HVD
LIFE SCIENCES

Phadia Allergen Component Product List 2018

Recombinant and purified native ImmunoCAP allergens components for molecular allergology

ImmunoCAP Allergen Components measure specific IgE antibodies to individual molecular allergens in serum or plasma. These allergens, which are purified or recombinant proteins, offer the unique opportunity to assess a person's allergic sensitization pattern at the molecular level. Different component groups often elicit different types of reactions, so testing them can indicate if a patient's prior symptoms or positive test results were caused by allergy to a given substance or by a cross-reaction with another allergen. Component testing also helps the clinician weigh a patient's risk of asystemic reaction versus a more mild or localized response.

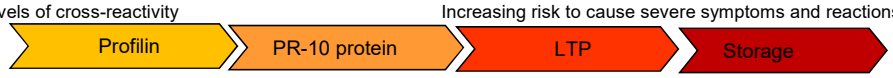
Reference: Canonica GW, et al. World Allergy Organ J.2013;6:17.

How to name allergen components: Ara h 2 (major peanut component)

Arachis hypogaea allergen component #**2**

Prefix "r" means recombinant based origin and "n" native origin (r Betv1 <-> nBetv1).

Increasing levels of cross-reactivity — Increasing risk to cause severe symptoms and reactions



Profilin*
- Labile to heat and digestion
- High cross-reactive with pollen and plant foods
- Low risk of reaction

Ara h 8 (f352)
- Labile to heat and digestion
- Mainly local reactions
- Associated with birch pollen allergy (cross-reactivity)

Ara h 9 (f427)
- Stable to heat and digestion
- Associated with local and systemic reactions
- Associated with allergy to stone fruits (cross-reactivity)

Ara h 1 (f422), Ara h 2 (f423), Ara h 3 (f424), Ara h 6 (f447)
- Stable to heat and digestion
- Associated with systemic reactions
- Indicates primary sensitization

PR-10 protein, Bet v1 homologue

- A heat labile protein, cooked foods are often tolerated
- Often associated with local symptoms such as oral allergy syndrome (OAS)
- Often associated with allergic reactions to fruit and vegetables in northern Europe

LTP (non-specific Lipit Transfer Protein, nsLTP)

- A protein stable to heat and digestion causing reactions also to cooked foods
- Often associated with systemic and more severe reactions in addition to OAS
- Often associated with allergic reactions to fruit and vegetables in southern Europe

Profilin

- Seldom associated with clinical symptoms but may cause demonstrable or even severe reactions in a small minority of patients

Storage protein

- Protein found in seeds serving as a source material during the grow of a new plant
- Often stable and heat-resistant proteins causing reactions also to cooked foods

CCD

- A marker for sensitization to cross-reactive carbohydrate determinants
- Seldom associated with clinical symptoms but may cause demonstrable or even severe reactions in a small minority of patients

Lipocalin

- Very stable proteins
- Allergen components displaying limited cross-reactivity between species

Parvalbumin

- A major allergen in fish
- A marker for cross-reactivity among different species of fish and amphibians
- A protein stable to heat and digestion causing reactions also to cooked foods

Serum albumin

- A common protein present in different biological fluids and solids e.g. Cows milk and beef, egg in chicken
- Cross-reactions between albumins from different animal species are well known, for i.e. between cat and dog and cat and pork

Tropomyosin

- An actin-binding protein in muscle fibers
- A marker for cross-reactivity between crustaceans, mites and cockroach

Grass pollens - ImmunoCAP Allergen components

Art. No.		Code	Size
14-4972-01	g216 nCyn d 1 Bermuda grass (Cynodon dactylon)	g216	10
14-5234-01	g205 rPhl p 1 Timothy grass (Phleum pratense)	g205	10
14-5235-01	g206 rPhl p 2 Timothy grass (Phleum pratense)	g206	10
14-5288-01	g208 nPhl p 4 native Timothy grass	g208	10
14-5289-01	g209 rPhl p 6 Timothy grass (Phleum pratense)	g209	10
14-5290-01	g210 rPhl p 7 Timothy grass (Phleum pratense)	g210	10
14-5291-01	g211 rPhl p 11 Timothy grass (Phleum pratense)	g211	10
14-5292-01	g212 rPhl p 12 Profilin Timothy grass (Phleum pratense)	g212	10
14-5312-01	g213 rPhl p 1; rPhl p 5b Timothy grass (Phleum pratense)	g213	10
14-5313-01	g214 rPhl p 7; rPhl p 12 Timothy grass (Phleum pratense)	g214	10
14-5338-01	g215 rPhl p 5b Timothy grass (Phleum pratense)	g215	10

Weed pollens - ImmunoCAP Allergen components

Art. No.		Code	Size
14-4969-01	w230 nAmb a 1 Ragweed (Ambrosia artemisiifolia, A. elatior)	w230	10
14-4970-01	w231 nArt v 1 Mugwort (Artemisia vulgaris)	w231	10
14-4983-01	w233 nArt v 3 LTP Mugwort (Artemisia vulgaris)	w233	10
14-5311-01	w211 rPar j 2 LTP Wall pellitory (Parietaria judaica	w211	10
14-5751-01	w234 rPla l 1 Plantain (Plantago lanceolata)	w234	10
14-4978-01	w232 nSal k 1 Saltwort (Salsola kali)	w232	10

Tree pollens - ImmunoCAP Allergen components

Art. No.		Code	Size
14-5225-01	t215 rBet v 1 PR-10 Birch pollen (Betula verrucosa)	t215	10
14-5226-01	t216 rBet v 2 Profilin Birch pollen (Betula verrucosa)	t216	10
14-5287-01	t220 rBet v 4 Birch pollen (Betula verrucosa)	t220	10
14-5345-01	t225 rBet v 6 Birch pollen (Betula verrucosa)	t225	10
14-5310-01	t221 rBet v 2; rBet v4 Birch pollen (Betula verrucosa)	t221	10
14-4977-01	t226 nCup a 1 Cypress (Cypressus arizonica)	t226	10
14-5705-01	t224 rOle e 1 Olive (Olea europaea)	t224	10
14-4993-01	t227 nOle e 7 LTP Olive (Olea europeae)	t227	10
14-4999-01	t240 rOle e 9 Olive (Olea europeae)	t240	10
14-5957-01	t241 rPla a 1 Maple leaf sycamore, London plane (Platanus acerifolia)	t241	10

Microorganisms - ImmunoCAP Allergen components			
Art. No.		**Code**	**Size**
14-5346-01	m229 rAlt a 1 Alternaria alternata	m229	10
14-5293-01	m218 rASP f 1 Aspergillus fumigatus	m218	10
14-5294-01	m219 rASP f 2 Aspergillus fumigatus	m219	10
14-5295-01	m220 rASP f 3 Aspergillus fumigatus	m220	10
14-5296-01	m221 rASP f 4 Aspergillus fumigatus	m221	10
14-5297-01	m222 rASP f 6 Aspergillus fumigatus	m222	10

Epidermals and animal proteins ImmunoCAP Allergen components			
Art. No.		**Code**	**Size**
14-5009-01	e204 nBos d 6 BSA (bovine serum albumin), Cow (Bos spp.)	e204	10
14-4955-01	e101 rCan f 1 Dog (Canis familiaris)	e101	10
14-4956-01	e102 rCan f 2 Dog (Canis familiaris)	e102	10
14-5241-01	e221 nCan f 3 Dog serum albumin (Canis familiaris)	e221	10
14-4998-01	e226 rCan f 5 Dog (Canis familiaris)	e226	10
14-4905-01	e94 rFel d 1 Cat (Felis domesticus)	e94	10
14-5240-01	e220 rFel d 2 Cat serum albumin (Felis domesticus)	e220	10
14-5702-01	e228 rFel d 4 Cat (Felis domesticus)	e228	10
14-5700-01	e227 rEqu c 1 Horse (Equus caballus)	e227	10
14-5242-01	e222 nSus s, Pig serum albumin, Swine (Sus scrofa)	e222	10

Mites - ImmunoCAP Allergen components			
Art. No.		**Code**	**Size**
14-5996-01	d202 rDer p 1 House dust mite (Dermatophagoides pteronyssinus)	d202	10
14-4967-01	d203 rDer p 2 House dust mite (Dermatophagoides pteronyssinus)	d203	10
14-4985-01	d205 rDer p 10 Tropomyosin,House dust mite (Dermatop. pteronyssinu	d205	10
14-6040-01	rDer p 23 House dust mite (Dermatop. pteronyssinus)	d209	10

Venoms - ImmunoCAP Allergen components			
Art. No.		**Code**	**Size**
14-4987-01	i208 rApi m 1 Phospholipase A2 Honey bee (Apis mellifera)	i208	10
14-6014-01	i214 rApi m 2 Honey bee (Apis melifera)	i214	10
14-6015-01	i215 rApi m 3 Honey bee (Apis melifera)	i215	10
14-6016-01	i216 rApi m 5 Honey bee (Apis melifera)	i216	10
14-6004-01	i217 rApi m 10 Honey bee (Apis mellifera)	i217	10
14-4995-01	i211 rVes v1 Phospholipase A 1, Common wasp (Vespula vulgaris)	i211	10
14-4992-01	i209 rVes v 5 Common wasp (Vespula vulgaris)	i209	10
14-4994-01	i210 rPol d 5 Paper wasp (Polistes dominulus)	i210	10

Miscellaneous ImmunoCAP Allergens component			
Art. No.		**Code**	**Size**
14-5997-01	o215 Galactose-alpha-1,3-Galactose (alpha-Gal) Thyroglobuline, bovine	o215	10
14-5339-01	o214 CCD; MUXF3 Bromelain	o214	10

Occupational - ImmunoCAP Allergen components			
Art. No.		**Code**	**Size**
14-5324-01	k215 rHev b 1 Latex (Hevea brasiliensis)	k215	10
14-5326-01	k217 rHev b 3 Latex (Hevea brasiliensis)	k217	10
14-5327-01	k218 rHev b 5 Latex(Hevea brasiliensis)	k218	10
14-5329-01	k220 rHev b 6.02 Latex (Hevea brasiliensis)	k220	10
14-5330-01	k221 rHev b 8 Latex (Hevea brasiliensis)	k221	10
14-5333-01	k224 rHev b 11 Latex (Hevea brasiliensis)	k224	10

Occupational / Enzymes - ImmunoCAP Allergen components			
Art. No.		**Code**	**Size**
14-5127-01	k202 nAna c 2 Bromelain, Pineapple	k202	10
14-4370-01	k87 nAsp o 21 alpha-amylase (Apergillus oryzae)	k87	10
14-5130-01	k201 nCar p 1 Papain (Papaya)	k201	10
14-5128-01	k208 nGal d 4 Lysozyme (Egg)	k208	10
14-5132-01	k206 Savinase (Bacillius spp.)	k206	10
14-5258-01	k213 nSus s Pepsin, Swine	k213	10

Foods - Fruits & vegetables ImmunoCAP Allergen components			
Art. No.		**Code**	**Size**
14-4984-01	f430 rAct d 8 PR-10 Kiwi (Actinidia deliciosa)	f430	10
14-5760-01	f443 rAna o 3 Cashew nut (Anacardium occidentale)	f443	10
14-4957-01	f417 rApi g 1.01 PR-10 Celery (Apium graveolens)	f417	10
14-5703-01	f434 rMal d 1 PR-10 Apple (Malus domesticus)	f434	10
14-5704-01	f435 rMal d 3 LTP Apple (Malus domesticus)	f435	10
14-4960-01	f419 rPru p 1 PR-10 Peach (Prunus persica)	f419	10
14-4961-01	f420 rPru p 3 LTP Peach (Prunus persica)	f420	10
14-4962-01	f421 rPru p 4 Profilin Peach (Prunus persica)	f421	10

Foods - Seed, legumes & nuts ImmunoCAP Allergen components			
Art. No.		**Code**	**Size**
14-4963-01	f422 rAra h 1 Peanut (Arachis hypogaea)	f422	10
14-4964-01	f423 rAra h 2 Peanut (Arachis hypogaea)	f423	10
14-4965-01	f424 rAra h 3 Peanut (Arachis hypogaea)	f424	10
14-6041-01	f447 rAra h 6 Peanut (Arachis hypogaea)	f447	10
14-5341-01	f352 rAra h 8 PR-10 Peanut (Arachis hypogaea)	f352	10
14-4980-01	f427 rAra h 9 LTP Peanut (Arachis hypogaea)	f427	10
14-5343-01	f354 rBer e 1 Brazil nut (Bertholletia exclsa)	f354	10
14-4981-01	f428 rCor a 1 PR-10 Hazel nut (Corylus avellana)	f428	10
14-4968-01	f425 rCor a 8 LTP Hazel nut (Corylus avellana)	f425	10
14-5758-01	f440 nCor a 9 Hazel nut (Corylus avellana)	f440	10
14-5754-01	f439 rCor a 14 Hazel nut (Corylus avellana)	f439	10
14-5340-01	f353 rGly m 4 PR-10 Soy (Glycine max)	f353	10
14-4990-01	f431 nGly m 5 beta-conglycinin Soy (Glycine max)	f431	10
14-4991-01	f432 nGly m 6 Glycinin Soy (Glycine max)	f432	10
14-5762-01	f441 rJug r 1 Walnut (Juglans regia)	f441	10
14-5954-01	f442 rJug r 3 LTP Walnut (Juglans regia)	f442	10
14-5701-01	f433 rTri a 14 LTP Wheat (Triticum aestivum)	f433	10
14-4954-01	f416 rTri a 19 Omega-5 Gliadin Wheat (Triticum spp.)	f416	10
14-5752-01	f98 Gliadin	f98	10

Foods - Fish, shellfish & mollusks ImmunoCAP Allergen components			
Art. No.		**Code**	**Size**
14-5344-01	f355 rCyp c 1 Carp (Cyprinus carpio)	f355	10
14-4971-01	f426 rGad c 1 Cod (Gadus morhua)	f426	10
14-5335-01	f351 rPen a 1 Tropomyosin (Shrimp)	f351	10

Foods - Egg & fowl ImmunoCAP Allergen components			
Art. No.		**Code**	**Size**
14-4805-01	f233 nGal d 1 Ovomucoid (Egg)	f233	10
14-4804-01	f232 nGal d 2 Ovalbumin (Egg)	f232	10
14-5222-01	f323 nGal d 3 Conalbumin (Egg)	f323	10

Foods - Milk ImmunoCAP Allergen components			
Art. No.		**Code**	**Size**
14-4522-01	f76 nBos d 4 alpha-lactalbumin (Milk)	f76	10
14-4523-01	f77 nBos d 5 beta-lactoglobulin (Milk)	f77	10
14-4524-01	f78 nBos d 8 Casein (Milk)	f78	10

Test profiles: From a mix to component resolved diagnostic

Art. No.	i.e. Foods - Mix ImmunoCAP® Allergens	Code	Size
14-4275-01	fx5 (f1,2,3,4,13,14) Egg white, Milk, Fish, Wheat, Peanut, Soya bean	fx5	16

when test result is positive (>0.35 kU/L)

Art. No.	Egg white, Milk, Fish, Wheat, Peanut, Soya bean single specific IgE allergens		Size
14-4111-01	f1 Egg white	f1	16
14-4112-01	f2 Milk	f2	16
14-4159-01	f3 Fish; cod (Gadus morhua)	f3	16
14-4113-01	f4 Wheat (Triticum aestivum)	f4	16
14-4126-01	f13 Peanut (Arachis hypogaea)	f13	16
14-4115-01	f14 Soya bean (Glycine max)	f14	16

when test result is positive (>0.1 kU/L)

Allergen components can be selected for above listed specific IgE allergens as following:

Art. No.	f1 Egg white	Code	Size
14-4805-01	f233 nGal d 1 Ovomucoid (Egg)	f233	10
14-4804-01	f232 nGal d 2 Ovalbumin (Egg)	f232	10
14-5222-01	f323 nGal d 3 Conalbumin (Egg)	f323	10

Art. No.	f2 Milk	Code	Size
14-4522-01	f76 nBos d 4 alpha-lactalbumin (Milk)	f76	10
14-4523-01	f77 nBos d 5 beta-lactoglobulin (Milk)	f77	10
14-4524-01	f78 nBos d 8 Casein (Milk)	f78	10

Art. No.	f3 Fish	Code	Size
14-5344-01	f355 rCyp c 1 Carp (Cyprinus carpio)	f355	10
14-4971-01	f426 rGad c 1 Cod (Gadus morhua)	f426	10

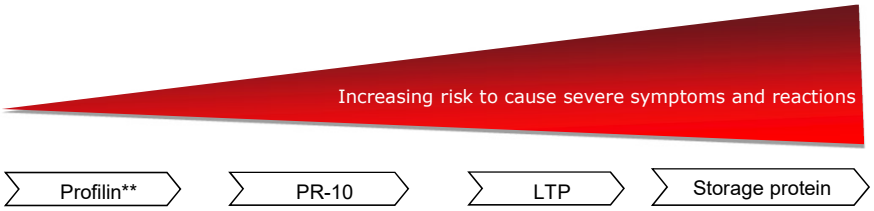
Art. No.	f4 Wheat	Code	Size
14-5701-01	f433 rTri a 14 LTP Wheat (Triticum aestivum)	f433	10
14-4954-01	f416 rTri a 19 Omega-5 Gliadin, Wheat (Triticum spp.)	f416	10
14-4291-01	f79 Gluten	f79	10
14-5752-01	f98 Gliadin	f98	10

Art. No.	f13 Peanut	Code	Size
14-4963-01	f422 rAra h 1 Peanut (Arachis hypogaea)	f422	10
14-4964-01	f423 rAra h 2 Peanut (Arachis hypogaea)	f423	10
14-4965-01	f424 rAra h 3 Peanut (Arachis hypogaea)	f424	10
14-6041-01	f447 rAra h 6 Peanut (Arachis hypogaea)	f447	10
14-5341-01	f352 rAra h 8 PR-10 Peanut (Arachis hypogaea)	f352	10
14-4980-01	f427 rAra h 9 LTP Peanut (Arachis hypogaea)	f427	10

Art. No.	f14 Soy	Code	Size
14-5340-01	f353 rGly m 4 PR-10 Soy (Glycine max)	f353	10
14-4990-01	f431 nGly m 5 beta-conglycinin Soy (Glycine max)	f431	10
14-4991-01	f432 nGly m 6 Glycinin Soy (Glycine max)	f432	10

ImmunoCAP™ Allergen components Peanut and Tree nuts

ImmunoCAP™ Whole allergens	Asymptomatic [1]	Local reactions [1]	Local and systemic reactions [1]	Systemic reactions [1]
	(usually)	(mainly)		
Peanut	Profilin**	Ara h 8	Ara h 9	Ara h 1, Ara h 2, Ara h 3, Ara h6
Hazelnut	Profilin**	Cor a 1	Cor a 8	Cor a 9, Cor a 14
Walnut ***	Profilin**		Jug r 3	Jug r 1, Jug r 2*
Cashew nut ****	Profilin**			Ana o 2*, Ana o 3
Brazil nut	Profilin**			Ber e 1



**Available on ImmunoCAP ISAC. **Surrogate markers for profilin Phl p 12, Bet v 2 or Pru p 4.*
****Patients senitized to pecan are very likely to also be IgE-reactive to walnut and vice versa. Jug r 1 and Jug r 3 may therefore be used as a risk marker for both pecan and walnut allergy.[2] ****Patients senitized to pistachio*
are very likely to also be IgE-reactive to cashew nut and vice versa. Ana o 3 may therefore be used as a risk marker for both pistachio and cashew nut allergy.[3]

1. Mills C, et al., editors. Plant Food Allergens: John Wiley and Sons Ltd., 2004.
2. Teuber SS, et al. J Allergy Clin Immunol. 2000;105:S140
3. Savvatianos S, et al. Allergy Clin Immunol. 2015;136:192-4.

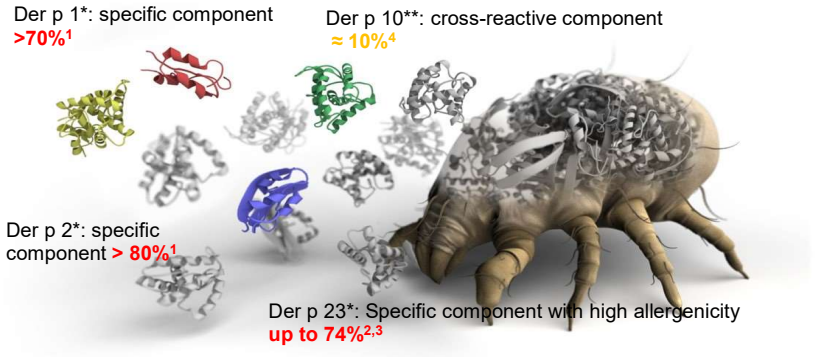
Mites - ImmunoCAP Allergen components

Art. No.		Code	Size
14-5996-01	rDer p 1 House dust mite (Dermatophagoides pteronyssinus)	d202	10
14-4967-01	rDer p 2 House dust mite (Dermatophagoides pteronyssinus)	d203	10
14-4985-01	rDer p 10 Tropomyosin House dust mite (Dermatop. pteronyssinus)	d205	10
14-6040-01	rDer p 23 House dust mite (Dermatop. pteronyssinus)	d209	10

New!

Key to accurate management is **knowing the sensitization profile**

Frequency of sensitization among HDM allergic children and adults

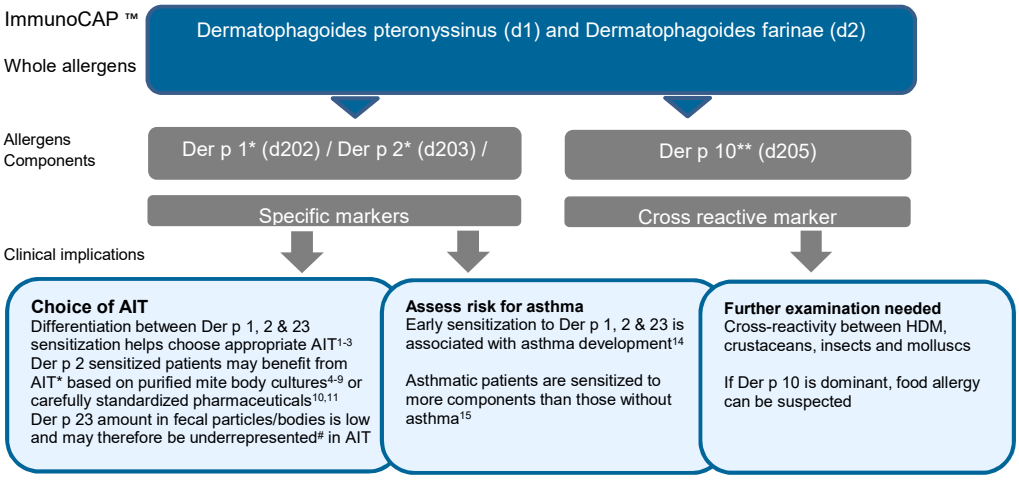


*High cross-reactivity between Der p 1 and Der f 1 resp. Der p 2 and Der f 2 resp. Der p 23 and Der f 23 from D. Farinae.[8]
**Mite tropomyosins such as Der p 10 and Der f 10 are widely cross-reactive among invertebrates.[8]

1. Batard T. et al. Allergy 2016; 71: 220–229. 2. Weghofer M. et al. J Immunol 2013; 190:3059-3067.

3. Mueller GA. Et al. Clin Exp Allergy. 2016;46(2):365-76. 4. Resch Y. et al. Clin Exp Allergy. 2011 October ; 41(10): 1468–1477

Suggested test profil: **HDM allergy**



*High cross-reactivity between Der p 1 and Der f 1 resp. Der p 2 and Der f 2 resp. Der p 23 and Der f 23 from D. Farinae.

**Mite tropomyosins such as Der p 10 and Der f 10 are widely cross-reactive among invertebrates. #Der p 23 content of extracts has not been studied.

1. Canonica GW, et al. World Allergy Organization Journal. 2013;6(1):17. 2.Asero R. Eur Ann Allergy Clin Immunol. 2012;44(5):183–7.

3.Schmid-Grendelmeier P. Hautarzt. 2010;61(11):946–53

4. Zertifikat NIBSC, 1st International Standard For House Dust Mite Dermatophagoides pteronyssinus (1984).

5.Poster zu: Frew A, et al. Allergy Clin Immunol Int. 2005;(Suppl 1),527. 6.Weber B, et al. Allergologie. 1998;21:116-24.

7.Brunetto R, et al. Allergy 2010;65:184–90. 8.Casset A, et al. Int Arch Allergy Immunol 2012;159:253–62.

9.Weber B, et al. Allergy. 1998:53 (Suppl 43):25. 10.Henmar H, et al. Int Arch Allergy Immunol. 2016;169(1):23-32.11. Canonica GW., et al.

Expert Rev Clin Immunol. 2016 Aug;12(8):805-15.12.Weghofer M. et al. J Immunol. 2013;190(7):3059-67.

13.Thomas WR. Allergology International 64 (2015) 304-11.14. Posa D. et al. J Allergy Clin Immunol 2017;139:541-9.15.Resch Y. et al.

J Allergy Clin Immunol 2015;136:1083-91 15.Resch Y. et al. J Allergy Clin Immunol 2015;136:1083-91

Test profile example ImmunoCAP epidermals and animal proteins

Art. No.	i.e. Epidermals and animal proteins ImmunoCAP Allergens mix	Code	Size
14-4203-01	ex1 (e1,e3,e4,e5) Cat dander, Horse dander, Cow dander, Dog dander	ex1	16

when test result is positive (>0.35 kU/L)

Art. No.	Cat dander, Horse dander, Cow dander, Dog dander single sIgE allergens		Size
14-4109-01	e1 Cat dander	e1	16
14-4122-01	e3 Horse dander	e3	16
14-4166-01	e4 Cow dander	e4	16
14-4110-01	e5 Dog dander	e5	16

when test result is positive (>0.1 kU/L)

Allergen components can be selected for above listed specific IgE allergens as following:

Art. No.	e1 Cat dander	Code	Size
14-4905-01	e94 rFel d 1 Cat (Felis domesticus)	e94	10
14-5240-01	e220 rFel d 2 Cat serum albumin (Felis domesticus)	e220	10
14-5702-01	e228 rFel d 4 Cat (Felis domesticus)	e228	10

Art. No.	e3 Horse dander	Code	Size
14-5700-01	e227 rEqu c 1 Horse (Equus caballus)	e227	10

Art. No.	e4 Cow dander	Code	Size
14-5009-01	e204 nBos d 6 BSA (bovine serum albumin), Cow (Bos spp.)	e204	10

Art. No.	e5 Dog dander	Code	Size
14-4955-01	e101 rCan f 1 Dog (Canis familiaris)	e101	10
14-4956-01	e102 rCan f 2 Dog (Canis familiaris)	e102	10
14-5241-01	e221 nCan f 3 Dog serum albumin (Canis familiaris)	e221	10
14-4998-01	e226 rCan f 5 Dog (Canis familiaris)	e226	10

Test profile example: ImmunoCAP™ venoms

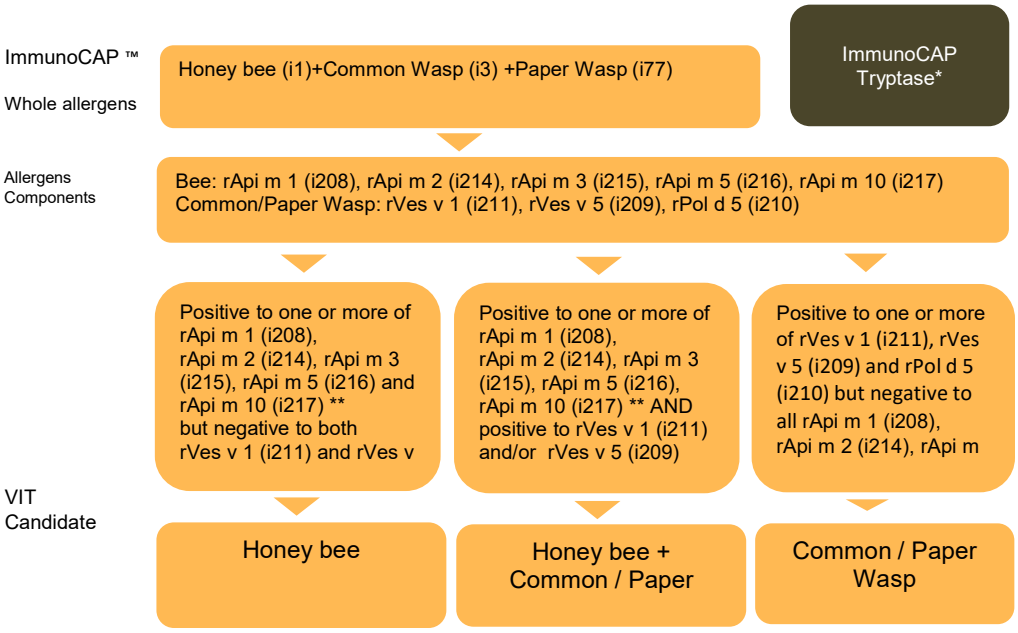
Up to 50% of venom allergic patients have positive test results to both bee and wasp venom extracts1

Resolve double positivity and identify suitable VIT for individual patients

Art. No.	i.e. Honey bee, Common wasp, Paper wasp single sIgE allergens		Size
14-4143-01	i1 Honey bee (Apis melifera)	i1	16
14-4527-01	i77 European paper (Polistes dominulus)	i77	10
14-4525-01	i3 Common wasp Yellow jacket (Vespula spp.)	i3	16

when test result is positive (>0.1 kU/L)

Allergen components can be selected for above listed specific IgE allergens for identifying true sensititzation:



Recommended tests

*Measure tryptase baseline levels before venom immunotherapy (VIT) to assess risk for severe reactions4 ImmunoCAP Tryptase (see page 13 - 14)

**Api m 3 and Api m 10 can be underrepresented in VIT extracts5,6

MUXF3 CCD o214 (from Bromelain)

- Pure Cross-reactive Carbohydrate Determinants (CCD) containing only the MUXF3 carbohydrate epitope
- Cross-reactivity marker for CCDs

References: 1. Spillner E. et al. Frontiers in immunology 2014; 5: 1-7. 2. Bonifazi F. et al. Allergy 2005; 60: 1459-1470.
3. Biló B. et al. Allergy 2005; 60: 1339-1349. 4. Rueff F et al. J Allergy Clin Immunol 2009; 124: 1047-1054.
5. Grunwald T. et al. J Allergy Clin Immunol 2006; 117: 848-54. 6. Blank S. et al. Allergy 2011; 66: 1322-29.

Comparison with other meat allergies

Features of α-Gal-mediated meat allergy, protein-mediated meat allergy and pork-cat syndrome

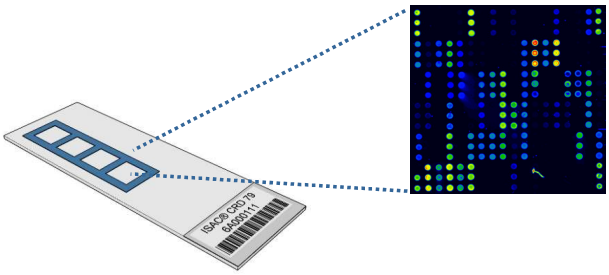
New ImmunoCAP™ Allergen o215 alpha-Gal			
Art. No.		**Code**	**Size**
14-5997-01	o215 Galactose-alpha-1,3-Galactose (alpha-Gal) Thyroglobuline, bovine	o215	10

	α-Gal-mediated meat allergy	**Protein-mediated meat allergy**	**Pork-cat syndrome**
Sensitizing allergen	α-Gal epitope from tick bite	Bovine serum albumin (Bos d 6) or Immunoglobulin (Bos d 7), actin, myoglobin Chicken serum albumin (Gal d 5)	Cat serum albumin (Fel d 2)
Clinical features			
Triggers	α-Gal on mammalian meat and offal proteins, milk in some patients Gelatin from Mamalian sources. Co-factors can increase the sensitivity to food triggers Non-oral triggers: Cetuximab infusion, vaccines and colloids containing mammmalian gelatin	Sensitizing meat proteins	Pork serum albumin
Symptoms	Often severe, ranging from generalized pruritus and urticaria, to gastrointestinal symptoms, angioedema, and anaphylaxis	Typically less severe, but range from conjunctivitis, urticaria, angioedema, and dyspnea to anaphylaxis	Typically less severe, but ranging from abdominal cramping, diarrhea, nausea, itching, hives to anaphylaxis Oral pruritus can occur during the meal
Symptom onset	Delayed reactions- generally 3-6 hours after consuming mammalian meat, but longer delays are not uncommon Co-factors can reduce the time to onset	Rapid - within 2 hours of consuming meat	Rapid - usually within 1 hour of consuming pork
Age group affected	Predominantly adults, but also children	Predominantly children	Predominantly adults, and teenagers
Diagnosis			
SPT	Unreliable - many patients show negative SPT results with meat extracts and fresh meat preparations	Positive to mammalian serum albumins and beef, lamb, pork and rabbit meat (can be negative to these meats after cooking) Often positive to cow's milk	Positive to cat and other animal danders and meats
Immunoassay	Can show positive results to beef, pork, milk, cat and dog dander	Can be positive to mammalian meats (beef, lamb, pork, rabbit), serum albumins and epithelium (dog, cat, cow, sheep, pig) and to cow's milk	Can be positive to pork and beef, and mammalian serum albumins (cat, dog, cow)

Note: The monoclonal antibody cetuximab (used in treatment of some cancers) contins the alpha-Gal epitope on the Fab fragment. Severe reactions to cetuximab infusions have been reported in patients with IgE to alpha-Gal. Physicians should be aware of the risk of allergic reactions to cetuximab in individuals with demonstrated IgE to alpha-Gal, or with delayed meat allergy or a history of tick bites.

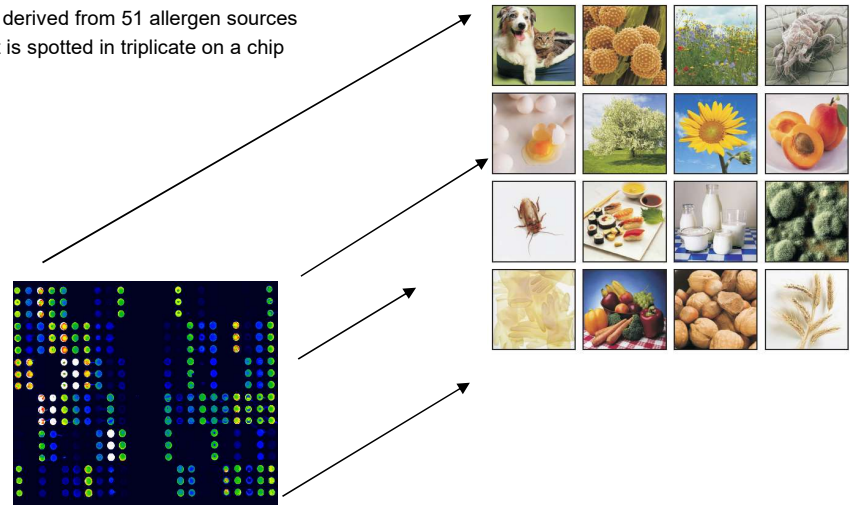
ImmunoCAP ISAC®

Immuno Solid-phase Allergen Chip

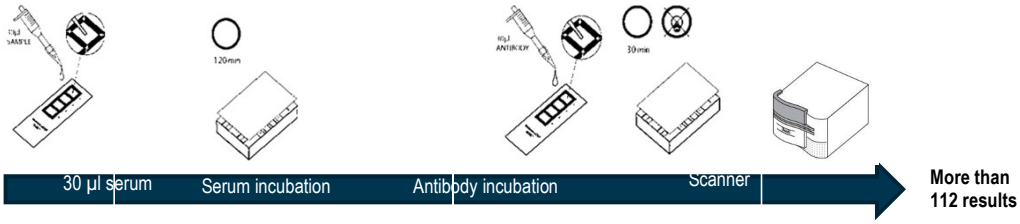


Based on modern biochip technology, ImmunoCAP ISAC is a miniaturized immunoassay platform that allows for multiplex measurement of specific antibodies to many allergen components using only 30µl of serum or plasma. Capillary blood sampling can be used, enabling a less invasive procedure for testing young children. Purified natural or recombinant allergen components are immobilized on a solid support (biochip). In a two step assay, antibodies from the patient serum bind to the immobilized allergen components. After a short washing step, allergen-bound antibodies are detected by a fluorescence-labeled antibody.
Test results are measured with a biochip scanner and evaluated using proprietary software.
ImmunoCAP ISAC is a semi-quantitative test and results are reported in ISAC Standardized Units (ISU).

- ✓ Screening using Molecular Allergology
- ✓ 112 Components derived from 51 allergen sources
- ✓ Every component is spotted in triplicate on a chip



Streamlined Assay procedure



ImmunoCAP ISAC System components:

Art. No.	
	ImmunoCAP ISAC specific IgE testing starter set containing
81-1002-01	**LuxScan 10k Microarray Scanner *)** Duo-Laser scanner for slides
81-1010-01	**ImmunoCAP ISAC Starter Pack** Contains equipment (1xhumid chamber, 2x washing dish, 2x magnetic stirring bar)
81-1009-01	**Phadia MIA Operator software including Phadia Xplain software**
	ISAC allergen chip needed for routine testing
81-1011-01	**ImmunoCAP ISAC sIgE 112** (Contain all reagents needed to perform 20 assays, 5 slides with 4 arrays each, detection antibody and control sample)
10-9422-01	**Washing Solution kit (6 bottles enough for 6L solution)** 1 litre Washing Solution per run! e.g. when one use 5 chips per run in parallel the same amount of washing solution as testing only one chip is required.
81-1015-01	**ImmunoCAP ISAC Specific IgE Control** (1 vial with 80µl for maximum of 2 tests; ready for use)
81-1016-01	**ImmunoCAP ISAC Specific IgE Detection Antibody** (1 vial with 0,8 ml for 20 tests; ready for use)

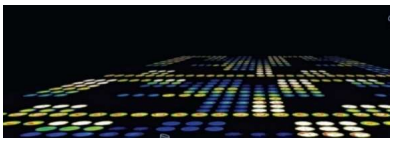
*) to operate the scanner a PC is needed and to obtain the result a printer they are not included in the scanner price and have to be bought seperately when needed.

Molecular allergology is available for
two complementing technologies

ImmunoCAP ALLERGEN COMPONENTS

•Precise, quantitative detection of IgE abs for more than 100 single components
•One test => One result for 1 component
•Solve ONE or FEW clinical question

ImmunoCAP ISAC



•For a broad spectrum profile on a molecular level
•One test => A result profile for 112 components
•Solve SEVERAL clinical questions at once

ImmunoCAP® Cross-Reactivity Map

Tech					Possible Cross-Reactivity																			
ISAC 112	ImmunoCAP	SOURCE	COMPONENT	PROTEIN FAMILY OR FUNCTION	Fruits	Vegetables	Nuts, seeds	Legumes	Cereals	Spices	Grass pollen	Tree pollen	Weed pollen	Latex	Milk	Meat	Fish	Egg	Seafood	Animals	Moulds	Mites	Insects	Venoms	Parasites
FOOD ALLERGENS																									
n	n	*Egg white*	Gal d 1	Ovomucoid														■							
n	n	*Egg white*	Gal d 2	Ovalbumin														■							
n	n	*Egg white*	Gal d 3	Conalbumin/Ovotransferrin														■							
	n	*Egg*	Gal d 4	Lysozyme														■							
n		*Egg yolk/chicken*	Gal d 5	Livetin/Serum Albumin												■		■							
n	n	*Cow's milk*	Bos d 4	Alpha-lactalbumin											■										
n	n	*Cow's milk*	Bos d 5	Beta-lactoglobulin											■										
n	n	*Cow's milk and meat*	Bos d 6	Serum Albumin											■	■				■					
n	n	*Cow's milk*	Bos d 8	Casein											■										
n		*Cow's milk*	Bos d Lactoferrin	Transferrin											■										
	r	*Carp*	Cyp c 1	Parvalbumin													■								
r	r	*Cod*	Gad c 1	Parvalbumin													■								
	r	*Shrimp*	Pen a 1	Tropomyosin															■			■	■		■
n		*Shrimp*	Pen m 1	Tropomyosin															■			■	■		■
n		*Shrimp*	Pen m 2	Arginine kinase															■				■		
n		*Shrimp*	Pen m 4	*Sarcoplasmic* Calcium binding protein															■						
r		*Cashew nut*	Ana o 2	Storage protein, 11S globulin			●																		
	r	*Cashew nut*	Ana o 3	Storage protein, 2S albumin			●																		
r	r	*Brazil nut*	Ber e 1	Storage protein, 2S albumin			●																		
r	r	*Hazelnut*	Cor a 1.0401	PR-10	■	■	■	■				■													
r	r	*Hazelnut*	Cor a 8	LTP	■	■	■	■	■	■		■	■												
n	n	*Hazelnut*	Cor a 9	Storage protein, 11S globulin			●																		
	r	*Hazelnut*	Cor a 14	Storage protein, 2S albumin			●																		
r	r	*Walnut*	Jug r 1	Storage protein, 2S albumin			●																		
n		*Walnut*	Jug r 2	Storage protein, 7S globulin			●																		
n	r	*Walnut*	Jug r 3	LTP	■	■	■	■	■	■		■	■												
	r	*Sesame*	Ses i 1	Storage protein, 2S albumin			●																		
r	r	*Peanut*	Ara h 1	Storage protein, 7S globulin				●																	
r	r	*Peanut*	Ara h 2	Storage protein, 2S albumin				●																	
r	r	*Peanut*	Ara h 3	Storage protein, 11S globulin				●																	
n		*Peanut*	Ara h 6	Storage protein, 2S albumin				●																	
r	r	*Peanut*	Ara h 8	PR-10	■	■	■	■				■													
r	r	*Peanut*	Ara h 9	LTP	■	■	■	■	■	■		■	■												
r	r	*Soy bean*	Gly m 4	PR-10	■	■	■	■				■													
n	n	*Soy bean*	Gly m 5	Storage protein, Beta-conglycinin				●																	
n	n	*Soy bean*	Gly m 6	Storage protein, Glycinin				●																	
n		*Buckwheat*	Fag e 2	Storage protein, 2S albumin					●																
r	r	*Wheat*	Tri a 14	LTP	■	■	■	■		■															
r	r	*Wheat*	Tri a 19	Omega-5 gliadin					●																
n		*Wheat*	Tri a aA_TI	Alpha-Amylase / Trypsin Inhibitor					■																
n		*Kiwi*	Act d 1	Cysteine protease	●																				
n		*Kiwi*	Act d 2	Thaumatin-like protein	■																■	■			
n		*Kiwi*	Act d 5	Kiwellin	●																				
r	r	*Kiwi*	Act d 8	PR-10	■	■	■	■				■													
r	r	*Celery*	Api g 1	PR-10	■	■	■	■				■													
r	r	*Apple*	Mal d 1	PR-10	■	■	■	■				■													
	r	*Apple*	Mal d 3	LTP	■	■	■	■	■	■		■	■												
r	r	*Peach*	Pru p 1	PR-10	■	■	■	■				■													
r	r	*Peach*	Pru p 3	LTP	■	■	■	■	■	■		■	■												
	r	*Peach*	Pru p 4	Profilin	■	■	■	■	■	■	■	■	■	■											
AEROALLERGENS																									
n	n	*Bermuda*	Cyn d 1	Grass group 1							■														
r	r	*Timothy*	Phl p 1	Grass group 1							■														
r	r	*Timothy*	Phl p 2	Grass group 2							■														
n	n	*Timothy*	Phl p 4	Berberine bridge enzyme							■														
r	r	*Timothy*	Phl p 5	Grass group 5							■														
r	r	*Timothy*	Phl p 6	Grass group 6							■														
r	r	*Timothy*	Phl p 7	Polcalcin							■	■	■												
r	r	*Timothy*	Phl p 11	Trypsin inhibitor							■														
r	r	*Timothy*	Phl p 12	Profilin	■	■	■	■	■	■	■	■	■	■											
r		*Alder*	Aln g 1	PR-10	■	■	■	■				■													
r	r	*Birch*	Bet v 1	PR-10	■	■	■	■				■													
r	r	*Birch*	Bet v 2	Profilin	■	■	■	■	■	■	■	■	■	■											
r	r	*Birch*	Bet v 4	Polcalcin							■	■	■												
	r	*Birch*	Bet v 6	Isoflavone reductases								■													

Important Allergen Families

Storage protein (1)
- Proteins stable to heat and digestion causing reactions also to cooked foods.
- Often associated with systemic and more severe reactions in addition to OAS.
- Proteins in nuts and seeds serving as source material during growth of new plants.

LTP (non-specific Lipid Transfer Protein, nsLTP) (1)
- Proteins stable to heat and digestion causing reactions also to cooked foods.
- Often associated with systemic and more severe reactions in addition to OAS.
- Associated with allergic reactions to fruit and vegetables especially in regions where peach and closely related fruits are cultivated.

PR-10 protein, Bet v 1 homologue (1)
- Most PR-10 proteins are sensitive to heat and digestion and cooked foods are often tolerated.
- Often associated with local symptoms such as oral allergy syndrome (OAS).
- Associated with allergic reactions to pollens, fruits and vegetables.

Polcalcin (Calcium-binding proteins) (2)
- A marker for cross-reactivity between pollen, which is not present in plant foods.

Profilin (1)
- Proteins sensitive to heat and digestion and cooked foods are often tolerated.
- Seldom associated with clinical symptoms but may cause local and even severe reactions in some patients.
- Profilins are present in all pollen and plant foods.

CCD (2)
- A marker for sensitization to cross-reactive carbohydrate determinants.
- Rarely causes allergic reactions, but may produce positive in-vitro test results to CCD-containing allergens from pollen, plant foods, insects and venoms.

Lipocalin (3)
- Stable proteins (and important allergens) in animals.
- Allergen component displaying limited cross-reactivity between species.

Parvalbumin (3)
- Proteins stable to heat and digestion causing reactions also to cooked foods.
- Often associated with systemic and more severe reactions in addition to OAS.
- Major allergen in fish and a marker for cross-reactivity among different species of fish and amphibians.

Tropomyosin (3)
- Proteins stable to heat and digestion causing reactions also to cooked foods.
- As food allergen often associated with systemic and more severe reactions in addition to OAS.
- Actin-binding proteins in muscle fibres and a marker for cross-reactivity between crustaceans, mites and cockroach.

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Tech					Possible Cross-Reactivity																			
ISAC 112	ImmunoCAP	SOURCE	COMPONENT	PROTEIN FAMILY OR FUNCTION	Fruits	Vegetables	Nuts, seeds	Legumes	Cereals	Spices	Grass pollen	Tree pollen	Weed pollen	Latex	Milk	Meat	Fish	Egg	Seafood	Animals	Moulds	Mites	Insects	Venoms	Parasites
r		*Hazel*	Cor a 1.0101	PR-10																					
n		*Japanese cedar*	Cry j 1	Pectate lyase								●													
n	n	*Cypress*	Cup a 1	Pectate lyase								●													
r	r	*Olive*	Ole e 1	Trypsin inhibitor								●													
n	n	*Olive*	Ole e 7	LTP																					
r	r	*Olive*	Ole e 9	Glucanase								●													
r	r	*Plane*	Pla a 1	Invertase Inhibitor								●													
n		*Plane*	Pla a 2	Polygalacturonases								●													
r		*Plane*	Pla a 3	LTP																					
n	n	*Ragweed*	Amb a 1	Pectate lyase									●												
n	n	*Mugwort*	Art v 1	Defensin									●												
n	n	*Mugwort*	Art v 3	LTP																					
r		*Goosefoot*	Che a 1	Trypsin Inhibitor									●												
r		*Mercury*	Mer a 1	Profilin																					
r	r	*Wall pellitory*	Par j 2	LTP									●												
r	r	*Plantain*	Pla l 1	Trypsin Inhibitor									●												
n	n	*Saltwort*	Sal k 1	Pectin methylesterase									●												
r	r	*Dog*	Can f 1	Lipocalin																●					
r	r	*Dog*	Can f 2	Lipocalin																●					
n	n	*Dog*	Can f 3	Serum Albumin																					
r	r	*Dog*	Can f 5	Arginine esterase/kallikrein																●					
r	r	*Horse*	Equ c 1	Lipocalin																●					
n		*Horse*	Equ c 3	Serum Albumin																					
r	r	*Cat*	Fel d 1	Uteroglobin																●					
r	r	*Cat*	Fel d 2	Serum Albumin																					
r	r	*Cat*	Fel d 4	Lipocalin																●					
n		*Mouse*	Mus m 1	Lipocalin																●					
	n	*Swine*	Sus s PSA	Serum Albumin																					
r	r	*Alternaria*	Alt a 1	Acidic glycoprotein																	●				
r		*Alternaria*	Alt a 6	Enolase																					
r	r	*Aspergillus*	Asp f 1	Mitogillin family																	●				
	r	*Aspergillus fumigatus*	Asp f 2	Fibrinogen Binding Proteins																					
r	r	*Aspergillus*	Asp f 3	Peroxysomal protein																					
	r	*Aspergillus fumigatus*	Asp f 4	Unknown																					
r	r	*Aspergillus*	Asp f 6	Mn superoxide dismutase																					
	n	*Aspergillus oryzae*	Asp o 21	Alpha-amylase																					
r		*Cladosporium*	Cla h 8	Mannitol dehydrogenase																					
r		*Blomia*	Blo t 5	Group 5 mite allergen																		●			
n		*Dermatophagoides*	Der f 1	Cysteine protease																					
r		*Dermatophagoides*	Der f 2	NPC2 family																					
n	r	*Dermatophagoides*	Der p 1	Cysteine protease																					
r	r	*Dermatophagoides*	Der p 2	NPC2 family																					
r	r	*Dermatophagoides*	Der p 10	Tropomyosin																					
r		*Lepidoglyphus*	Lep d 2	NPC2 family																		●			
r		*Cockroach*	Bla g 1	Cockroach group 1																			●		
r		*Cockroach*	Bla g 2	Aspartic protease																			●		
r		*Cockroach*	Bla g 5	Glutathione S-transferase																			●		
n		*Cockroach*	Bla g 7	Tropomyosin																					
OTHERS																									
r	r	*Honey bee*	Api m 1	Phospholipase A2																				●	
	r	*Honey bee*	Api m 2	Hyaluronidase																					
	r	*Honey bee*	Api m 3	Acid phosphatase																				●	
n		*Honey bee*	Api m 4	Melittin																				●	
		Honey bee	Api m 5	Dipeptidyl peptidase																					
	r	*Honey bee*	Api m 10	Icarapin																				●	
r	r	*Paper wasp*	Pol d 5	Antigen 5																				●	
	r	*Common wasp*	Ves v 1	Phospholipase A1																				●	
r	r	*Common wasp*	Ves v 5	Antigen 5																				●	
r		*Anisakis*	Ani s 1	Serine protease inhibitor																					●
r		*Anisakis*	Ani s 3	Tropomyosin																					
r	r	*Latex*	Hev b 1	Rubber elongation factor										●											
r	r	*Latex*	Hev b 3	Small rubber particle protein										●											
r	r	*Latex*	Hev b 5	Acidic protein										●											
r	r	*Latex*	Hev b 6.01	Prohevein																					
	r	*Latex*	Hev b 6.02	Hevein																					
r	r	*Latex*	Hev b 8	Profilin																					
	r	*Latex*	Hev b 9	Glycolytic Enzyme										●											
	r	*Latex*	Hev b 11	Chitinases																					
n	n	*Bromelain*	MUXF3	CCD-marker																					
	n	*Pineapple*	Ana c 2	Bromelain, enzyme																					
	n	*Bovine Thyroglobulin*	Alpha-Gal	Gal-alpha-1,3-Gal (alpha-Gal)												●									

Important Allergen Families

Serum albumin (3, 4)

- Proteins fairly sensitive to heat and digestion.
- Proteins present in different biological fluids and solids in all animals e.g, cow's milk, blood, beef and epithelia.
- Cross-reactions between albumins from different mammalian species are well known, for example between cat and dog and cat and pig (pork).

Important Allergens

Gal d 1, Ovomucoid (egg white) (3)

- IgE abs to ovomucoid are associated with persistent egg allergy and usually neither raw or cooked is tolerated.

Ara h 1, 2, 3, 6, 8 and 9 (peanut) (3)

- IgE abs to Ara h 1, 2, 3, 6 and 9 (LTP) are associated with systemic peanut reaction in addition to OAS.
- IgE abs to Ara h 8 (PR-10) are usually associated with milder, local symptoms such as OAS, and often originating from birch sensitzation.

Gly m 4, 5 and 6 (soy) (3)

- Soy bean allergic patients often have IgE abs to Gly m 5 and Gly m 6. Gly m 5 & Ara h 1 and Gly m 6 & Ara h 3, respectively, show high degree of similarity, also with corresponding proteins in other legumes such as lentils. IgE to these legume storage proteins may cross react and may be associated with clinical reactivity.
- IgE abs to Gly m 4 (PR-10) are usually associated with local symptoms such as OAS, originating from birch sensitzation. However, a few cases of severe allergic reactions to Gly m 4 have been reported to occur, e.g. during birch pollen season and often in combination with exercise and intake of low-processed soy drinks.

Tri a 19, Omega-5 gliadin (wheat) (5, 6, 7)

- IgE abs to omega-5 gliadin (Tri a 19) in adults are associated with a risk of exercise- or NSAIDs-induced reactions in connection with wheat ingestion.
- IgE abs to omega-5 gliadin in children are associated with a risk of immediate reactions to wheat.

Alt a 1 (Alternaria) (3)

- Alt a 1, the major allergen in alternaria is associated with asthma development.

References:

1. Mills C, et al., editors. Plant Food Allergens: John Wiley and Sons Ltd., 2004.
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● Primarily species-specific allergen

October 6, 2016

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