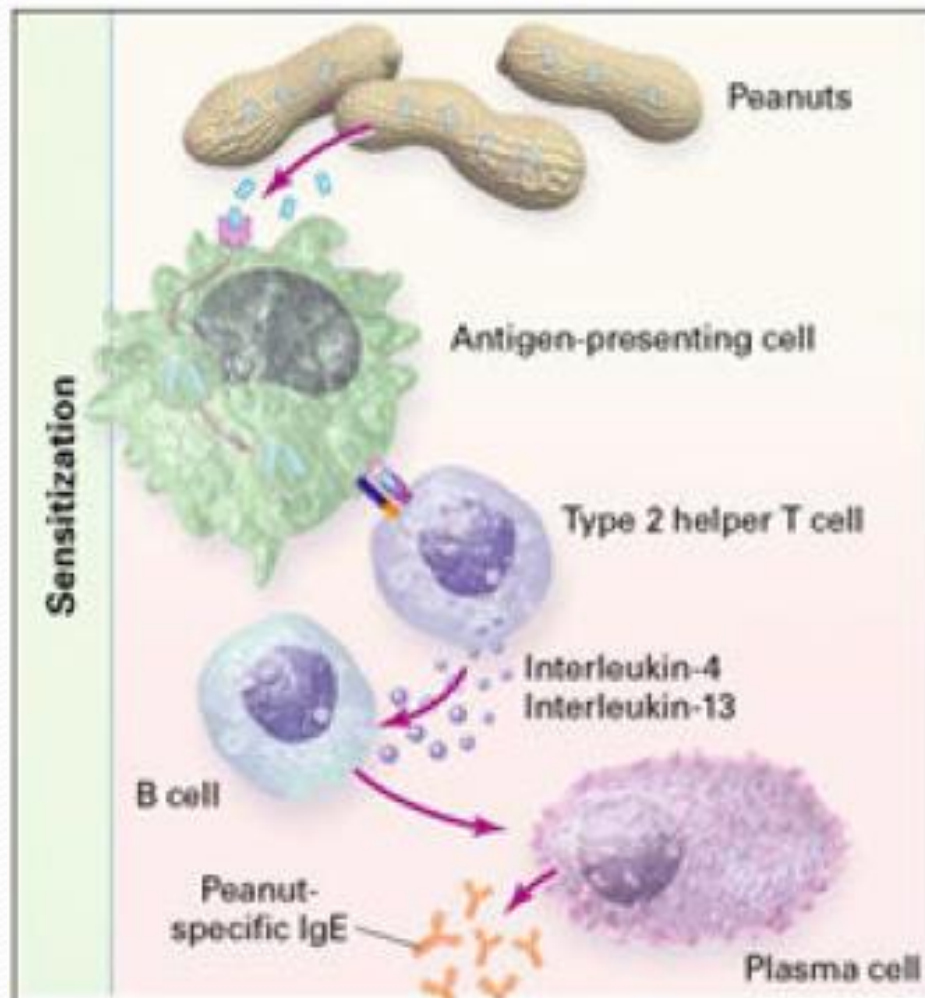
- Should be avoided
- Both are potentially **fatal** and require **emergency** treatment.
- Both involve **mast cell and basophil stimulation**.
- The **European** consensus terms:
 - **Allergic anaphylaxis**(IgE-mediated anaphylaxis)
 - **Non-allergic anaphylaxis**(non-IgE-mediated anaphylaxis)

Allergic (IgE-mediated) anaphylaxis

- Cross-linking of **specific IgE** bound to membrane $Fc\epsilon RI$ by Ag
- **Type 1 hypersensitivity**
- Occurs more often in p't with eczema, **asthma**

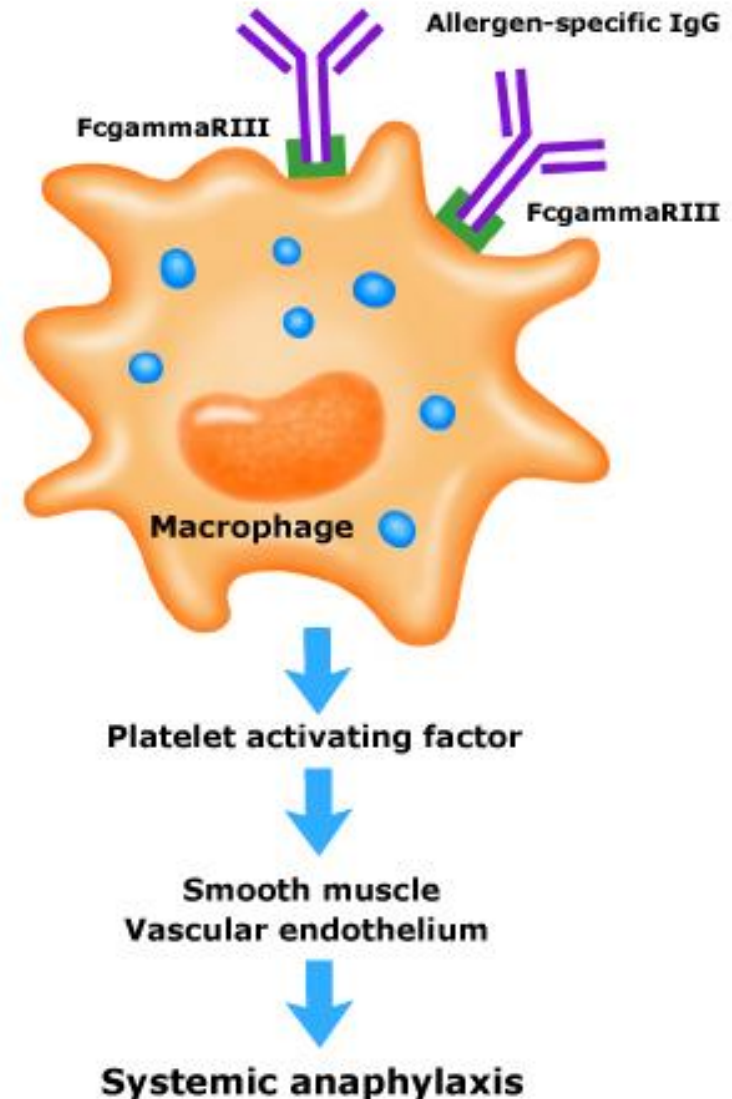


IgE mediated anaphylaxis



Non-allergic (non-IgE-mediated) anaphylaxis

- Processes bypass the need for membrane FcεRI cross-linking
 - **Directly activate mast cells and basophils.**
- Mechanisms: unknown; **cellular activation** via other cell surface **receptors?**
- Occurs to **radiocontrast media**, **salicylates**, **IgA**, **opioid drugs**.



全身型過敏性反應的誘發因素

- 造成全身型過敏性反應的常見誘發因素包括昆蟲螫刺、食物、藥物(例如，盤尼西林和麻醉劑等)、過敏原的萃取物(即注射所謂的減敏針)、生物製劑(如胰島素)、疫苗(如由禽類產製的疫苗)、診斷用藥物(如放射性對比劑)、乳膠紙(latex)、男性精液、或運動等。
- 有些病兒的誘發因素是十分明顯而易見的，例如病兒於接觸了某種特定的食物後，在短時間內產生全身型過敏性反應。但有些產生全身型過敏性反應的病兒其誘發因素則是費盡千辛萬苦仍然找不出來，我們稱之為特發性(idiopathic)全身型過敏性反應。

全身型過敏反應 馬偕病例報告

- 花生
- 堅果
- 魚類
- 蛤蜊
- 牛蛙
- 蕎麥
- 燕窩
- 雞蛋蛋白
- 鬆餅污染儲藏室塵蟎
- 麵粉
- 昆蟲螫刺
- 食物依賴性運動誘發型
- 麻疹疫苗
- 減敏針
- X光攝影對比劑

Fish induced anaphylactic reaction

SHYH-DAR SHYUR MD
Mackay Memorial Hospital, Taipei

Shyur SD, et al. Acta Pediatr Tw 1998;39(3):200-2.

Buckwheat Anaphylaxis

SHYH-DAR SHYUR MD


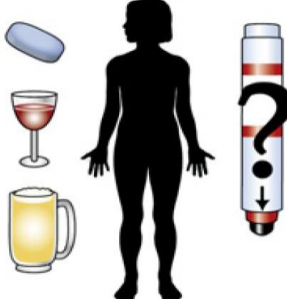

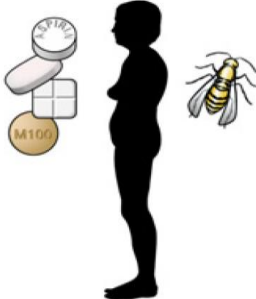


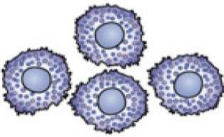
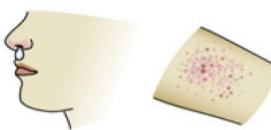

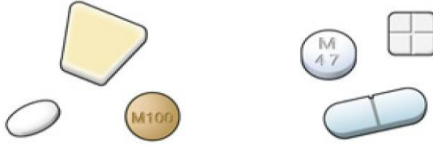





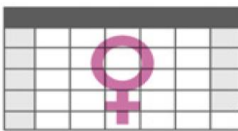
Mackay Memorial Hospital, Taipei

Wang TC, et al. Asian Pac J Allergy Immunol. 2006;24:167-70.

Systemic anaphylaxis after the ingestion of pancake contaminated with the storage mite *Blomia freemani*





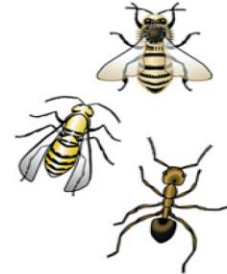


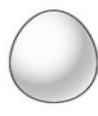









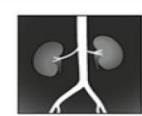


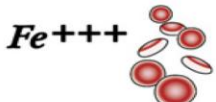
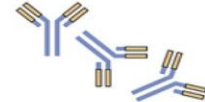




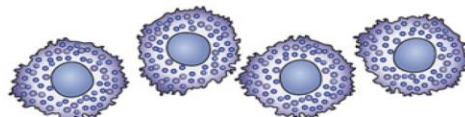
- An 8-year-old boy in whom **systemic anaphylaxis** developed shortly after the ingestion of pancakes prepared with commercial pancake flour contaminated with the **storage mite *Blomia freemani***.
- Microscopic examination of the pancake flour revealed the storage mite *Blomia freemani*. Using an immunochemical assay, we found that the **contaminated flour contained 5.4 microg/g of the allergen Blo t 5** but **no Der p 1 or Der f 1**.
- Positive rate of mite contamination over **flour or other cereal products** opened over 3 months in Taipei area is **12.9%**.

Patient factors that contribute to anaphylaxis

AGE-RELATED FACTORS*				
				
Infants Cannot describe their symptoms	Adolescents and young adults Increased risk-taking behaviors	Labor and delivery Risk from medications (e.g. antibiotic to prevent neonatal group B strep infection)	Elderly Increased risk of fatality from medication or venom-triggered anaphylaxis	
CONCOMITANT DISEASES*				
				
Asthma and other respiratory diseases	Cardiovascular diseases	Mastocytosis/clonal mast cell disorders	Allergic rhinitis and eczema**	Psychiatric illness (e.g. depression)
CONCURRENT MEDICATIONS/ETHANOL/RECREATIONAL DRUG USE*				
				
β-adrenergic blockers and ACE inhibitors***		Ethanol/sedatives/hypnotics/antidepressants/recreational drugs (potentially affect recognition of anaphylaxis triggers and symptoms)		
CO-FACTORS THAT AMPLIFY ANAPHYLAXIS*				
				
Exercise	Acute infection (e.g. a cold or fever)	Emotional stress	Disruption of routine (e.g. travel)	Premenstrual status (females)

Anaphylaxis

mechanisms and triggers

IMMUNOLOGIC MECHANISMS (IgE dependent)					
 peanut		 tree nuts		 shellfish	
 fish		 stinging insects		 β-lactam antibiotics*	
 milk		 egg		 soybean	
 peach		 sesame		 NSAIDs* **	
 biologic agents*					
Foods		Venoms		Medications*	
 Natural rubber latex		 Occupational allergens		 Seminal fluid	
 Aeroallergens		 Radiocontrast media*			
IMMUNOLOGIC MECHANISMS (IgE independent)					
 Radiocontrast media*		 NSAIDs* **		 Dextrans	
		(e.g. HMW*** iron or other source)		 Biologic agents*	
		(e.g. some monoclonal antibodies)			
NONIMMUNOLOGIC MECHANISMS (Direct mast cell activation)					
 Physical factors		 Ethanol		 Medications*	
(e.g. exercise, cold, heat, sunlight)				(e.g. opioids)	
IDIOPATHIC ANAPHYLAXIS (No apparent trigger)					
 Previously unrecognized allergen?		 Mastocytosis/clonal mast cell disorder?			
*Trigger anaphylaxis by more than one mechanism **NSAIDs, non-steroidal anti-inflammatory drugs ***HMW, high molecular weight					

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ANAPHYLAXIS PATHOGENESIS

MECHANISMS

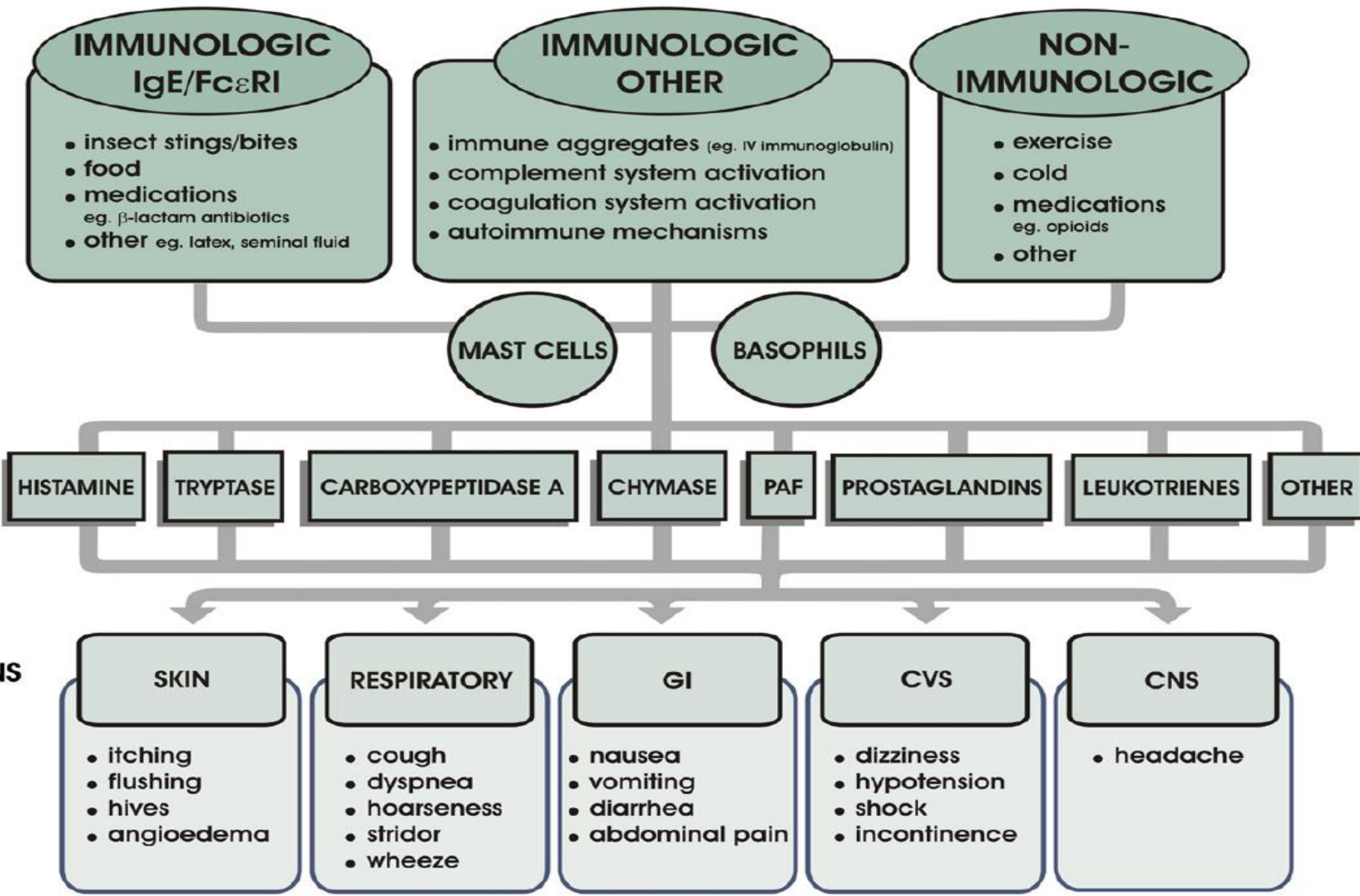
TRIGGERS

KEY CELLS

MEDIATORS

TARGET ORGANS

SYMPTOMS



全身型過敏性反應的臨床症狀

- 全身型過敏性反應臨床症狀的嚴重度、起始時間、和病程是因人而異，且千變萬化的，它可由輕微的全身病變至嚴重到咽喉水腫、心血管虛脫，甚至因而死亡。
- 全身型過敏性反應的臨床症狀發作早期常見先產生皮膚紅斑或癢感，再逐漸演變成蕁麻疹和血管性水腫。
- 病兒常有即將死亡的感覺：“A sense of impending doom”: feel extremely ill, as if are going to die
- 病兒常抱怨頭暈或昏厥有時合併血壓過低。

全身型過敏性反應的臨床症狀

- 病兒亦常有胃腸症狀，包括噁心、嘔吐、腹部痙攣、和腹瀉。
- 病兒常見的上呼吸道阻塞現象包括聲音嘶啞、發聲困難、或吞嚥困難，而下呼吸道阻塞現象，則包括喘鳴和胸部緊繃。
- 其它症狀尚包括鼻子、眼睛、和顎部的癢感。
- 有些病兒甚至以知覺喪失或抽搐為其發生全身型過敏性反應的第一次臨床表徵。

TABLE I. Frequency of occurrence of signs and symptoms of anaphylaxis*†

Signs and symptoms

Cutaneous	90%
Urticaria and angioedema	85%-90%
Flushing	45%-55%
Pruritus without rash	2%-5%
Respiratory	40%-60%
Dyspnea, wheeze	45%-50%
Upper airway angioedema	50%-60%
Rhinitis	15%-20%
Dizziness, syncope, hypotension	30%-35%
Abdominal	
Nausea, vomiting, diarrhea, cramping pain	25%-30%
Miscellaneous	
Headache	5%-8%
Substernal pain	4%-6%
Seizure	1%-2%

*On the basis of a compilation of 1865 patients reported in references 1 through 14.

†Percentages are approximations.

Grading of Anaphylactic/Anaphylactoid Reactions

According to Severity of Clinical Systems

Severity Grade	Skin	Gastrointestinal Tract	Respiratory Tract	Cardiovascular Tract
I	Pruritus Flush Urticaria Angioedema	No symptoms	No symptoms	No symptoms
II	Pruritus Flush Urticaria Angioedema (not mandatory)	Nausea Cramping	Rhinorrhea Hoarseness Dyspnea	Tachycardia Drop of RR Arrhythmia
III				Full shock
IV				Cardiac and/or respiratory arrest

From Ring J, Messme. Lancet 1977; 1:466.

Biphasic anaphylactic reaction

- second phase or reoccurrence occurring after first usually within **6-8 hours** (range **1-78 hours**)
- • Reported incidence **1-20%**
- • Range 1-78 hours, usually 6-8 hours after resolution of first episode
- • **Fatalities** reported; range **2-7%**
- • Levels 2-4 anaphylaxis events
- • **Undertreated initial phase**
- • **Immunotherapy reported 10-23% biphasic reactions**

Biphasic anaphylactic reaction

- Risk factors considered
- 1. Oral antigen
- 2. Medication: **beta-blocker; ACE Inhibitor**
- 3. **Delayed onset of 30 minutes** between antigen and symptoms
- 4. Cardiovascular events especially **hypotension** or **Laryngeal edema** during **initial event**

Biphasic anaphylactic reaction

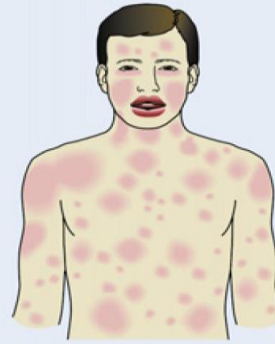
- **Protracted: prolonged reactions**
- **Fatalities ~5% reported**
- **Multiple stings or antigen deposited (IM injection or in oil)**
- **Iatrogenic prolonged exposure**
- **Undertreated or unrecognized initial phase**

Clinical criteria for the diagnosis of anaphylaxis

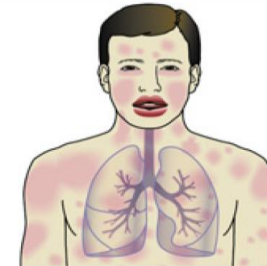
Anaphylaxis is highly likely when any one of the following three criteria is fulfilled:

1

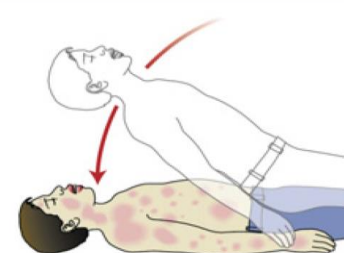
Sudden onset of an illness (minutes to several hours), with involvement of the skin, mucosal tissue, or both (e.g. generalized hives, itching or flushing, swollen lips-tongue-uvula)



AND AT LEAST ONE
OF THE FOLLOWING:



Sudden respiratory symptoms and signs
(e.g. shortness of breath, wheeze, cough, stridor, hypoxemia)

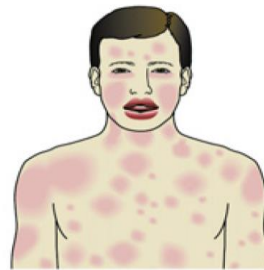


Sudden reduced BP or symptoms of end-organ dysfunction (e.g. hypotonia [collapse], incontinence)

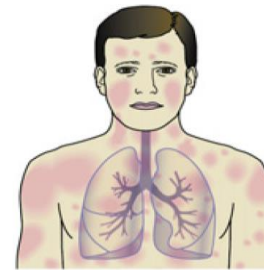
OR

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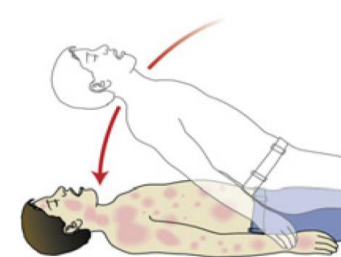
Two or more of the following that occur suddenly after exposure to a *likely allergen or other trigger** for that patient (minutes to several hours):



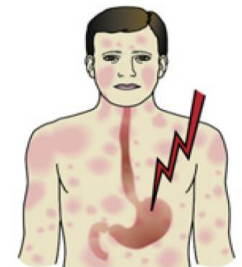
Sudden skin or mucosal symptoms and signs
(e.g. generalized hives, itch-flush, swollen lips-tongue-uvula)



Sudden respiratory symptoms and signs
(e.g. shortness of breath, wheeze, cough, stridor, hypoxemia)



Sudden reduced BP or symptoms of end-organ dysfunction (e.g. hypotonia [collapse], incontinence)



Sudden gastrointestinal symptoms (e.g. crampy abdominal pain, vomiting)

OR

3

Reduced blood pressure (BP) after exposure to a *known allergen*** for that patient (minutes to several hours):



Infants and children: low systolic BP (age-specific) or greater than 30% decrease in systolic BP***



Adults: systolic BP of less than 90 mm Hg or greater than 30% decrease from that person's baseline

Table 1 Diagnostic clinical criteria for anaphylaxis

Anaphylaxis is highly likely when any one of the following three conditions exists:

1. Acute onset of symptoms (minutes to several hours) with mucocutaneous involvement AND one of the following:
 - a. Respiratory compromise
 - b. Reduced blood pressure or associated symptoms of end-organ dysfunction (hypotonia, syncope, incontinence)
2. Two or more of the following that occur after exposure to a *likely* allergen for that patient (minutes to several hours):
 - a. Mucocutaneous involvement
 - b. Respiratory compromise
 - c. Reduced blood pressure or associated symptoms
 - d. Persistent gastrointestinal symptoms
3. Reduced blood pressure after exposure to *known* allergen for that patient (minutes to several hours):
 - a. Infants and children ≤ 10 years: low systolic blood pressure (age-specific) or $>30\%$ decrease in systolic blood pressure*
 - b. Children ≥ 11 years and adults: systolic blood pressure of <90 mmHg or $>30\%$ decrease from that person's baseline

Adapted from [2^{••}] (p. 393).

* Low systolic blood pressure for children is defined as <70 mmHg from 1 month to 1 year, <70 mmHg + $(2 \times \text{age})$ from 1 to 10 years.

全身型過敏性反應的實驗室診斷

- 全身型過敏性反應的特異性實驗室檢查可能有：
 - 血清中或尿中**組織胺**濃度上升
 - 血清中**tryptase**濃度上升
- 但這些過敏產生的物質會隨著時間而消失，理想的監測時間如下
 - 血清中**組織胺**濃度:全身型過敏性反應症狀發生後10分鐘到一小時
 - 尿中**組織胺**濃度(Urinary methyl-histamine):持續較久可長達24小時
 - 血清中**tryptase**濃度:全身型過敏性反應症狀發生後一到二小時，不超過六小時

Mature and total tryptase levels

Clinical condition	Tryptase levels (ng/mL)		Total/mature tryptase ratio
	Total	Mature	
Normal	1-15 (Immunocap® upper range of normal = 11.4)	<1	NA
Systemic anaphylaxis (acute)	> baseline	>1*	<10
Systemic mastocytosis (nonacute)	>20•	<1	>20

NA: not available.

* Level related to clinical severity (hypotension), timing of sample collection in relation to onset of signs and symptoms, and nature of the anaphylactic stimulus.

• Reflects primarily the total body burden of mast cells when subject is in a non-anaphylactic state.

CONFIRM THE ANAPHYLAXIS TRIGGER

RETAKE HISTORY OF THE EPISODE

GET MORE DETAILS RE:

- EXPOSURES
- EVENTS
- CHRONOLOGY



RETAKE COMPLETE MEDICAL HISTORY

- CONCOMITANT DIAGNOSES
 - ASTHMA
 - CARDIOVASCULAR DISEASE
 - MASTOCYTOSIS
 - OTHER
- CONCURRENT MEDICATIONS
 - β BLOCKERS
 - ACE INHIBITORS
 - OTHER



SKIN TESTS

- PRICK/PUNCTURE
 - FOODS
 - OTHER
- INTRADERMAL
 - INSECT VENOMS
 - β -LACTAM ANTIBIOTICS



ALLERGEN-SPECIFIC IgE MEASUREMENTS, QUANTITATIVE



CHALLENGE TESTS

- MAY/MAY NOT BE INDICATED
- ALLERGEN-SPECIFIC
 - FOOD
 - MEDICATION

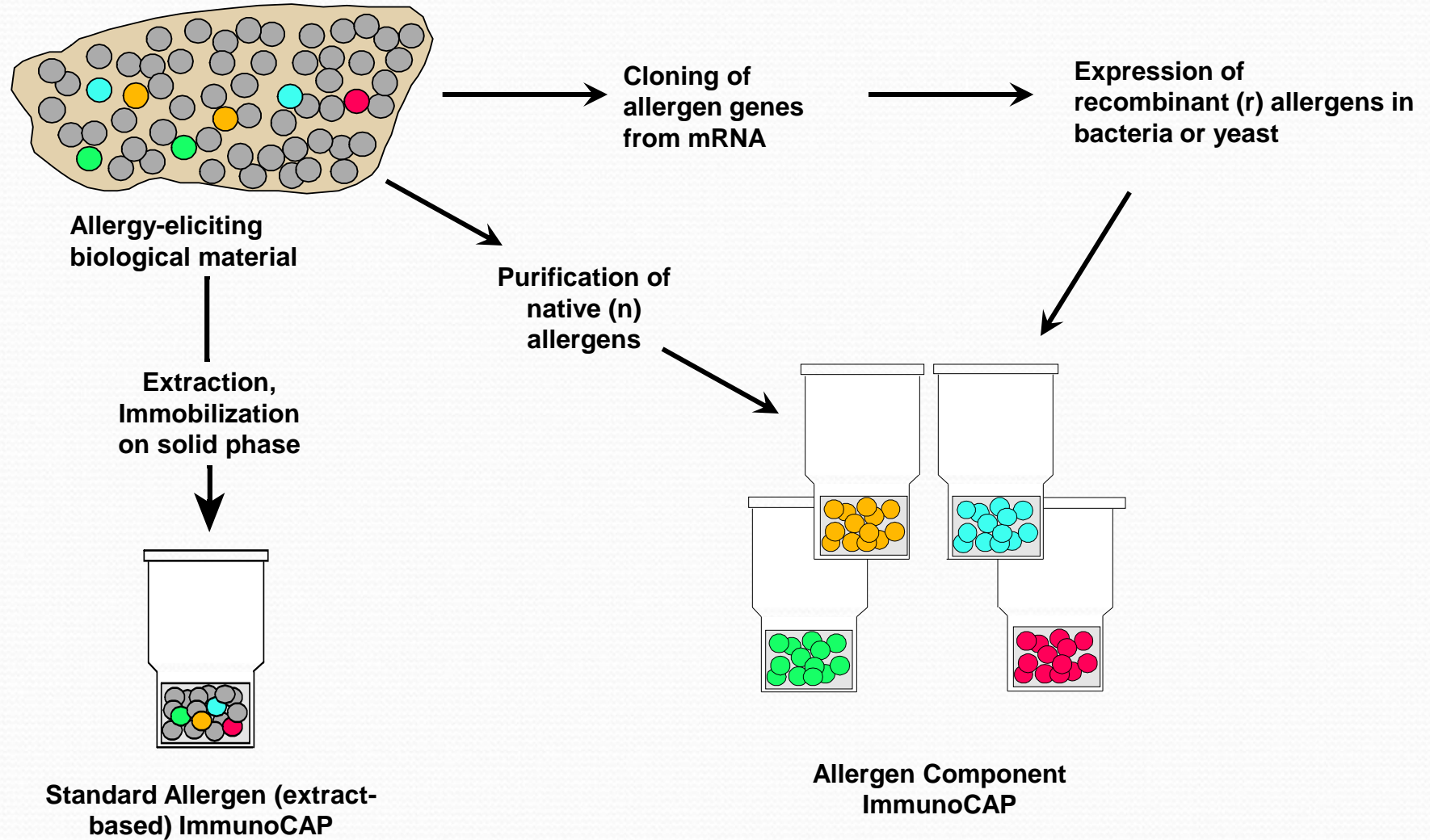
(PROCEED WITH CAUTION!)
- ALLERGEN NON-SPECIFIC
 - EXERCISE
 - COLD
 - OTHER



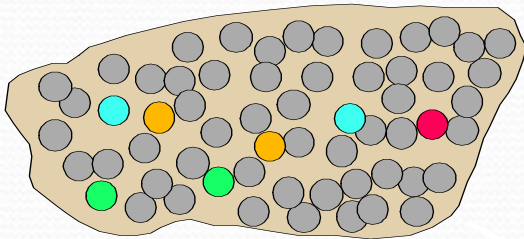
OTHER ASSESSMENTS, AS INDICATED

- IDIOPATHIC ANAPHYLAXIS
 - SERUM TRYPTASE*
 - AUTOIMMUNE WORK-UP*

Allergen Components

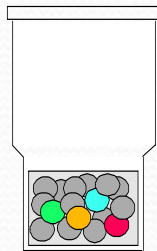


Allergen Components



Allergy-eliciting
biological material

Extraction,
Immobilization
on solid phase



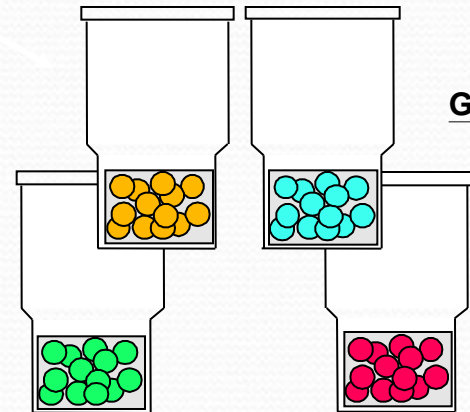
Standard Allergen (extract-
based) ImmunoCAP
F1 egg white

Cloning of
allergen genes
from mRNA

Expression of
recombinant (r) allergens in
bacteria or yeast

Purification of
native (n)
allergens

Gal d 2



Gal d 1
ovomucoid



Marker of
severity

Allergen Component
ImmunoCAP

Gal d 3

Gal d 4

Marker of
Cross
reactions



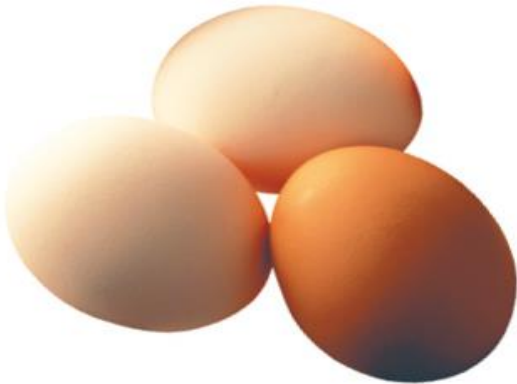
Suspicion of egg allergy

Is it allergy? Risk for clinical reactions?

Test with ImmunoCAP® Allergen
Egg white (f1) + Ovomucoid (f233)

Egg white: neg
Ovomucoid: neg

Low risk for clinical
reactions to egg



Egg white: pos
Ovomucoid: neg

Risk for clinical
reactions to egg

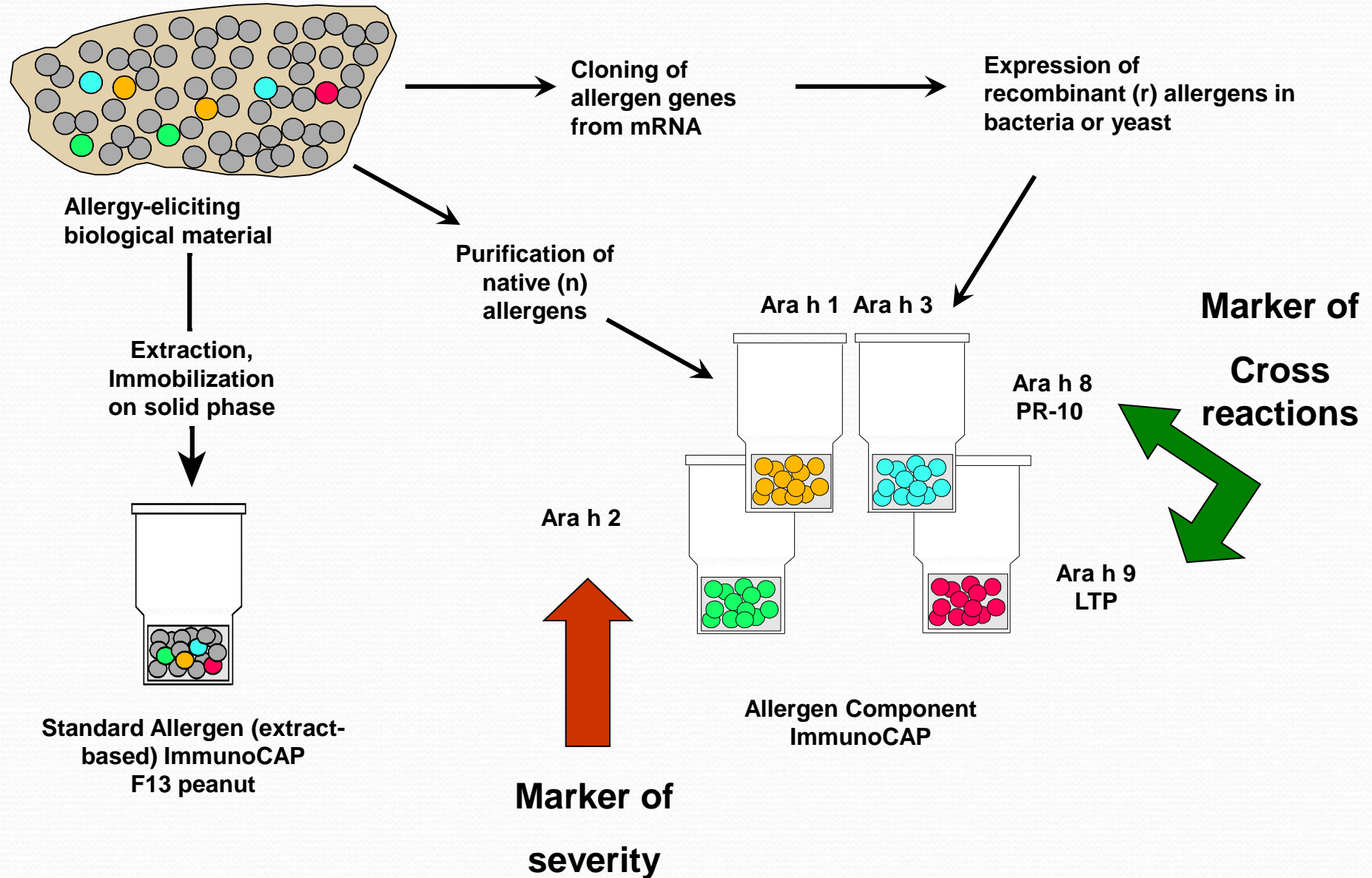
Absence of
IgE antibodies to ovomucoid
indicates tolerance to
ingestion of hard-boiled and
egg in baked cakes

Egg white: pos
Ovomucoid: pos

High risk for clinical
reactions to egg

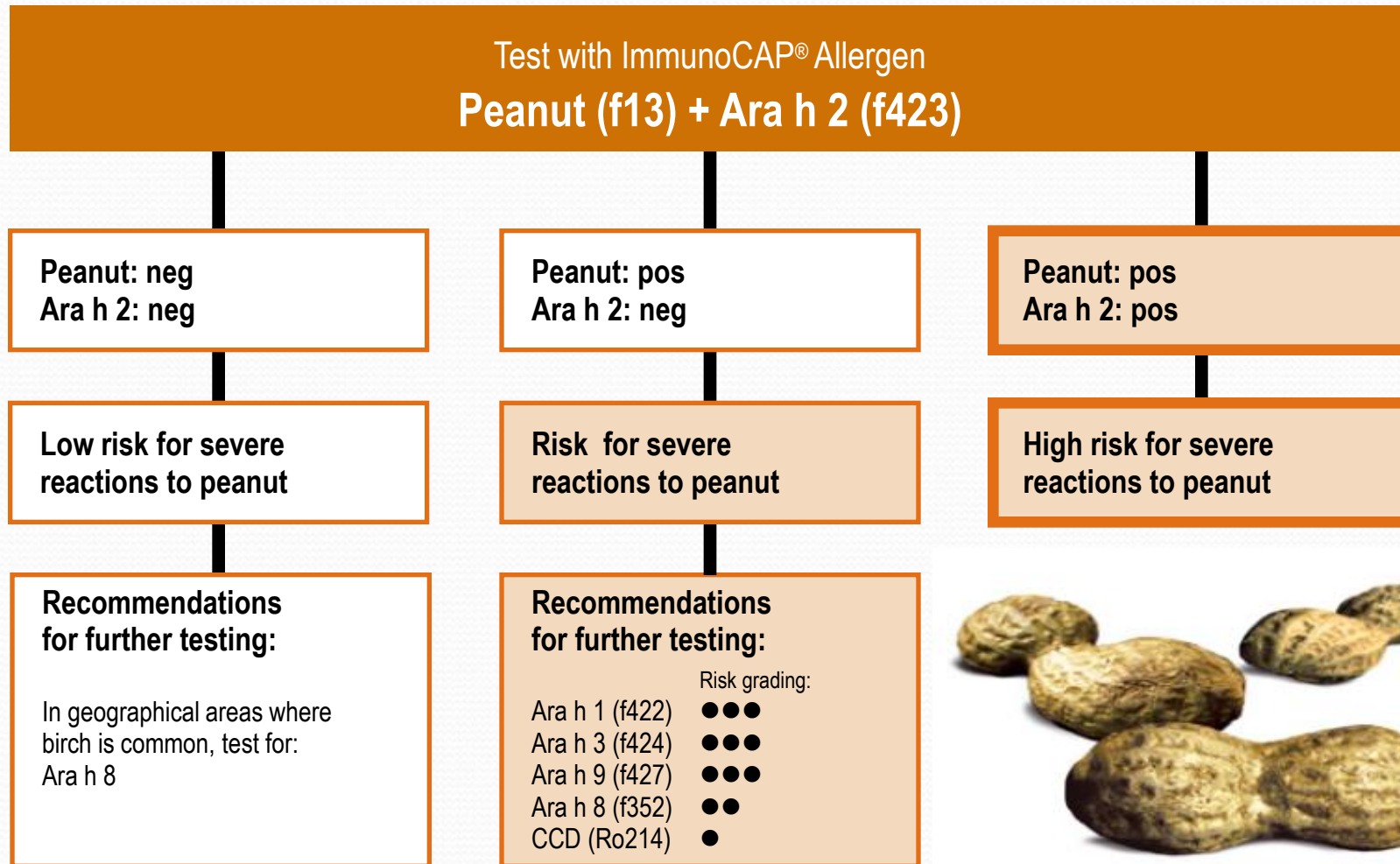
Increased risk for
persistent egg allergy

Allergen Component



Suspicion of peanut allergy

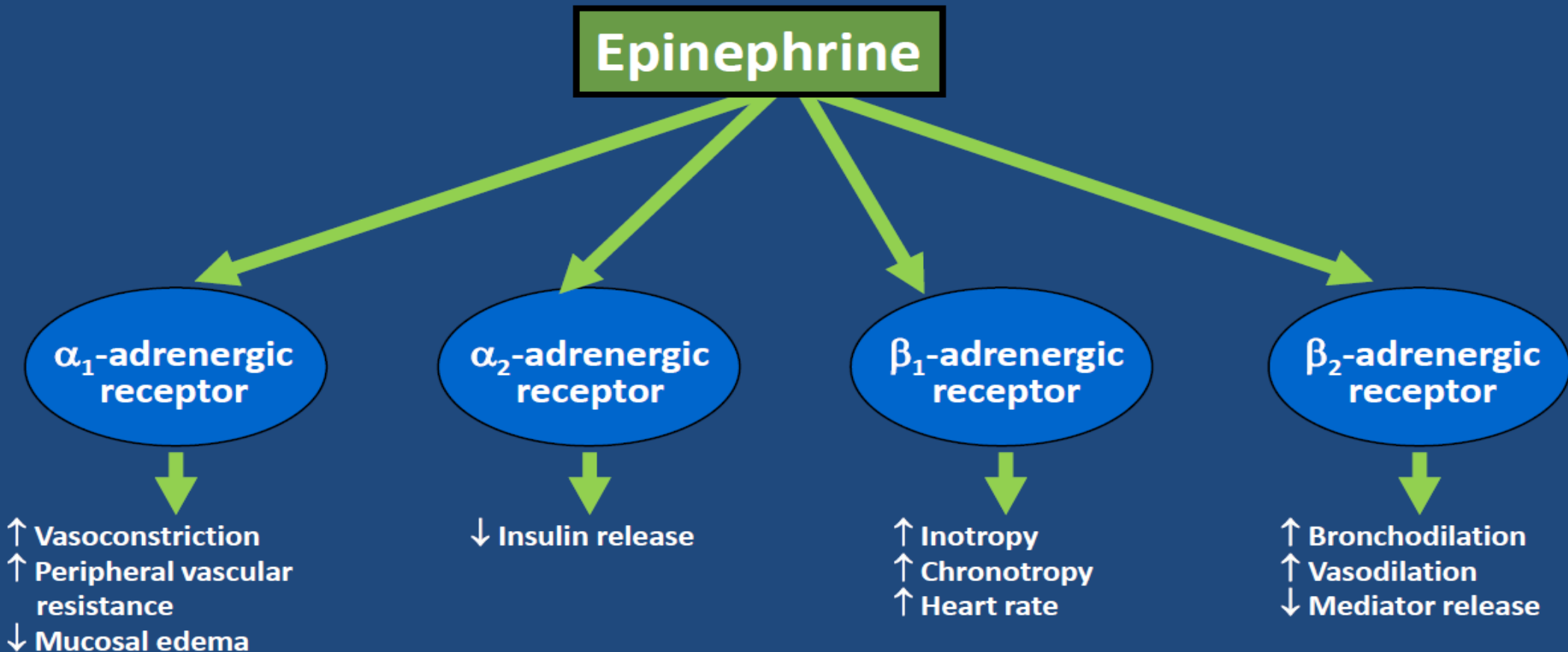
Is it allergy? Risk for severe reactions?



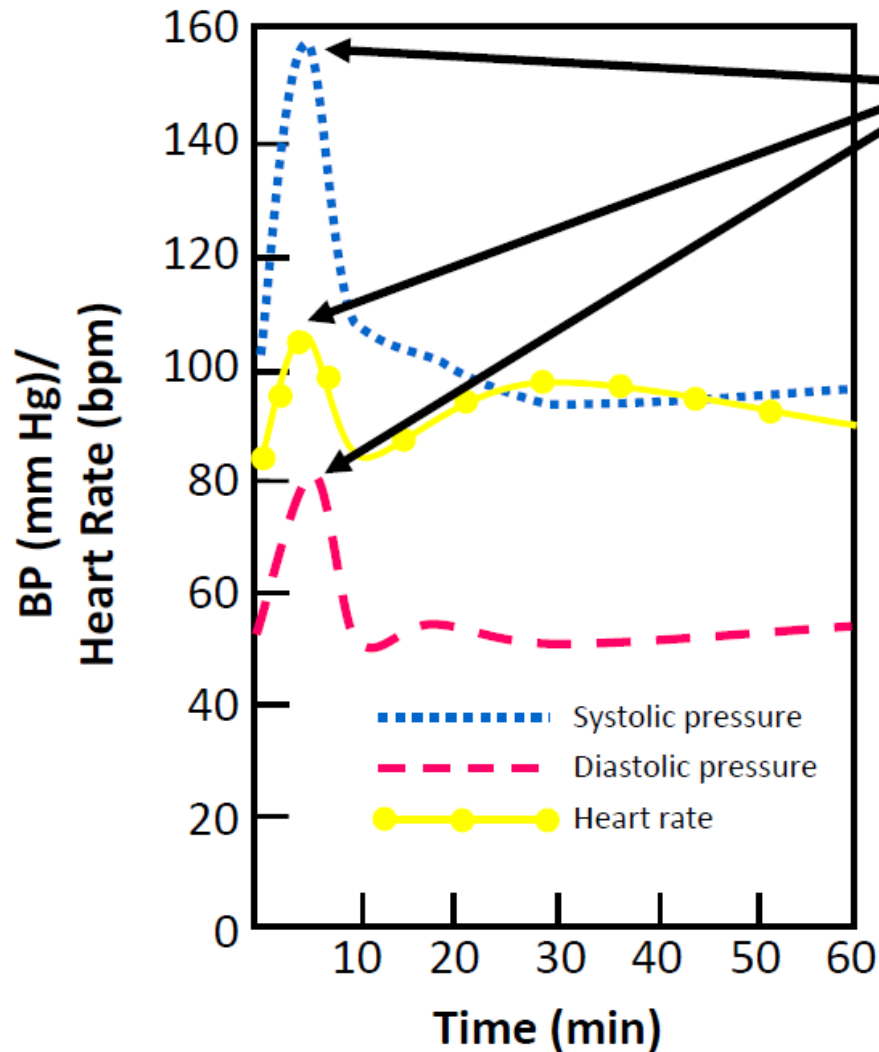
全身型過敏性反應的處理原則

- 為了要將全身型過敏性反應再次發生機會降到最低，我們必須找出造成此反應的**確定原因**，並且要正確教導病兒及其家屬如何去**避免**之，以及再次遇到此種狀況時的緊急處置方式。我們建議病兒須隨身攜帶各種形式的**隨身卡**，上面詳細記載會引起其本身全身型過敏性反應的誘發因素、臨床症狀、以及緊急處理或送醫治療的方法。
- 隨身攜帶**自我注射型的腎上腺素**對曾經發生過全身型過敏性反應的病兒，會有異想不到的救命效果。

Action of Epinephrine



IM Epinephrine: Onset of Effect



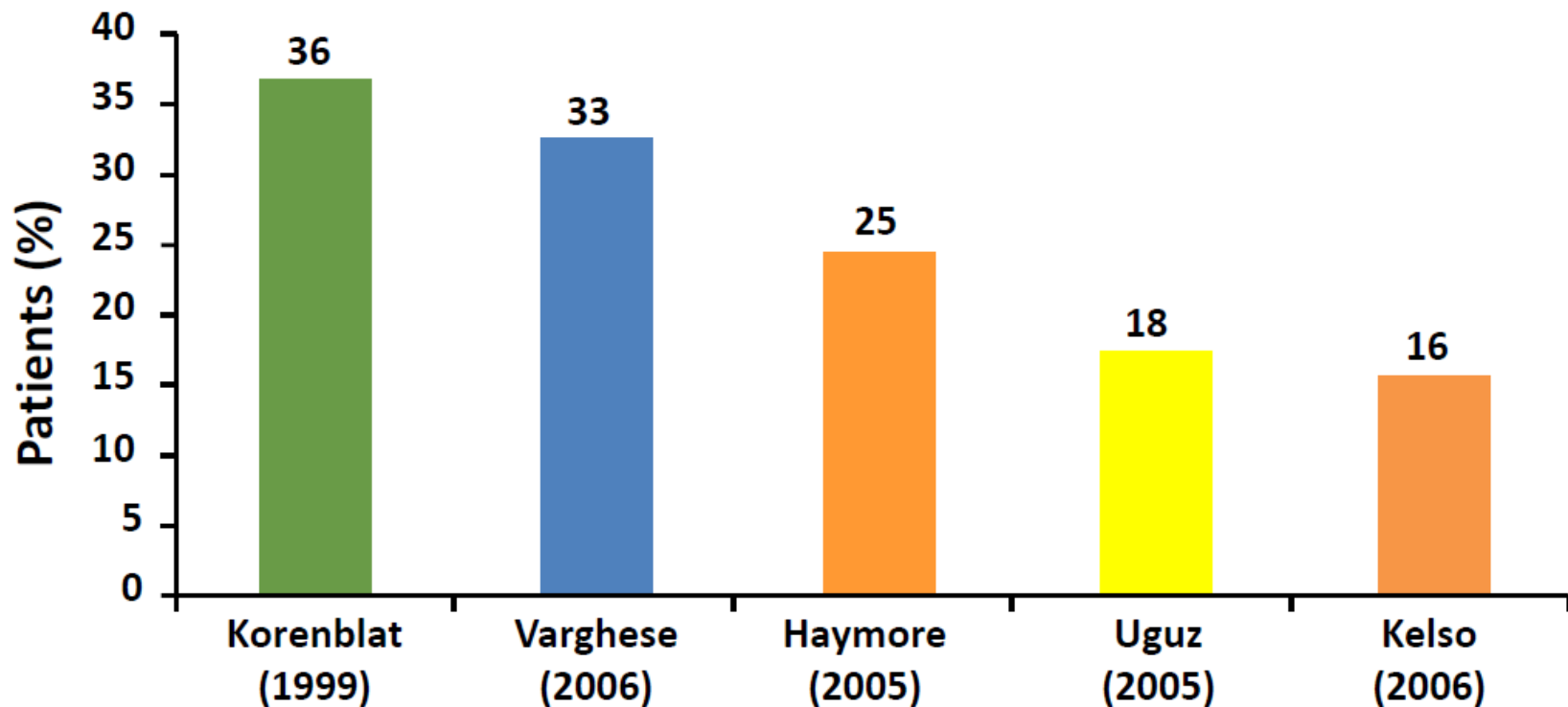
Maximum pharmacodynamic effect occurs before 10 minutes

- Systolic pressure
- Diastolic pressure
- Heart rate

Epinephrine absorption was delayed in the children receiving SQ injection vs IM injection

Frequency of Need for 2 Doses of Epinephrine Regardless of Cause

Patients Requiring >1 Dose of Epinephrine

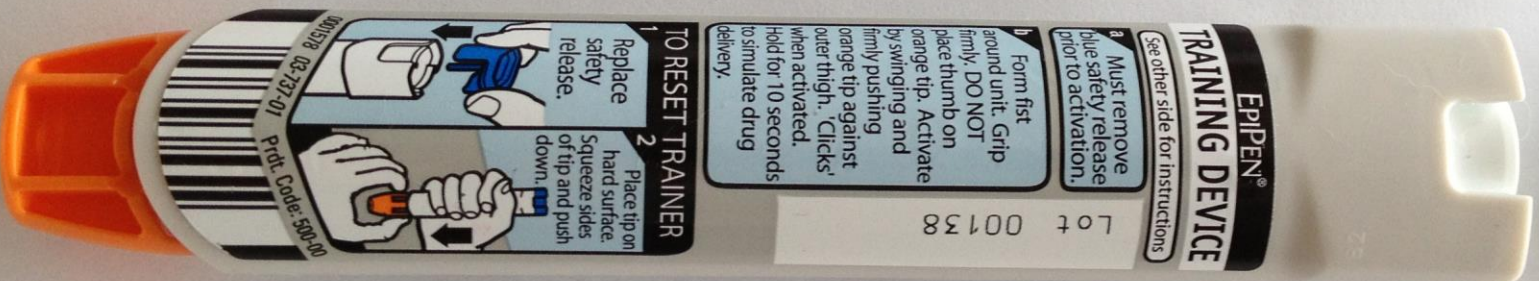
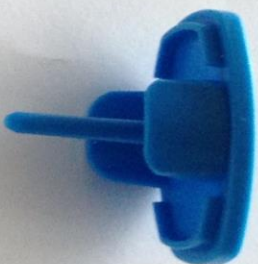


Korenblat P, et al. *Allergy Asthma Proc.* 1999;20:383-386; Varghese M, Lieberman P. *J Allergy Clin Immunol.* 2006;117(2, suppl):S305. Abstract 1178; Haymore BR, et al. *Allergy Asthma Proc.* 2005;26(5):361-365; Uguz A, et al. *Clin Exp Allergy.* 2005;35:746-750; Kelso JM. *J Allergy Clin Immunol.* 2006;117(2):464-465.

EpiPen:



Mid-point of the anterolateral thigh (the bottom right of the right trouser pocket)



EpiPen®/EpiPen® Jr: Directions for Use



EpiPen®/EpiPen® Jr: Directions for Use



EpiPen®/EpiPen® Jr: Directions for Use



全身型過敏性反應的處理原則

- 對全身型過敏性反應病兒的最佳處置策略為預防重於治療和提高警覺、早期診斷、早期治療。
- 一旦發生全身型過敏性反應，醫護人員須先儘速給予病兒注射型的腎上腺素(每公斤體重0.01毫升，最多0.3毫升)。
- 如係因於四肢注射或接觸誘發因素所造成者，除了須用止血帶綁住四肢的近端外，兩劑量的腎上腺素可分別於誘發因素在四肢的注射或接觸處以及止血帶外的適當身體部位注射之。
- 緊急處理全身型過敏性反應病兒所必備的緊急處置裝備，尚須包括氧氣、注射型的抗組織胺、靜脈注射型的類固醇、口腔咽喉的人工氣道、以及維持靜脈輸液治療的設備。

Basic management of anaphylaxis

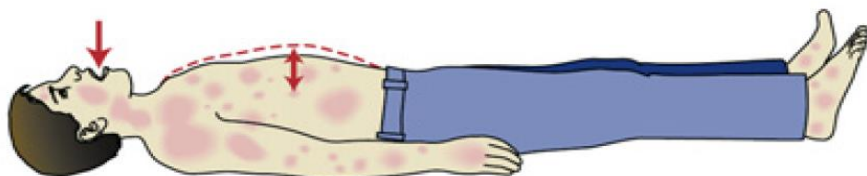
1

Have a written emergency protocol for recognition and treatment of anaphylaxis and rehearse it regularly.

2

Remove exposure to the trigger if possible, eg. discontinue an intravenous diagnostic or therapeutic agent that seems to be triggering symptoms.

3



Assess the patient's circulation, airway, breathing, mental status, skin, and body weight (mass).

4



Promptly and simultaneously, perform steps 4, 5 and 6.

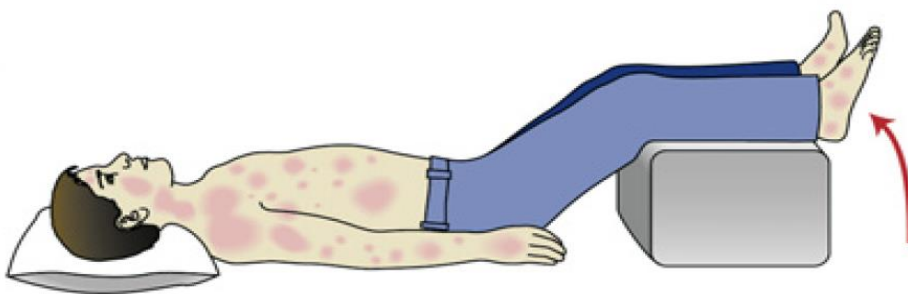
Call for help: resuscitation team (hospital) or emergency medical services (community) if available.

5



Inject epinephrine (adrenaline) intramuscularly in the mid-anterolateral aspect of the thigh, 0.01 mg/kg of a 1:1,000 (1 mg/mL) solution, maximum of 0.5 mg (adult) or 0.3 mg (child); **record the time of the dose and repeat it** in 5-15 minutes, if needed. Most patients respond to 1 or 2 doses.

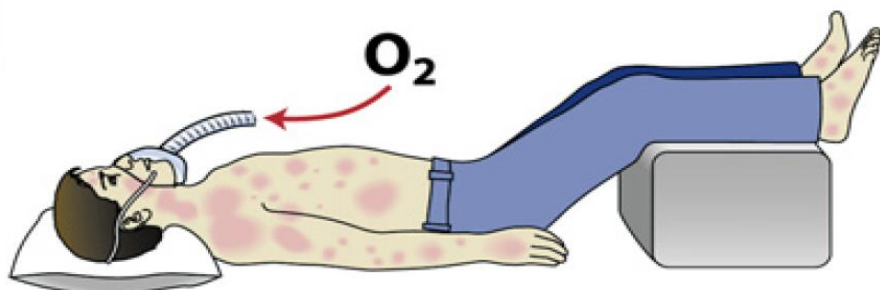
6



Place patient on the back or in a position of comfort if there is respiratory distress and/or vomiting; **elevate the lower extremities**; fatality can occur within seconds if patient stands or sits suddenly.

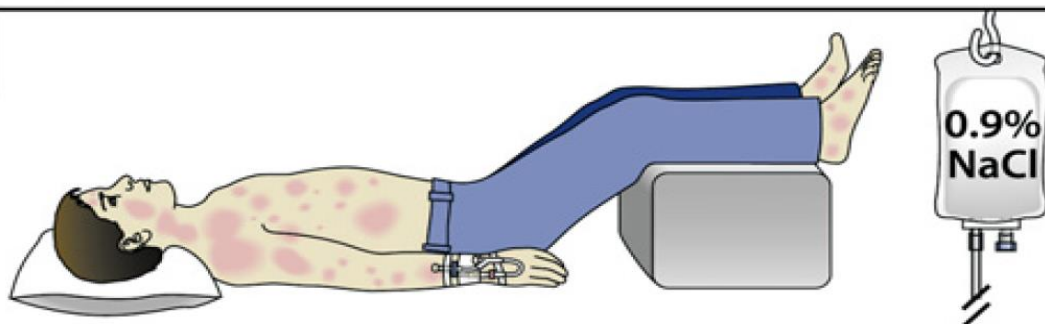
Basic management of anaphylaxis

7



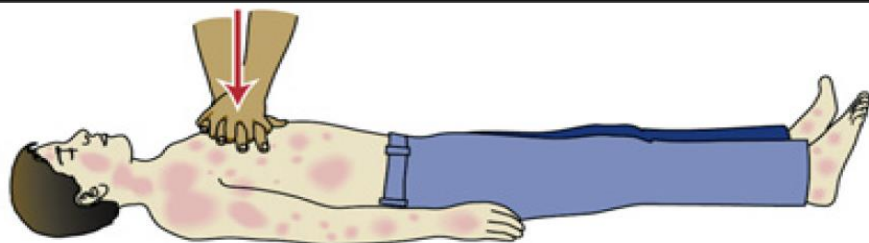
When indicated, give high-flow supplemental oxygen (6-8 L/minute), by face mask or oropharyngeal airway.

8



Establish intravenous access using needles or catheters with wide-bore cannulae (14 - 16 gauge).
When indicated, give 1-2 litres of 0.9% (isotonic) saline rapidly (e.g. 5-10 mL/kg in the first 5-10 minutes to an adult; 10 mL/kg to a child).

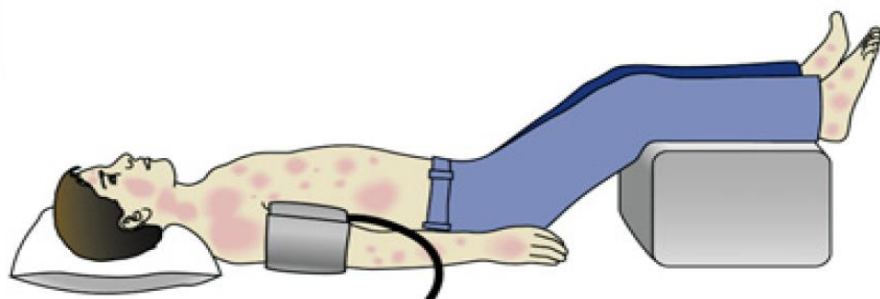
9



When indicated at any time, perform cardiopulmonary resuscitation with continuous chest compressions.

In addition,

10



At frequent, regular intervals, monitor patient's blood pressure, cardiac rate and function, respiratory status, and oxygenation (monitor continuously, if possible).

ANAPHYLAXIS MANAGEMENT

ACUTE TREATMENT, HEALTHCARE SETTING

ASSESSMENT

- airway
- breathing
- circulation
- orientation
- skin*
- weight*

TREATMENT

- epinephrine
- oxygen
- IV fluids
- supine position**
- 911***

TREATMENT, IF NEEDED

- ADDITIONAL EPINEPHRINE
- ANCILLARY MEDICATIONS
 - β_2 -agonist (inhaled)
 - H_1 -antihistamine
 - H_2 -antihistamine
 - glucocorticoid
 - other vasopressor
 - glucagon
- OTHER
 - CPR and ACLS
 - rapid volume expansion

LONG-TERM RISK REDUCTION, COMMUNITY SETTING

EMERGENCY PREPAREDNESS

- epinephrine autoinjector
- Anaphylaxis Emergency Action Plan (www.aaaai.com)
- medical ID

ASSESS/TREAT COMORBIDITIES

- asthma
- cardiovascular disease
- mastocytosis
- other

ASSESS NEED FOR CO-MEDICATIONS

- nonselective β -blockers
- other

ALLERGEN AVOIDANCE

- www.foodallergy.org
- www.latexallergyresources.org
- www.aaaai.org
- www.acaai.org

IMMUNOMODULATION

- allergen-specific
 - immunotherapy with insect venom
 - desensitization to β -lactam antibiotics, NSAIDs, other
- allergen non-specific
 - idiopathic anaphylaxis: consider glucocorticoid treatment

Principles of management (I)

- Assess **A**irway, **B**reathing, **C**irculation, and level of **consciousness** (altered mentation might suggest the presence of hypoxia)
- **Maintenance** of adequate **oxygenation** and **intravascular volume** have high priority
- Administer **epinephrine**
- Cardiopulmonary arrest during anaphylaxis
 - **Cardiopulmonary resuscitation** and **advanced cardiac life support** measures

Epinephrine

- **Epinephrine** is the treatment of choice for acute anaphylaxis
- **Aqueous epinephrine 1:1000** dilution, 0.2 to 0.5 ml (**0.01 mg/kg in children**; Maximum dose, 0.3 mg)
 - **IM 5 minutes or more frequent injections until control symptoms and ↑ BP**
- Alternative routes of administration
 - **Inhaled epinephrine, sublingual injection** in the presence of laryngeal edema
 - **Endotracheally** administration for intubated patients
- No absolute contraindication to epinephrine in anaphylaxis

Vasopressor

- Hypotension refractory to volume replacement and epinephrine injections
 - Vasopressor infusion is indicated
 - **Dopamine** (400 mg in 500 mL of 5% dextrose) at 2 to 20 $\mu\text{g}/\text{kg}/\text{min}$ and titrated to maintain systolic blood pressure of greater than 90 mm Hg
 - Preparation: by the “rule of 6” :
 - $0.6 \times \text{BW} = \text{milligrams}$ diluted to total 100 ml of saline, 1 ml/hr delivers 0.1 $\mu\text{g}/\text{kg}/\text{min}$

Oxygen

- **Oxygen (6-8 L/min)** should be administered to patients with anaphylaxis have
 - prolonged reactions or require multiple doses of epinephrine or pre-existing hypoxemia or myocardial dysfunction or receive inhaled β_2 -agonists
 - ABG determination or continuous pulse oximetry
- **Bronchospasm resistant** to adequate doses of epinephrine
 - consider **inhaled β -agonist** (eg, nebulized albuterol, 2.5 to 5 mg in 3 ml of saline and repeat as necessary)

Antihistamines: H1 Antagonists

- Antihistamines
 - Much slower onset of action than epinephrine
 - **Never be administered alone (second-line treatment)**
 - Useful in the treatment of **urticaria-angioedema or pruritus** as manifestations of the anaphylactic episode
- **Diphenhydramine(H1 antagonists)**
 - 25 to 50 mg for adults and 1 mg/kg (up to 50 mg) for children, slowly intravenously
 - Oral diphenhydramine, in identical dosages, might be sufficient for milder attacks

Antihistamines: H2 Antagonists

- **Ranitidine**
 - Fewer potential drug interaction
 - 12.5 -50 mg in adults & 1 mg/kg in children infused over 10-15 min
 - Diluted in 5% dextrose to a total 20 ml and injected over 5 min
- **Cimetidine**
 - Slowly, 4 mg/kg in adults, no dosages in children,
 - Rapid intravenous administration might produce hypotension
- **Combination of H1 and H2 antagonists more effective in anaphylaxis than with H1 antagonists alone**

Corticosteroids

■ Systemic corticosteroids

- No role in the acute management of anaphylaxis
 - Because no effect for 4 to 6 hours, even when administered iv
- Might potentially prevent protracted or biphasic anaphylaxis, management of frequent idiopathic anaphylaxis
- Provide additional benefit for patients with asthma or other conditions recently treated with corticosteroids
- Administered early in the treatment of anaphylaxis at a dosage equivalent to 1.0-2.0 mg/kg/d of methylprednisolone q6h
- Oral administration of prednisone, 0.5 mg/kg, might be sufficient for milder attacks

Anaphylaxis in patients with β -blockers

- Anaphylaxis in patients receiving β -adrenergic blockers
 - More severe or refractory anaphylaxis
 - increased propensity for bronchospasm
 - decreased cardiac contractility \rightarrow propound hypotension and bradycardia
 - **blunted response to epinephrine**
- Selective β_1 or β_2 antagonists : do not reduce the risk of anaphylaxis
- **Ophthalmic β -blockers** : systemic effects, including potential for bronchospasm and bradycardia

Anaphylaxis in patients with β -blockers

- Epinephrine administered might be ineffective
- In this situation, both **glucagon administration and isotonic volume expansion** might be necessary
- **Glucagon**
 - activating adenyl cyclase directly
 - bypassing the β -adrenergic receptor

Glucagon

- The recommended dosage : 1 to 5 mg (20-30 µg/kg [maximum dose, 1 mg] in children)
- Administered IV drip for over 5 minutes and followed by an infusion (5-15 µg/min) titrated to clinical response
- Protection of the airway
 - **glucagon** might cause **emesis and risk aspiration** in severely drowsy or obtunded patients
 - Placement in the **lateral recumbent position**

Cardiopulmonary Arrest

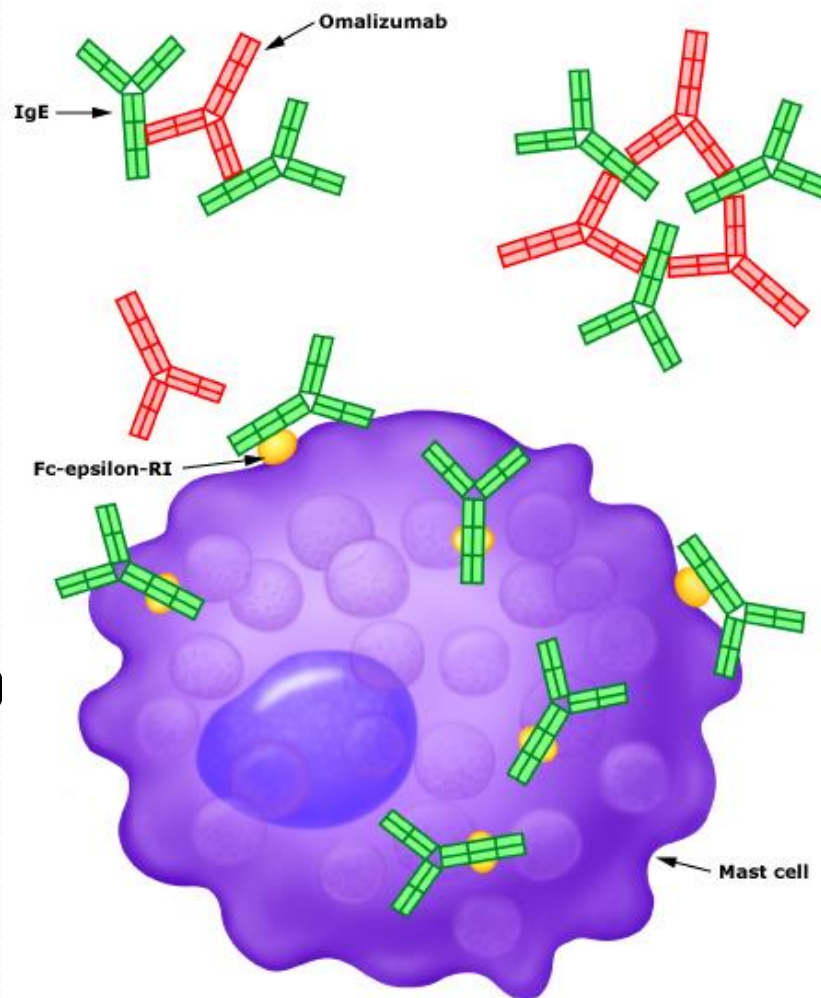
- Start **CPR and ACLS** measures
- High-dose intravenous epinephrine
 - 1 to 3 mg (1:10,000 dilution) IV slowly over 3 min, 3 to 5 mg over 3 min, and then a 4 to 10 µg/min infusion
 - The recommended initial resuscitation dosage in children is 0.01 mg/kg (0.1 mL/kg of a 1:10,000 solution up to a maximum of 0.3 mg) repeated **every 3 to 5 minutes** for ongoing arrest

Cardiopulmonary Arrest

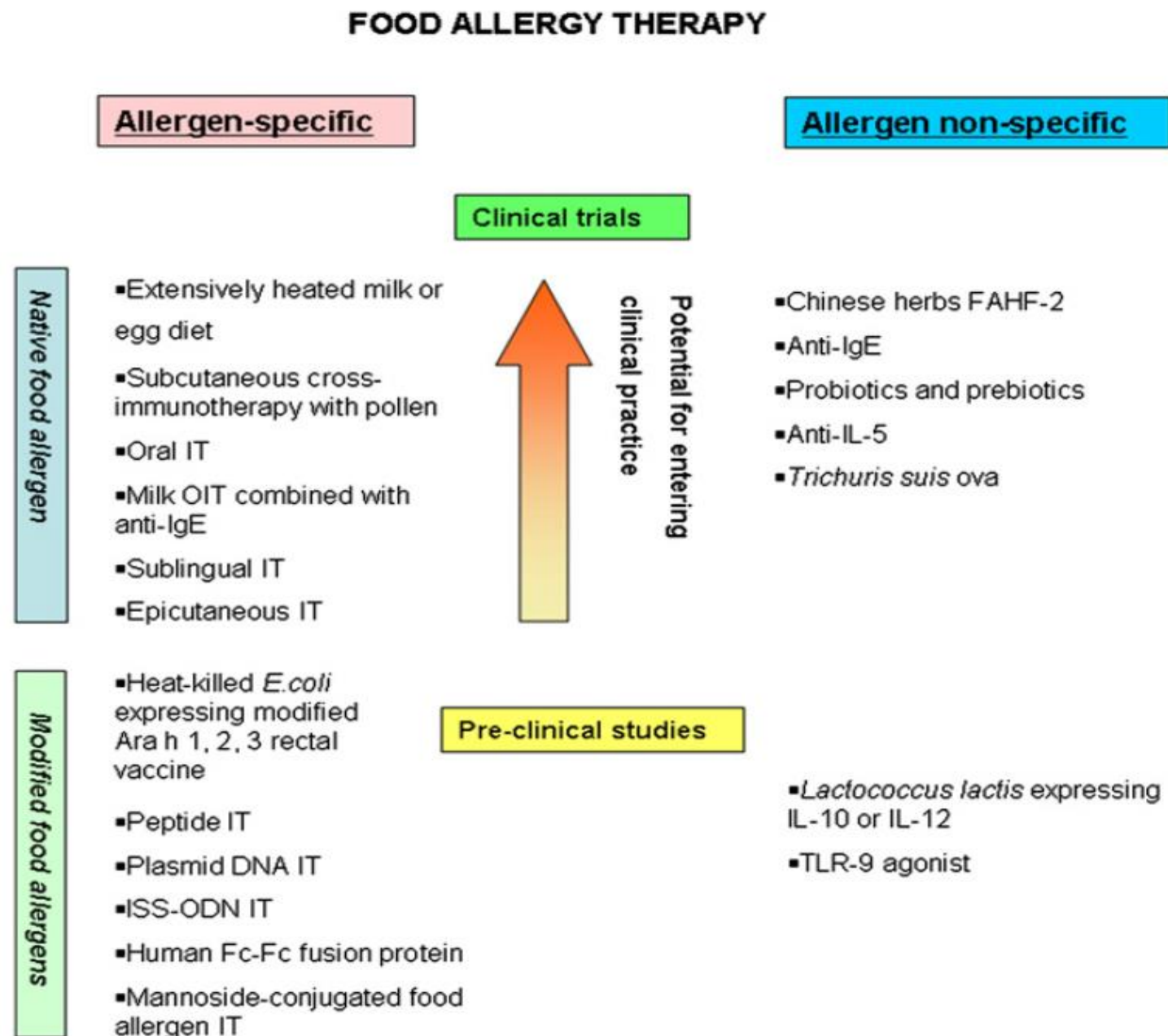
- High-dose intravenous epinephrine
 - Another option is to start an epinephrine infusion and deliver up to 10 µg/min
 - Higher subsequent dosages (0.1-0.2 mg/kg; 0.1 ml/kg of a 1:1,000 solution) might be considered for unresponsive asystole or pulseless electrical activity
- Rapid volume expansion is mandatory
 - Atropine and transcutaneous pacing if asystole and/or pulseless electrical activity
- Transport to the emergency department or ICU soon

全身型過敏性反應的處理原則

- 如果造成全身型過敏性反應的誘發因素無法完全避免，則過敏免疫學專科醫生必須考慮給予病兒進行去敏感治療(Desensitization)或過敏原的免疫療法(Immunotherapy)。免疫療法(Immunotherapy, IT)目前有四種方式包括：SCIT、SLIT、OIT和EPIT。



Approaches to food allergy immunotherapy



Nowak-Wegrzyn A, et al. J Allergy Clin Immunol 2011;127:558-73

FIG 1. Approaches to food allergy immunotherapy. *ISS-ODN*, Immunostimulatory oligodeoxynucleotide; *IT*, immunotherapy.

Table 2. General indications for immunotherapy for venom skin test or in vitro assay-positive patients

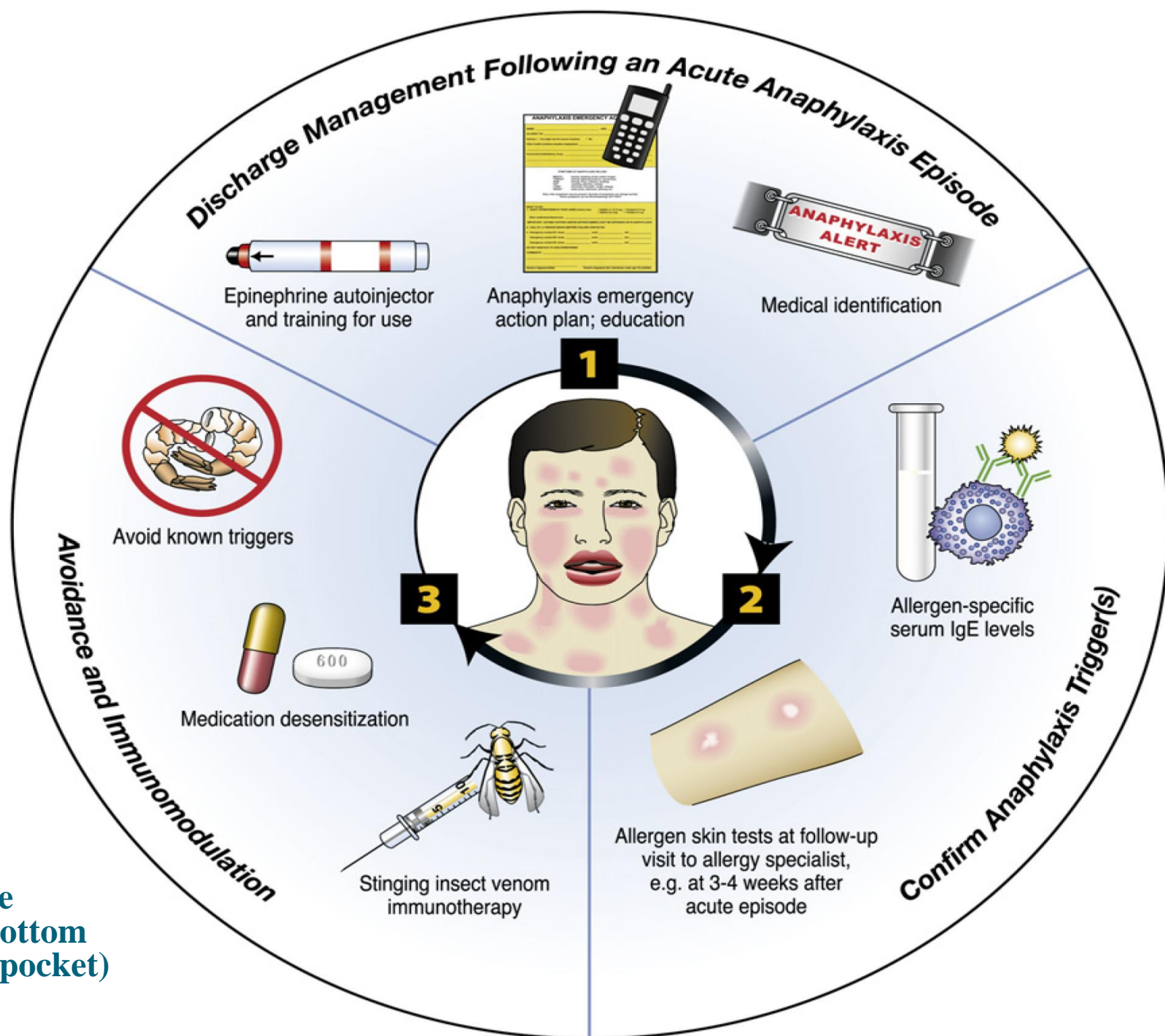
Reaction type	Immunotherapy
<hr/>	
Adult	
Any generalized allergic reaction	Yes
Children	
Generalized reaction not limited to cutaneous system	Yes
Generalized reaction limited to cutaneous system (flying <i>Hymenoptera</i>)	No ^a
Generalized reaction limited to cutaneous system (fire ant)	Optional
Local reactions	No

^a*Optional at parents' request.*

全身型過敏性反應的處理原則

- 過敏氣喘病童接受X光對比劑攝影或外科手術麻醉前應事先給予術前的預防全身型過敏性反應藥物處理(成人劑量為類固醇Prednisolone 50毫克、抗組織胺Diphenhydramine 50毫克、麻黃素Ephedrine 25-50毫克於術前13, 7, 1小時給予)，以避免發生全身型過敏性反應嚴重到咽喉水腫、心血管虛脫，最後甚至造成病童的不幸死亡。

Discharge management and prevention of future anaphylaxis recurrences in the community



EpiPen : Mid-point of the anterolateral thigh (the bottom right of the right trouser pocket)

感謝您的聆聽！

馬偕兒童醫院過敏免疫風濕科

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