

# 過敏原

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# 什麼是過敏？



在環境中接觸到某些物質, 導致人體免疫系統過度反應的情況.

● McConnell, Thomas H. (2007). The nature of disease : pathology for the health professions ●

# 過敏疾病 & 症狀

## • 常見過敏疾病

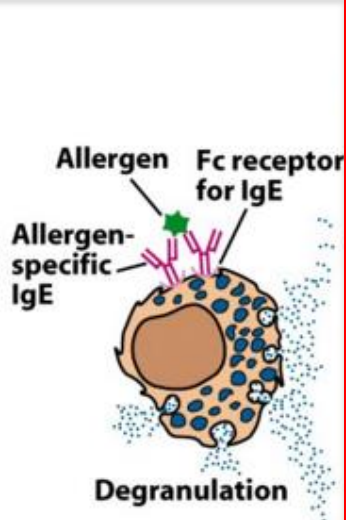
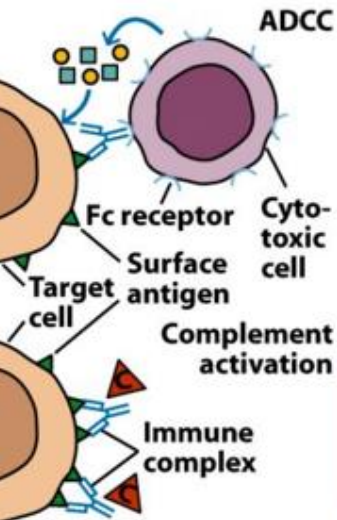
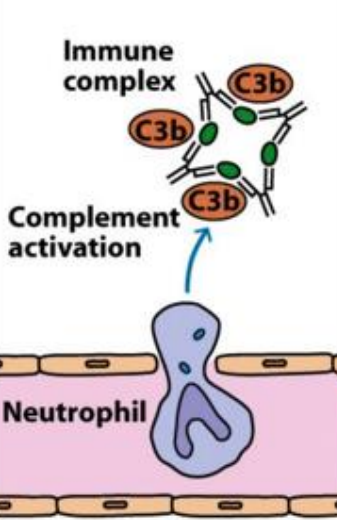
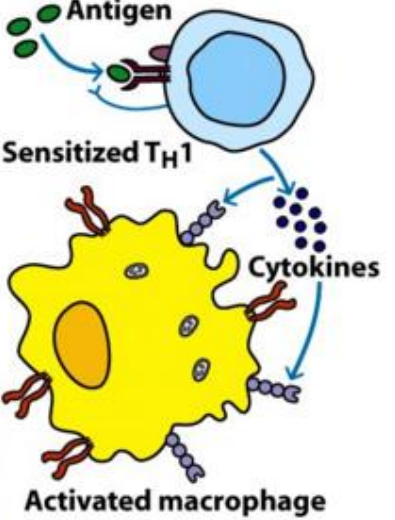
– 花粉症, 食物過敏, 過敏性皮膚炎, 氣喘, 全身性過敏反應.

## • 臨床表徵

– 眼紅, 瘙癢紅疹, 流鼻水, 呼吸困難, 腫脹.



# 四大類過敏反應

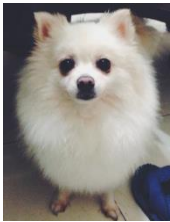
 <p><b>Type I</b></p>	 <p><b>Type II</b></p>	 <p><b>Type III</b></p>	 <p><b>Type IV</b></p>
<p><b>IgE-Mediated Hypersensitivity</b></p>	<p><b>IgG- or IgM-Mediated Cytotoxic Hypersensitivity</b></p>	<p><b>Immune Complex-Mediated Hypersensitivity</b></p>	<p><b>Cell-Mediated Hypersensitivity</b></p>
<p>Ag induces cross-linking of IgE bound to mast cells and basophils with release of vasoactive mediators.</p>	<p>Ab directed against cell surface antigens mediates cell destruction via complement activation or ADCC.</p>	<p>Ag-Ab complexes deposited in various tissues induce complement activation and an ensuing inflammatory response mediated by massive infiltration of neutrophils.</p>	<p>Sensitized <math>T_H1</math> cells shown above release cytokines that activate macrophages or <math>T_C</math> cells that mediate direct cellular damage. <math>T_H2</math> cells and CTLs mediate similar responses.</p>
<p>Typical manifestations include systemic anaphylaxis and localized anaphylaxis such as hay fever, asthma, hives, food allergies, and eczema.</p>	<p>Typical manifestations include blood transfusion reactions, erythroblastosis fetalis, and autoimmune hemolytic anemia.</p>	<p>Typical manifestations include localized Arthus reaction and generalized reactions such as serum sickness, necrotizing vasculitis, glomerulonephritis, rheumatoid arthritis, and systemic lupus erythematosus.</p>	<p>Typical manifestations include contact dermatitis, tubercular lesions, and graft rejection.</p>

# 過敏原

## 吸入性



貓



狗



居家塵蟎



花粉

## 醫藥



例：盤尼西林

## 食物類



## 直接接觸



乳膠手套

# 造成過敏的原因

- **基因**

- 染色體11q12-13, 5q31-33 (氣喘&濕疹)
- 種族
- 性別
- 年齡

(一般而言IgE孩童時期最高, 快速下降於10至30歲之間.)

J Pediatr. 1992 Nov;121(5 Pt 2):S58-63.

- **其他環境因子**

- 工業化 v.s 傳統農業化 國家
- 都市v.s 鄉村 人口
- 衛生理論 (致病源, 腸內菌叢, Th1, Th2, Treg)

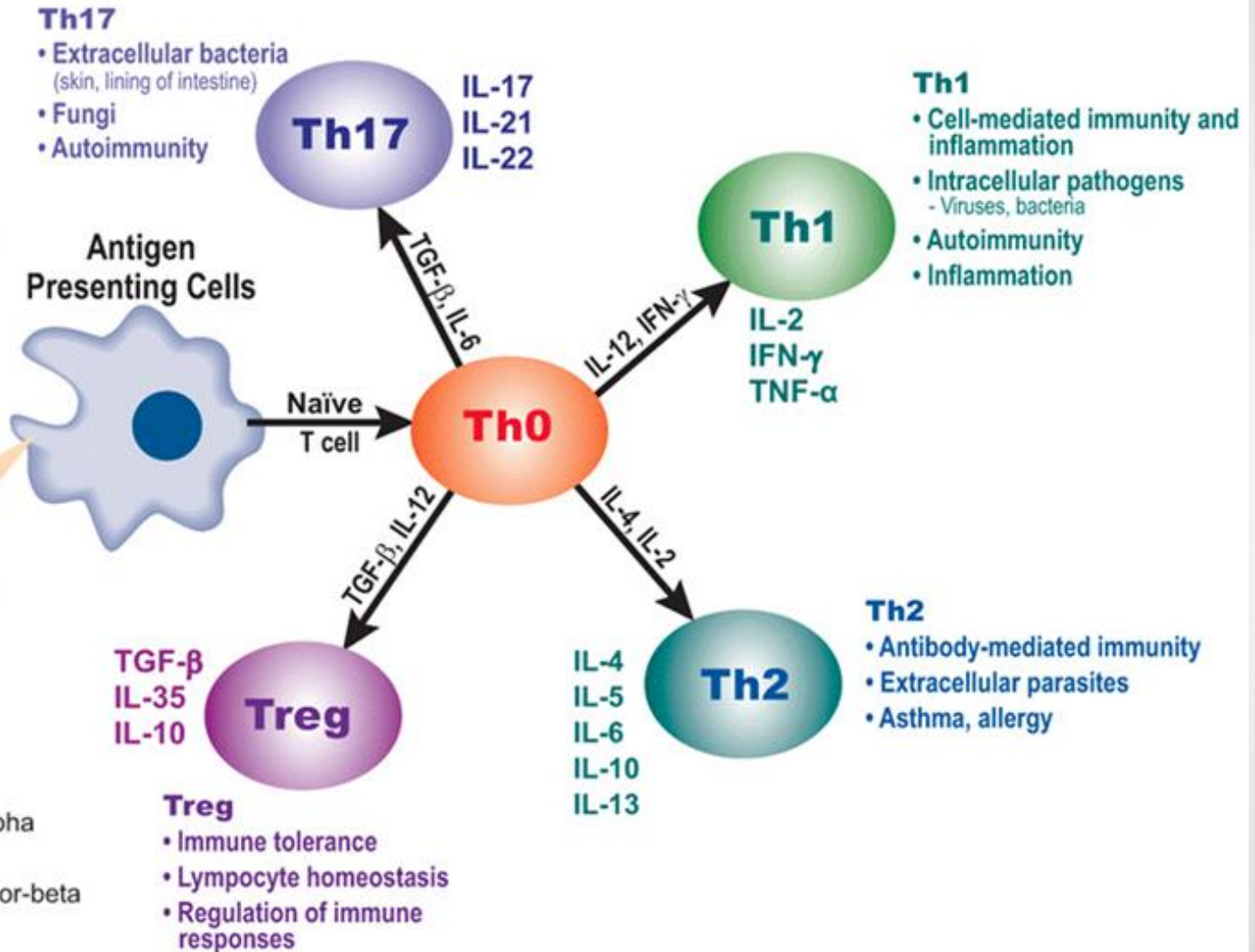
Edward Willett. 2013-01-30. Retrieved 2013-05-30.

De Swert LF (1999). "Risk factors for allergy". Eur. J. Pediatr. 158 (2): 89–94.

# T細胞分化

## Physical Triggers of Immune Response:

- **Infections**
  - Bacterial, viral
  - Fungal, parasitic
- **Toxins**
  - Exogenous
  - Endogenous
- **Food peptides**
- **Allergens**
- **Medications**
- **Auto antigens**



Th0: Naïve T cells

Th: Helper T cells

Treg: Regulatory T cells

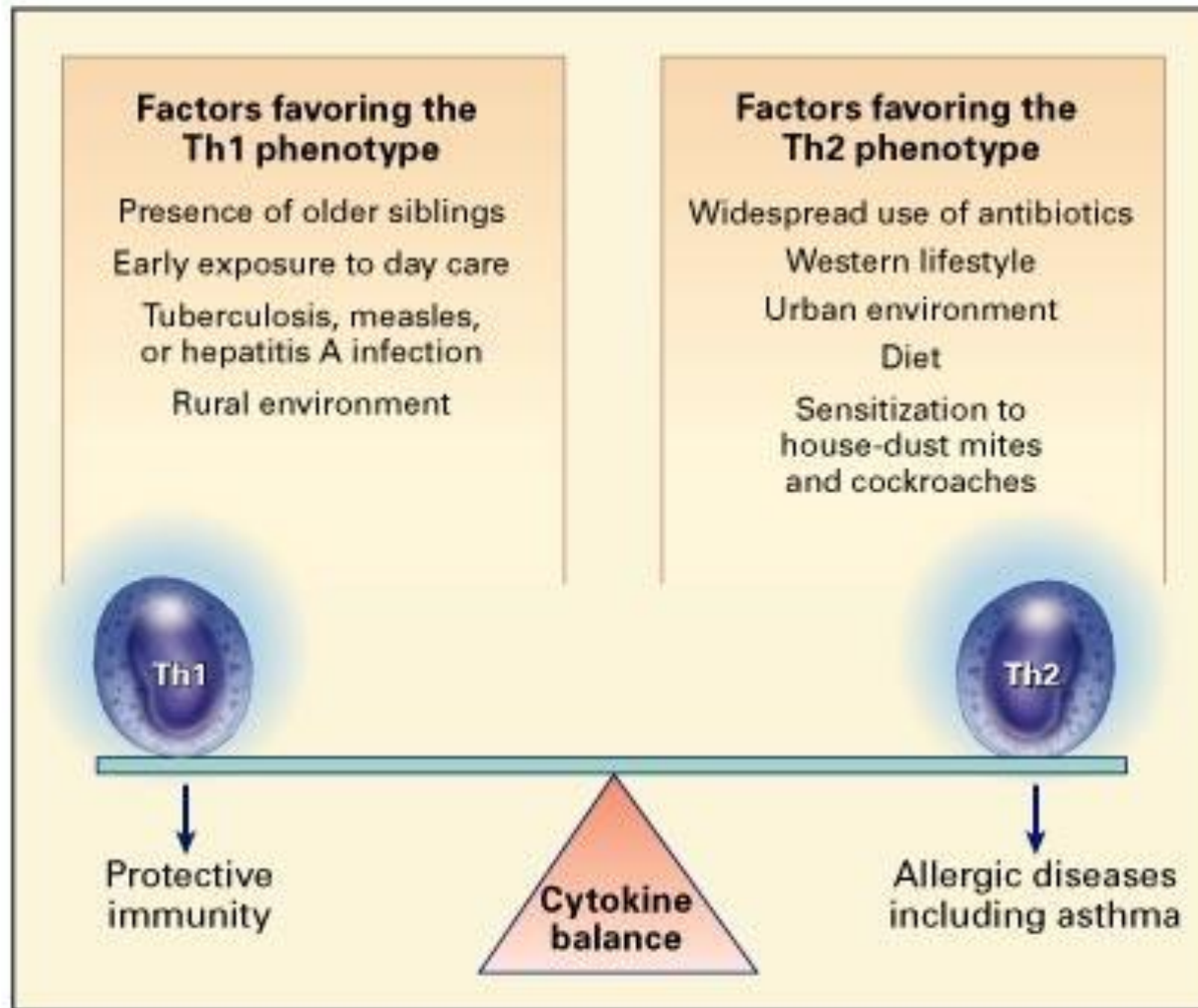
IL: Interleukin

TNF- $\alpha$ : Tumor necrosis factor-alpha

IFN- $\gamma$ : Interferon-gamma

TGF- $\beta$ : Transforming growth factor-beta

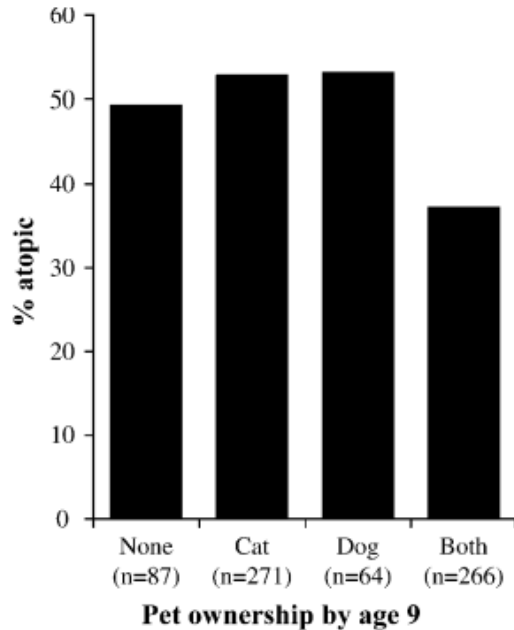
# Th1, Th2平衡



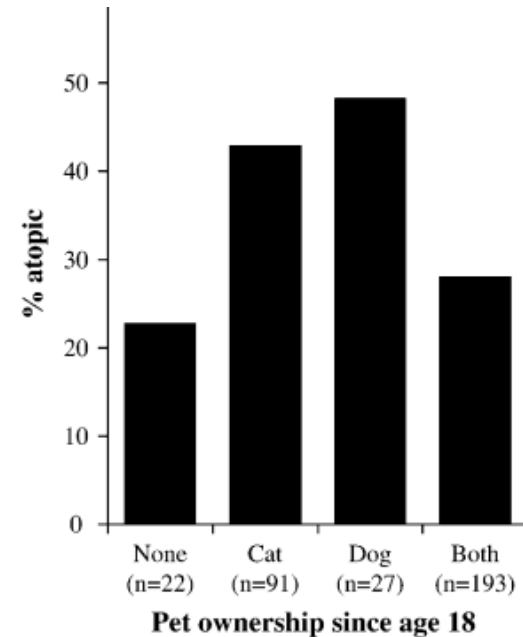


# Cats and dogs and the risk of atopy in childhood and adulthood

Piush J. Mandhane, MD,<sup>a</sup> Malcolm R. Sears, MB,<sup>b</sup> Richie Poulton, PhD,<sup>c</sup> Justina M. Greene, DipCompSys,<sup>b</sup> W. Y. Wendy Lou, PhD,<sup>d</sup> D. Robin Taylor, MD,<sup>e</sup> and Robert J. Hancox, MD<sup>e</sup> *Edmonton, Alberta, and Hamilton and Toronto, Ontario, Canada, and Dunedin, New Zealand*



**FIG 1.** Atopy at age 13 years according to pet ownership by age 9 years. The difference between groups is significant ( $\chi^2 [3] = 14.9, P = .002$ ).



**FIG 2.** Atopy at age 32 years according to pet ownership since age 18 years. Analyses are restricted to those who were not atopic at age 13 years. The difference between groups is significant ( $\chi^2 [3] = 10.0, P = .019$ ).

研究不一致:

性別, 過敏史, 寵物在其社區盛行率, 暴露於過敏原時機, 時間及強度。

# 過敏檢測

- 皮膚測試
  - 皮下注射
  - 貼片測試
- 血液檢測
  - RAST (Radioabsorbent test)
  - MAST (Multiple allergens simultaneous test)
  - Immuno CAP
  - 96 Food allergens

# 皮膚測試

- 皮下注射

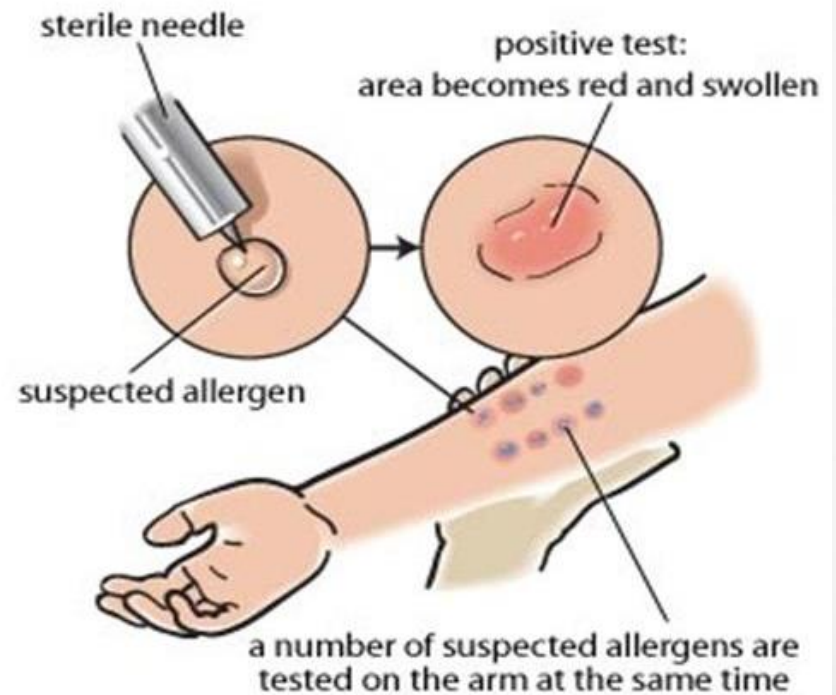
(立即反應, 數分鐘至數小時)

- 盤尼西林皮膚測試

- 貼片測試

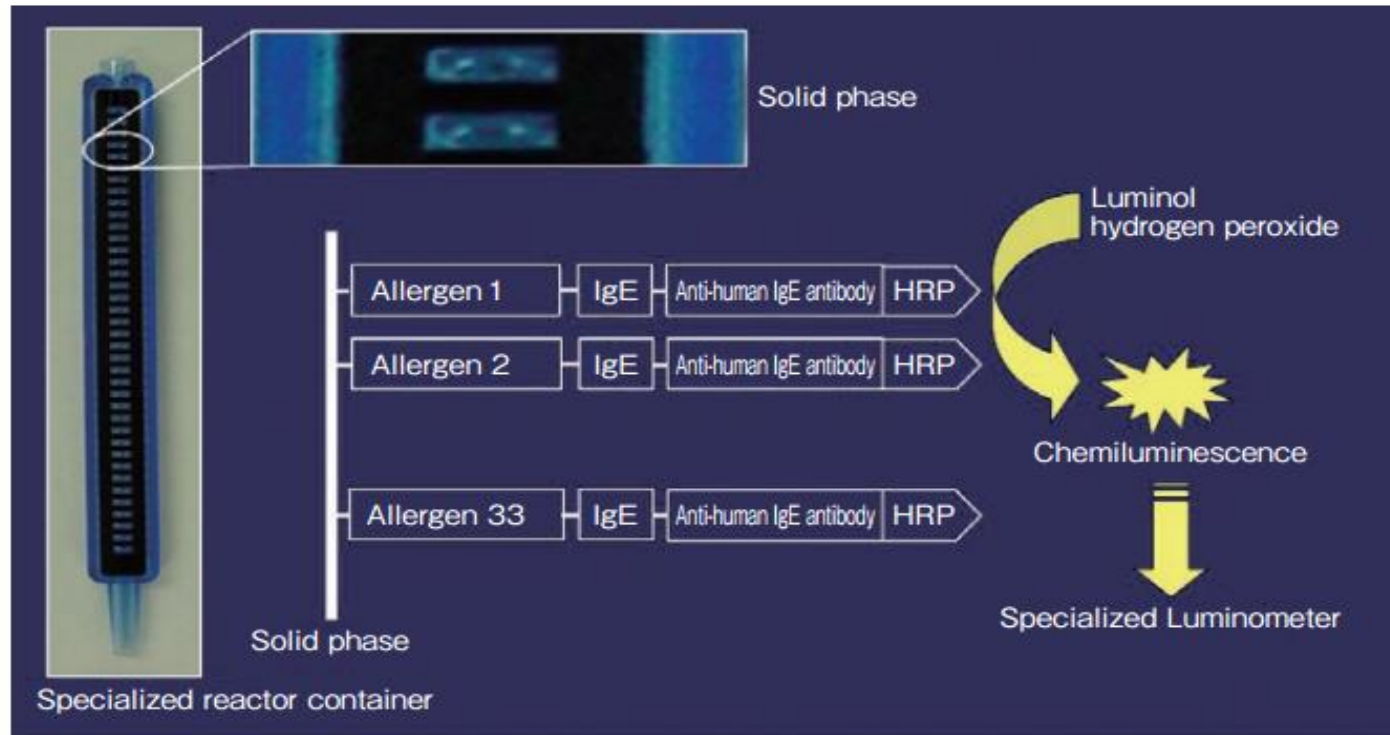
(延遲反應, 超越48-72小時)

- 貼片上塗有已知過敏原



# MAST CLA-1

## (冷光過敏原檢測系統)



HRP : Horseradish Peroxidase



# MAST過敏原項目

1	Latex	乳膠	19	Bermuda Grass	狗牙根
2	Avocado	酪梨	20	Willow, Black	黑柳樹
3	Pork	豬肉	21	Eucalyptus	尤加利
4	Beef	牛肉	22	Japanese Cedar	日本衫
5	Milk	牛奶	23	White Mulberry	白桑
6	Cheddar cheese	乳酪	24	Pigweed	莧科
7	Shrimp	蝦子	25	Ragweed Mix	豕草
8	Crab	螃蟹	26	Timothy Grass	梯牧草
9	Clam	蚌殼類	27	Alternaria	交錯黴菌屬
10	Codfish	鱈魚	28	Aspergillus	麴菌屬
11	Tuna	鮪魚	29	Cladosporium	芽枝菌屬
12	Peanut	花生	30	Penicillium	青黴菌屬
13	Soybean	黃豆	31	Cat	貓毛屑
14	Wheat	小麥	32	Dog	狗毛屑
15	Yeast Brewer's	酒釀酵母	33	Housedust	家塵
16	Egg yolk	蛋黃	34	Cockroach Mix	蟑螂
17	Egg White	蛋白	35	Mite.D.Farinae	塵蹣
18	Chicken Feathers	雞毛	36	Mite.D.Pteronyssinus	塵蹣

# ImmunoCAP 250

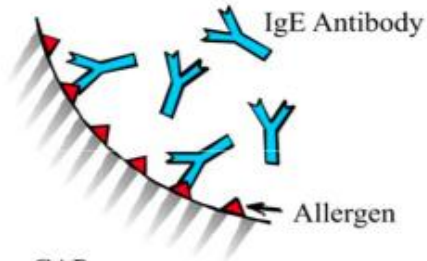
## (螢光酵素免疫分析)

ImmunoCAP<sup>®</sup>250



1

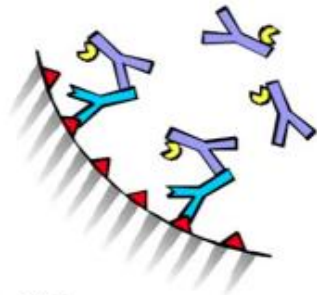
The allergen of interest, covalently coupled to ImmunoCAP, reacts with the specific IgE in the patient sample.



ImmunoCAP

2

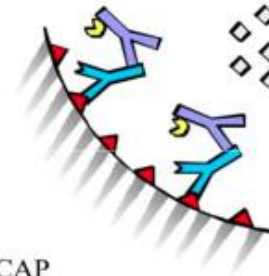
After washing away non-specific IgE, enzyme labelled antibodies against IgE are added to form a complex.



ImmunoCAP

3

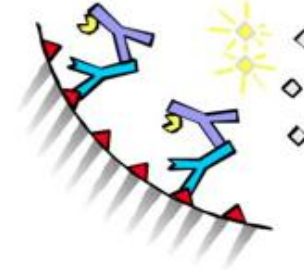
After incubation, unbound enzyme-anti-IgE is washed away and the bound complex is then incubated with a developing agent.



ImmunoCAP

4

After stopping the reaction, the fluorescence of the eluate is measured. The higher the fluorescence the more specific IgE is present in the sample.



ImmunoCAP

# Immuno CAP過敏原項目

f1 蛋白	f24 蝦子	g2 狗牙根	e1 貓皮屑	<p><b>ex2動物皮屑</b>：e1貓, e5狗, e6天竺鼠, e87大鼠, e88小鼠</p> <p><b>mx2黴菌類</b>: m1青黴菌, m2芽枝黴菌, m3麴菌, m5念珠菌, m6交錯黴菌, m8長蠕孢屬</p> <p><b>hx2屋塵類</b>: h2家塵, d1屋塵蹣, d2粉塵蹣, i6德國蟑螂</p> <p><b>rx3雜草禾本</b>: g2狗牙根, g5黑麥草, g17百喜草, w1豕草, w9車前草, w10藜</p> <p><b>fx5蛋奶類</b>: f1蛋白, f2牛奶, f3鱈魚, f4小麥, f13花生, f14黃豆</p> <p><b>fx10肉類</b>: f26豬肉, f27牛肉, f75蛋黃, f83雞肉, f284火雞肉</p>
f2 牛奶	f25 番茄	g6 梯牧草	e5 狗皮屑	
f3 鱈魚	f26 豬肉	w1 豕草	e85 雞毛	
f4 小麥	f27 牛肉	m1 青黴菌	i6 德國蟑螂	
f8 玉米	f33 橘子	m2 芽枝黴菌	h1 家塵	
f13 花生	f45 酵母	m3 麴菌	d1 屋塵蹣	
f14 黃豆	f91 芒果	m5 念珠菌	d2 粉塵蹣	
f23 螃蟹	t7 橡樹	m6 交錯黴菌		

# 過敏原檢測方法比較

	<b>MAST</b>	<b>Immuno CAP</b>	<b>96 Food allergens</b>
抗體種類	IgE	IgE	IgG
一次檢測 過免原數	36	1 ~ above	96
分析方法	冷光激發	螢光酵素免疫分析	螢光酵素免疫分析
報告格式	Class 0: < 26LUs Class 1: 27-65 LUUs Class 2: 66-142 LUUs Class 3: 143-242 LUUs Class 4: >242 LUUs	Class 0: < 0.34 KU/L Class 1: > 0.35 KU/L Class 2: > 0.70KU/L Class 3: >3.50 KU/L Class 4: >17.50 KU/L Class 5: >50.00 KU/L Class 6: >100.00 KU/L	Class 0: no reactivity Class 1: Low Class 2: Moderate Class 3: High
應用	<b>Inhaled &amp; Foods (General)</b>	<b>Inhaled &amp; Foods &amp; Low IgE &amp; ECP (Specific, High sensitivity)</b>	<b>Foods (Detail)</b>



# 過敏疾病治療

- 藥物

- 阻擋過敏反應的細胞途徑.

抗組織胺, 固醇類用藥, 腎上腺素.

- 免疫療法

- 增加免疫耐受性, 減少特異性IgE抗體的產生.
- 逐漸增加的抗原劑量.

- 體液免疫                      轉成                      細胞免疫

