Anaphylactic Shock

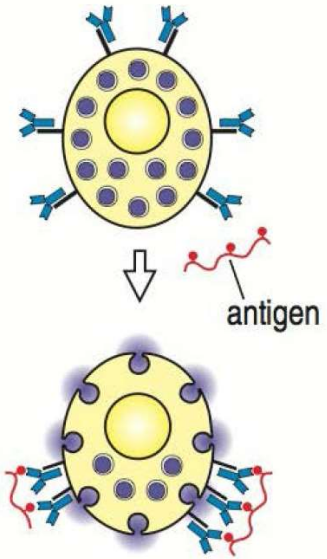
Case Study

Anaphylaxis

Type I IgE-mediated hypersensitivity reaction that can be fatal.

Typically involves at least two organ systems

(Skin, respiratory, GI, cardiovascular, CNS)

Type I immune-mediated tissue damage	
Immune reactant	IgE antibody
Antigen	Soluble antigen
Effector mechanism	Mast-cell activation
	
Example of hyper-sensitivity reaction	Allergic rhinitis, allergic asthma, systemic anaphylaxis

Type I Hypersensitivity is mediated by a Th2 response

Mediators of anaphylaxis		
Mediator	**Action**	**Signs/symptoms**
Histamine	Vasodilation, bronchoconstriction	Pruritus, swelling, hypotension, diarrhea, wheezing
Leukotrienes	Bronchoconstriction	Wheezing
Platelet-activating factor*	Bronchoconstriction, vasodilation	Wheezing, hypotension
Tryptase	Proteolysis	Unknown

Anaphylaxis

Dr. Richet asked by prince Albert to study effect of Portuguese man-of-war toxin on living animals. (Early 1900s)

Ana= Negation (not)

Phylaxis= protection

Dog experiment!

IgE-mediated allergic reactions			
Syndrome	**Common allergens**	**Route of entry**	**Response**
Systemic anaphylaxis	Drugs Serum Venoms	Intravenous (either directly or following oral absorption into the blood)	Edema Vasodilation Tracheal occlusion Circulatory collapse Death
Acute urticaria (wheal-and-flare)	Insect bites Allergy testing	Subcutaneous	Local increase in blood flow and vascular permeability
Allergic rhinitis (hay fever)	Pollens (ragweed, timothy, birch) Dust-mite feces	Inhaled	Edema of nasal mucosa Irritation of nasal mucosa
Allergic asthma	Danders (cat) Pollens Dust-mite feces	Inhaled	Bronchial constriction Increased mucus production Airway inflammation
Food allergy	Shellfish Milk Eggs Fish Wheat	Oral	Vomiting Diarrhea Pruritus itching Urticaria (hives) Anaphylaxis (rarely)

Case of John Mason

22 months, swollen lips at first exposure to peanut, another exposure after a month.

Vomiting, hoarse voice, difficulty breathing, wheezing, swollen face.

Very low blood pressure

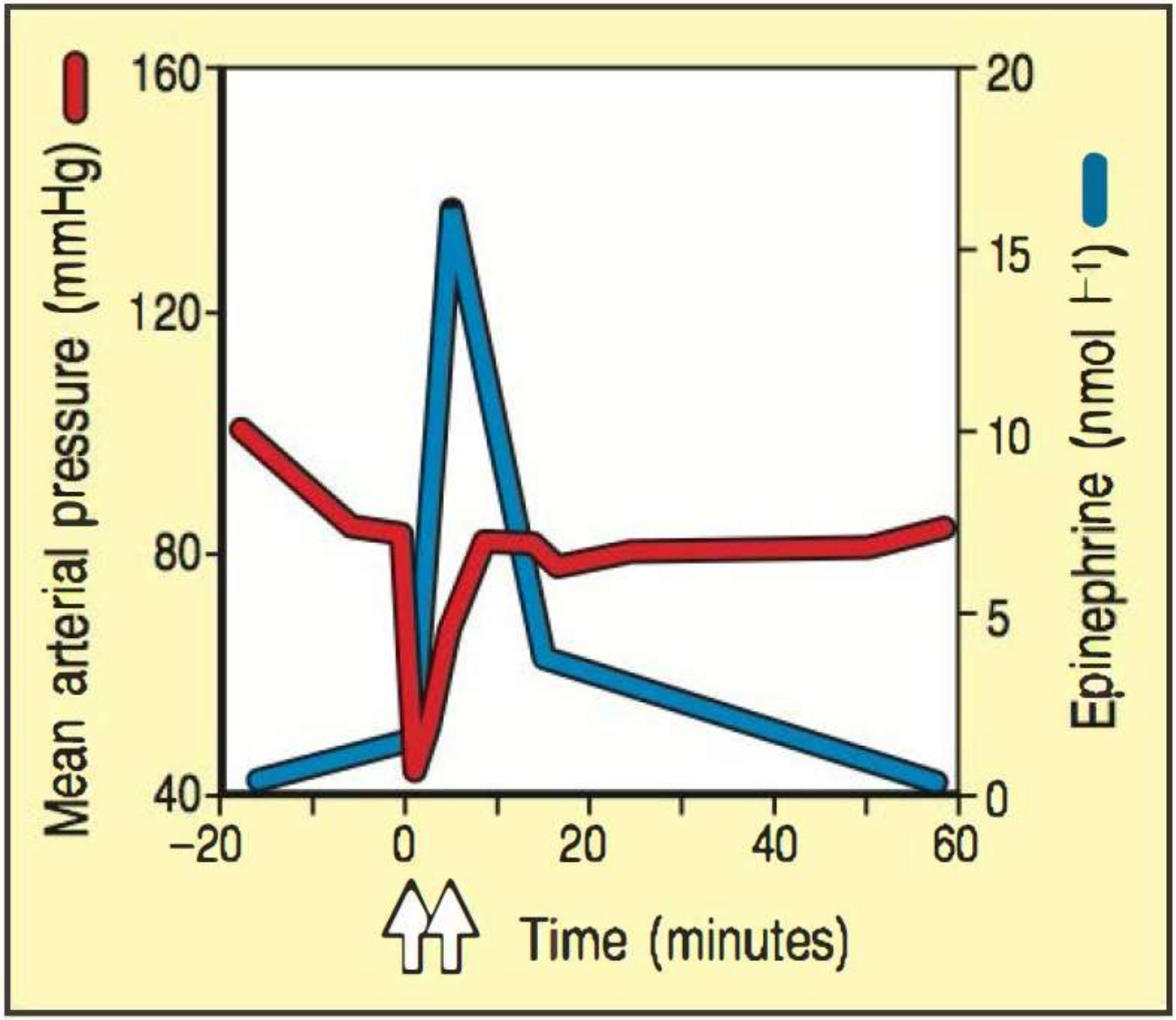
Epinephrine injection (vs. Hereditary angioedema)

Ant-histamines, anti-inflammatory corticosteroids, β2 agonists by inhalation

Blood tests for histamine and tryptase

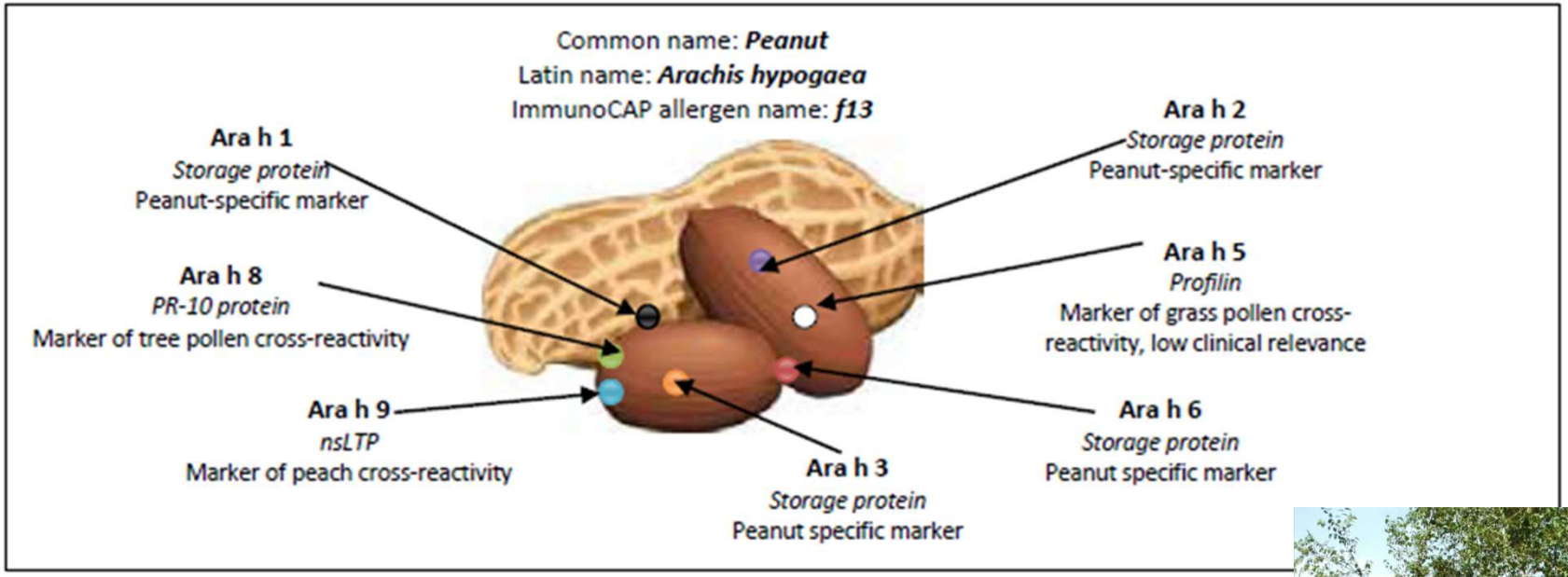
Observed, discharged with an Epi-Pen, asked not to eat anything that contains peanuts.

Asked to come for some immunological tests few days later


Mean arterial pressure (mmHg)
160
120
80
40
20
15
10
5
0
Epinephrine (nmol l⁻¹)
−20
0
20
40
60
Time (minutes)

Molecular Allergy Diagnostics (or CRD)

Component-based Multiparameter peanut allergy test



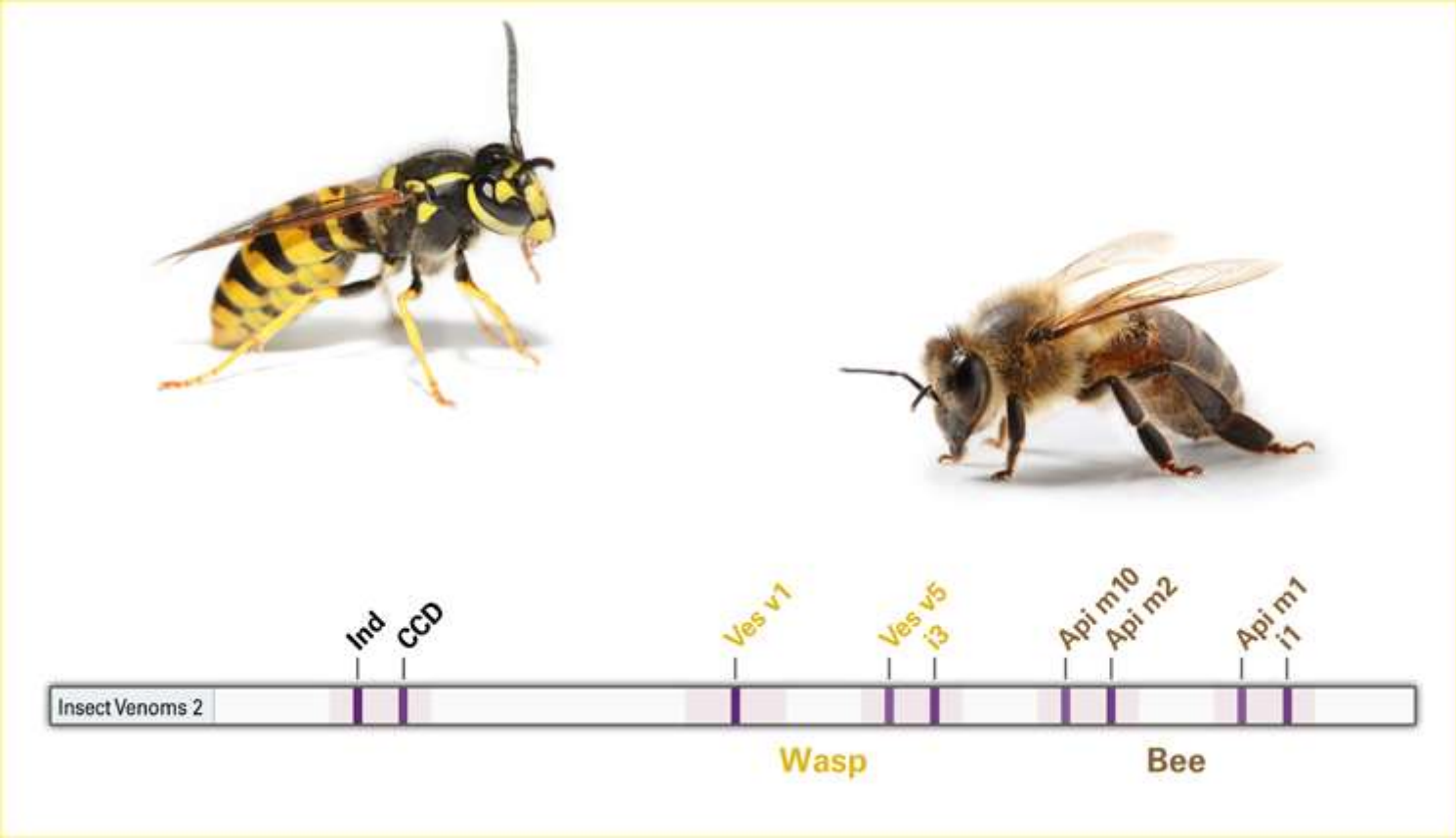
Not every peanut allergy is of the same consequence!

Molecular Allergy Diagnostics (or CRD)

***f1* (*Gallus domesticus*), Egg white components**				
f1 Egg white 	*Gal d1*, **Ovomucoid** *Heat stable* protein. Risk of reaction to cooked egg, **Highly allergenic**, associated with persisting egg allergy.	*Gal d2*, **Ovalbumin** Heat labile protein. Risk of reaction to raw/ slightly cooked egg.	*Gal d3*, **Conalbumin** Heat labile protein. Risk of reaction to raw/ slightly cooked egg.	*Gal d4*, **Lysozyme** Heat labile protein. Risk of reaction to raw/ slightly cooked egg.

***f2* (*Bos domesticus*), Milk- components**					
f2 Milk 	**α-lactalbumin** *Bos d4*	**β-lactoglobulin** *Bos d5*	**Albumin** (BSA) *Bos d6* Heat labile protein. Risk for reactions to fresh milk, may tolerate well-cooked milk. Main allergen in beef/ cross-react with mammals	**Casein** *Bos d8* *Heat stable* protein. **Risk of severe reactions** to all forms of milk (fresh and cooked). 80% of milk proteins (cross-react between mammals).	**Lactoferrin** *Bos d lactoferrin* Heat labile protein. Risk of reactions to fresh milk, may tolerate well-cooked milk.
	Whey proteins Heat labile protein. Risk of reactions to fresh milk, may tolerate well-cooked milk.				

Bee vs. Wasp Venoms



Api m10 German Beekeeper story, futile SIT

Explain the hoarseness of voice and wheeze?

Hoarseness= Angioedema of vocal cord, Wheeze= histamine and leukotrienes causing smooth muscle constriction of bronchial tubes.

Skin Prick and specific IgE blood tests revealed peanut allergy only, advise patient?

Avoid any foods containing peanuts, read food labels, ask in restaurants. Avoid Peas! Wear bracelet, and Keep Epi-Pen injection at home or when traveling.

What other drug were given to John?

Albuterol (β2-adrenergic agent) by inhalation.

Why was John’s blood tested for histamine and tryptase?

Released by mast cells, indication of anaphylactic shock

Why was Skin Prick test delayed a few days and not done on the spot in the hospital?

Immediately after Anaphylactic shock, patient is unresponsive to skin prick test, why?

Tachyphylaxis (lasts 72-96 hours following anaphylaxis)