thermoscientific

ImmunoCAP ALLERGEN COMPONENTS

ReCAPtulando

Edtion nº 57 - Year XIII/2019 - June/July

DUST MITES

Evaluation of sensitization to Der p 1 and Der p 2 in a pediatric population in northern Portugal.

WHEAT

Development of a prediction model for severe wheat allergy.

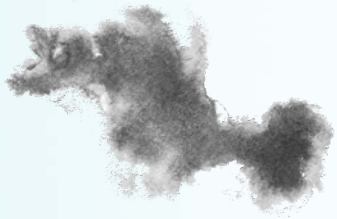
TRYPTASE

Diagnostic value of Tryptase in Food Allergic reactions: A prospective study of 160 Adult peanut challenges.

ThermoFisher SCIENTIFIC

77763.AL.INT15.EN.v1.19

ImmunoCAP®
ALLERGEN COMPONENTS



Evaluation of sensitization to Der p 1 and Der p 2 in a pediatric population in northern Portugal

Peixoto S, Soares J, Monteiro T, Carvalho M, Santos M, Simões C, et al. An Pediatr (Brac) 2018;89(3):162-9.

Commented by:
Prof. Dr. Gustavo Falbo Wandalsen
Master and PhD in Sciences from the Federal University of São Paulo (UNIFESP)
Adjunct Professor of the Discipline of Allergy, Clinical Immunology and Rheumatology ofUNIFESP

INTRODUCTION

House dust mites are considered the main source of indoor allergens, and sensitization to them is an important risk factor for the development of respiratory allergic diseases. Among mites, *Dermatophagoides pteronyssinus* (Dp) is the one with the greatest global relevance. About 20 Dp allergenic components have been identified, with Der p 1 and Der p 2 being considered major allergens due to the high sensitization frequency.

Nevertheless, data on the sensitization profile of mite components are poorly understood in many countries. Identification of this profile is of great importance for Dp specific immunotherapy.

METHODS

This is a retrospective study with children and teenagers with asthma and/or allergic rhinitis attended at an allergology service in the northern region of Portugal in 2016. All of them were submitted to an immediate-reading skin test and, in those who tested positive for Dp, ImmunoCAP™ test for Der p 1* and Der p 2*2 was performed. Specific IgE levels were classified into six ranges: low (0.35 to 0.69 kU_A/L), moderate (0.70 to 3.49 kU_A/L), high (3.50 to 17.49 kU_A/L), very high I (17.50 to <50.00 kU_A/L), very high II (50.00 to <100.00 kU_A/L) and very high III (≥100.00 kU_A/L).

RESULTS

A total of 279 children and teenagers aged 4 to 17 years (65% males) were evaluated, with 71% diagnosed asthma and 88% allergic rhinitis.

Sensitization to Der p 1 was found in 73.5% of patients and Der p 2 in 76.3%. Very high levels (3 categories) to Der p 1 were observed in 41% of cases and Der p 2 in 43%. Only 29 (10%) patients were not sensitized to the two components. Specific IgE levels for Der p 1 and Der p 2 presented a moderate correlation with each other (r: 0.62; p <0.001), but poor correlation with Dp papule diameter observed in the skin test (Der p 1 - r: 0.32, Der p - r: 2: 0.25).

DISCUSSION AND COMMENTS

Mites are the main global source of allergic sensitization and it is estimated that between 65 and 130 million people are sensitized in the world. In this way, a detailed identification of sensitization profile to these allergens is justified. The present study corroborated the relevance of two main allergenic components of Dp (Der p 1 and Der p 2), which, together, presented allergic sensitization in about 90% of study population.

Changes and home care to reduce indoor exposure and specific immunotherapy are usually indicated for patients with respiratory allergic diseases and mite sensitization. Immunotherapy is the only form of treatment with a potential for change in natural course of allergic diseases, and a reduction in symptoms (nasal and pulmonary) and in the need for rescue medication, as well as improvement of lung function and prevention of new sensitization have been already documented.

Immunotherapy is a long-term, cost-effective treatment and should be prescribed according to individual profile of sensitization and allergens clinical relevance. In Portugal, immunotherapy extracts are standardized only for Der p 1 and Der p 2. Thus, according to the results of this study, about 10% of patients could have mispronounced indication of immunotherapy to Dp, if this was prescribed only by patients results of immediate-reading skin test.

In addition to Der p 1 and Der p 2, other components of Dp are clinically relevant. Der p 10 is a component composed of Dp tropomyosin and cross-reacts with other tropomyosins, such as cockroaches and shrimp. More recently, Der p 23 has been identified as an immunodominant Dp allergen, together with Der p 1 and Der p 2. Studies indicate that Der p 23 plays a relevant role in allergic diseases, especially in asthma.

* ImmunoCAP Allergen d202, Allergen component nDer p 1, House dust mite, 2* ImmunoCAP Allergen d203, Allergen component rDer p 2, House dust mite

ImmunoCAP®
ALLERGEN COMPONENTS

How to use components in dust mites allergy?

Pedro, 12 years old

BACKGROUND

• Asthma and allergic rhinitis diagnosed several years ago and in regular use of inhaled and nasal corticosteroids.

• Despite environmental measures to reduce exposure to mite allergens, Pedro maintains frequent nasal symptoms and occasional exacerbations of asthma.

• Parents worry about prolonged use of medications.

ALLERGIST EVALUATION

The patient was referred to an allergist who, after analyzing the case, decided to initiate specific immunotherapy.

An immediate response skin test was performed, that was positive for *Dermatophagoides pteronyssinus*, *Blomia tropicalis* and cockroach mix. Besides the skin test, the physician also order the ImmunoCAP™ components test.

Can allergen components of mites help the proper prescription of immunotherapy?

EXAMS

• ImmunoCAP™ components test for Der p 1 (d202)* and Der p 2 (d203)*[2], Der p 10 (d205)*[5]

• ImmunoCAP™ test for *Blomia tropicallis**[6]

1st scenario

Der p 1 or Der p 2 positive and *Blomia tropicallis* positive: concomitant sensitization to *Dermatophagoides pteronyssinus* and *Blomia tropicalis*, documented by positivity to major components of both mites. Consider concomitant immunotherapy for both mites.

2nd scenario

Der p 1 and Der p 2 negative, Der p 10 positive and *Blomia tropicallis* positive: sensitization only to *Blomia tropicalis*. Possible cross-reaction with other tropomyosins in the skin test for *Dermatophagoides pteronyssinus* (perhaps by sensitization to cockroach). Consider immunotherapy only for *Blomia tropicalis.*

3rd scenario

Der p 1 or Der p 2 positive, *Blomia tropicallis* negative: sensitization to *Dermatophagoides pteronyssinus*, but without evidence of sensitization to *Blomia tropicalis*. Consider immunotherapy only for *Dermatophagoides pteronyssinus.*

Recomended test profile

ImmunoCAP ALLERGENS	*Dermatophagoides pteronyssinus* (d1)*[3] *Dermatophagoides farinae* (d2)*[4], *Blomia tropicallis* (d201)*[6]	
ImmunoCAP COMPONENS	Der p 1 (d202)*/ Der p 2 (d203)*[2]	Der p 10 (d205)*[5] Mite tropomiosin
Clinical Implications	• Allergy-Specific Markers to house dust mites. [4] • Patient can benefit from immunotherapy. • Distinction between sensitization to Der p 1 and Der p 2 help to choose adequate immunotherapy. • High cross-reactivity between the response to Der p 1 and Der f 1 Der p 2 e Der f 2 do *D. Farinae.*[5]	• Test helps assess reactivity between the dust mites domestic, crustaceans, insects andmolluscs • Mite tropomyosins such as Der p 10 and Der f 10 have cross reactivity between invertebrates.[5] • If the sensitization to Der p 10 is there may be a suspicion of food allergy and patients should be tested against others relevant food components.

* ImmunoCAP Allergen d202, Allergen component nDer p 1, House dust mite, 2* ImmunoCAP Allergen d203, Allergen component rDer p 2, House dust mite, 3* ImmunoCAP Allergen d1, House dust mite, 4* ImmunoCAP Allergen d2, House dust mite, 5* ImmunoCAP Allergen d205, Allergen component rDer p 10 Tropomyosin, House dust mite 6*ImmunoCAP Allergen d201, House dust mite

ImmunoCAP®
ALLERGEN COMPONENTS

Development of a prediction model for severe wheat allergy.

Sugiura S, Matsui T, Furuta T, Sasaki K, Kando N, Ito K. Pediatric Allergy and Immunology, v. 29, n. 1, p. 93-96, 2018.

Commented by:
Dra. Ekaterini Goudouris
Professor of the Department of Pediatrics, Faculty of Medicine, UFRJ.
Specialist in Allergy and Immunology by the Brazilian Society of Allergy and Immunopathology

INTRODUCTION

Nowadays the Oral Food Challenge (OFC) has evolved from a definitive diagnostic tool in food allergy to a strategy in determining the food allergen limit dose to initiate oral immunotherapy or even to determine the minimum amount of consumption. However, the OFC test represents a risk of anaphylaxis in patients with severe food allergy.

In order to prevent serious reactions before the OFC, a group of Japanese authors have previously proposed a predictive model for severe egg and cow's milk reactions based on multiple factors.

Wheat is the third antigen most commonly related to food allergy in Japan. Wheat challenge test was identified as an independent risk factor for anaphylaxis at low doses of antigen, requiring the use of adrenaline. Therefore, in a OFC, it is more important to predict severe cases with wheat than it is for other food allergens.

The diagnosis of wheat allergy based on components (omega 5-gliadin) has been shown to be relevant in predicting positive test challenge results but has failed to predict the allergen limit dose or severity of symptoms[6].

OBJECTIVE

The objective of the present study was to identify the clinical factors that contribute to the severity of the reactions, as well as to develop a predictive model to wheat allergy.

METHODS

OFC tests with udon-type pasta (wheat protein 26mg/g) were performed according to the Japanese guidelines for food allergy of 2014.The severity of the symptoms triggered in the challenge test was determined by the Aichi Anaphylaxis Scoring System (ASCA). They also used the ratio between number of points in ASCA and the cumulative dose of wheat that triggered the symptoms. The diagnosis of anaphylaxis was based on guidelines from the World Allergy Organization (WAO) of 2013.

Development data were obtained from challenge tests with udon-type noodles between April 2012 and December 2014. During this period, 360 tests were performed, 65% of which were positive. Of these, 43 tests were excluded due to lack of complete data.

To validate the results obtained with these data, 123 consecutive provocation tests were prospectively analyzed between January 2015 and March 2016, of which 84 were positive.

The factors that were analyzed as contributors to the OFC test result were: age, gender, history of wheat anaphylaxis, history of atopic dermatitis or asthma, total IgE level, wheat-specific IgE level and omega 5-gliadin-specific IgE level. Patients were classified as severe and non-severe according to the ratio between ASCA points and cumulative protein dose of the allergen that provoked the symptoms, based on the authors' clinical practice.

To compare the sequence data they used a univariate analysis with Mann-Whitney U-test and to analyze the binary variables they used a chi square test. All factors with statistical significance in the univariate analysis were used in the multivariate regression analysis, step by step, to identify independent predictors of severe reactions. Based on the results of these analyzes, the authors constructed a logistic regression model using independent factors with $P < 0.05$. Next, they built a simple model with points. The discriminatory capacity of this model was evaluated using the area under curve ROC. The suitability of the model was tested by the Hosmer-Lemeshow test.

RESULTS

The characteristics of the development group were: average age of 3 years, 68.1% of males. The average ASCA score was 10 with mean cumulative dose of 8 g pasta, resulting in a ratio of 87. Serious cases corresponded to 61% of the cases. Univariate analysis identified 5 significantly different variables among the groups of patients with severe and non-serious reactions: IgE for wheat, IgE for omega 5-gliadin, history of anaphylaxis, age and total IgE level. The multivariate analysis identified as independent factors associated with the severity of the reactions: IgE class for wheat, history of anaphylaxis, total IgE <1000 kU/L and IgE for omega 5-gliadin positive (> 0.34 kU_A/L). The simple points model constructed has a maximum score of 10 and is shown in table 1 below:

Table 1 - Scoring model to identify risk of serious reactions to wheat

Variables	Number of points
IgE for wheat/class	1/class
IgE for omega 5 gliadin	1
Total IgE <1000 kU/L	1
Anaphylaxis history	2

ImmunoCAP®
ALLERGEN COMPONENTS

How to use components in wheat allergy?

The scoring model created has a significant correlation with the ratio between ASCA points and cumulative dose of wheat that triggers symptoms and was able to predict severity significantly higher than the use of only the wheat-specific IgE class.

DISCUSSION/CONCLUSION

The authors conclude that they developed a simple scoring model to predict serious reactions to the wheat challenge test. The specific IgE for wheat showed a better correlation with the ratio between ASCA points and the protein dose that trigger the symptoms than omega 5-gliadin specific IgE. This may suggest that although oemga 5-gliadin is an important component, there are other gliadins, glutenins and water-soluble proteins that may be the cause of allergic reactions.

The fact that a total IgE below 1000 I/mL is an independent risk factor is possibly due to the fact that higher IgE values may promote competition in binding to IgE receptors on the surface of mast cells.This scoring system should not be used in patients with celiac disease because they were excluded from the study.

The proposed scoring system may be clinically useful. Patients with scores ≥ 8 by this system should not be subjected to wheat challenge tests because of the risk of serious reactions. In patients with ≤ 4, the challenge tests are safe.

COMMENTS

The work brings a simple model, easy to apply and relevant to daily clinical practice. In the daily routine, provocation tests are essential to confirm the diagnosis of food allergy and to plan oral immunotherapy. However, they imply significant serious reactions that we must be prepared and which we should avoid whenever possible. The proposed model includes easily obtainable variables, which include data from the clinical history and complementary tests that are available in our country.

Case Report
Luan, 1 years old

BACKGROUND

• Received exclusive breastfeeding up to the fourth month of life. From that age on, he began to receive formula of cow's milk, and then there was the introduction of fruits and salt potatoes, without intercurrences.

• At 7 months of age, the aunt offered French bread with butter and cheese that was eating in the snack. Approximately one hour later, the patient had very pruritic erythematous plaques on the face, which extended to the trunk and limbs without edema or other clinical changes.

PHYSICIAN EVALUATION

Considering that cow's milk was introduced earlier and without problems, is suspicious of a reaction to wheat. It was decided to carry out a provocation test to clarify the diagnosis, and the suggestion was to carry out the wheat test first. Relatives are quite fearful of taking the test, despite the proposal to perform in a hospital setting.

EXAMS

• ImmunoCAP™ test for Milk (f2)*, casein (f78)*2, beta-lactoglobulin (f77)*3 an alfa-lactoalbumin (f76)*4 all below 0,1 kU_A/L

• ImmunoCAP test for wheat (f4)*5 = 2,45 kU_A/L and Tri a 19 (omega 5 gliadin) (f416)*6 = 1,78 kU_A/L

COMMENTS

Patient, according to the suspicion, did not present positive results for cow's milk. The food was already being consumed without problems since the four months of life.The positive result of IgE for wheat confirmed the pediatrician hypothesis of wheat allergy.

We know that the presence of IgE to the omega 5-gliadin component of wheat is related to the risk of positive challenge test. The presence of higher values of specific IgE for wheat, in addition to the clinical history, presence of total IgE <1000 and presence of IgE to omega 5-gliadin should be considered to evaluate the risk of a serious reaction occurring during the test. provocation with wheat.

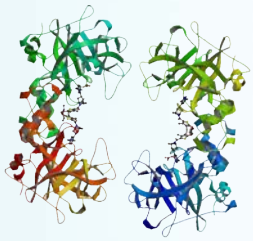
The patient's tests revealed a positive result for wheat and for wheat omega 5-gliadin, with total IgE <1000 kU/L.

CONCLUSION

In view of the results of the patient's exams, in support of the clinical history, it is possible to say that the patient is allergic to wheat, with a risk of severe reaction during a challenge test, which is therefore not indicated at the present time.

*ImmunoCAP Allergen f2, Milk, 2*ImmunoCAP Allergen f78, Allergen component nBos d 8 Casein , Milk 3*ImmunoCAP Allergen f77, Allergen component nBos d 5 Beta-lact oglobulin, Milk, 4* ImmunoCAP Allergen f76, Allergen component nBos d 4 Alpha-lactalbumin, Milk, 5* ImmunoCAP Allergen f4, Wheat 6* ImmunoCAP Allergen f416, Allergen component rTri a 19 Omega -5 Gliadin, Wheat

ImmunoCAP®
ALLERGEN COMPONENTS



Diagnostic value of Tryptase in Food Allergic reactions: A prospective study of 160 adult peanut challenges.

Dua S, Dowey J, Foley L, Islam S, King Y, Ewan P, Clark AT. J Allergy Clin Immunol Pract. 2018 Sep - Oct;6(5): 1692 - 1698. e1. doi: 10.1016/j.jaip.2018.01.006.

Commented by:
Prof. Dr. Marcelo Aun
Medical Alergologist graduated by FMUSP
Professor of the Discipline of Clinical Immunology and Allergy of FMUSP

INTRODUCTION

Serum tryptase is a marker of mast cell activation and an increase in tryptase is a useful indicator of the occurrence of an immediate hypersensitivity reaction. Tryptase has been shown to be valuable in allergic reactions triggered by insect venom and by drugs. However, its usefulness in food allergy remains unknown. Some studies report that tryptase does not increase in food-induced anaphylaxis. Most of these studies rely on data derived from post-mortem samples from patients who died from anaphylaxis or patients who presented acute symptoms in the emergency resulting in varying sampling times and a tendency for more severe reactions. Experimental evidence of tryptase dosage in allergic reactions to food and, in particular, in its typical course of time, are scarce.

OBJECTIVES

The aim of this study was to determine if tryptase increased in allergic reactions to food. In addition, it was evaluated if there would be ideal moments for sample collection and if there would be a diagnostic cutoff point to confirm a clinical reaction.

Results included data from 919 patients, out of 2,369 evaluated, 65.1% male, with a mean age of 3.2 years. A little over 20% had a history of egg-related anaphylaxis, 33.5% had anaphylaxis to other foods. Atopic dermatitis was the allergic disease most frequently associated with egg protein allergy (47.8%), followed by asthma (24%) and allergic rhinitis rhinitis (9.1%). Total IgE levels ranged from 106 to 1040 U/L.

METHODS

Adult patients allergic to peanut were recruited and submitted to up to 4 challenges (oral food challenge [OFC]) with peanut and 1 with placebo, respectively. Tryptase was measured in series on days of challenge before (baseline) and during challenge. The peak percentage of tryptase increasing (peak/baseline) was related to reaction's severity. Receiver Operating Characteristic (ROC) curves were generated by establishing an optimal diagnostic cutoff point.

RESULTS

Tryptase was analyzed in 160 cases with positive OFC (9% with anaphylaxis) and 45 cases with negative OFC (placebo) tests in 50 adults between 18 and 39 years. Tryptase increased above the normal range (11.4 ng/mL) in only 4 of 160 reactions. However, when compared to basal levels, tryptase increase was observed in 100 of 160 (62.5%) reactions, but in 0 out of 45 placebo challenges. Median of increase (95% confidence interval [CI]) for all reactions was 25% (13.3% to 33.3%) and 70.8% (33.3% to 300%) during anaphylaxis. Peak levels occurred 2 hours after OFC and correlated with severity ($p < 0.05$). Moderate to severe respiratory symptoms, generalized erythema, dizziness and hypotension were correlated with a higher peak/basal tryptase ($p < 0.05$). Analysis of ROC curve showed the optimal cutoff point to identify a reaction as a 30% increase (sensitivity of 0.53, specificity of 0.85), area under the curve of 0.72 (95% IC, 0.67-0.78).

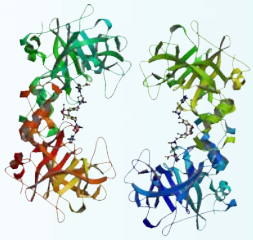
CONCLUSION

Serum tryptase dosage is valuable in allergic reactions to food and correlates with symptoms severity. Comparing peak reaction levels after 2 hours with basal tryptase is essential. An increase in tryptase of 30% is associated with food allergic reactions.

COMMENTS

It's already well defined in literature that there is an association between mastocytosis and anaphylaxis to venoms of hymenoptera and medications. However, this association is not well documented in case of food reactions, nor whether in food anaphylaxis an increase in serum tryptase dosed in acute phase would occur immediately after the reaction.

This study showed that, from the clinical point of view, tryptase levels rarely exceed normal values after an immediate food reaction (4 cases in 160 reactions). However, when compared to basal tryptase, this study showed that tryptase increase occurs after allergic peanut reactions in adults (100 out of 160), and these levels are higher in patients with more severe anaphylactic reactions. In addition, it has been shown that 30% increase in tryptase is associated with food-induced reactions, in this case, peanut. And data showed that 2 hours after exposure to the causative agent was the ideal interval for collection of blood sample.



ImmunoCAP®
ALLERGEN COMPONENTS

How to use tryptase in food allergy reactions?

Case Report

Renato, 9 years old

BACKGROUND

• Has moderate to severe intermittent allergic rhinitis since age 6. A history of angioedema at age 8, occurred during a children's buffet party, in which he had eaten several snacks and chocolate candies, with and without nuts. No reaction ever since.

EMERGENCY CARE

Get to the pediatric emergency room with disseminated urticaria, coughing and diarrhea minutes after eating peanuts at his club's bar. Evaluated by the pediatrician, who diagnosed "allergic reaction" and medicated with intravenous corticosteroid and antihistamine. After 15 minutes it evolved with saturation drop (86%) and hypotension. Taken to the emergency room, where received adrenaline 0.3mg intramuscularly in the thigh, with case resolution. An allergist on call at a distance was contacted, which guided collect of serum tryptase, which was performed 1h40min after the start of the reaction. Tryptase value was 9.2 ng/mL (normal to 11.4 ng/mL).

After discharge from the ER, his mother sought the allergist who guided the case and asked for new laboratory tests, collected 50 days after the reaction.

EXAMS

• ImmunoCAP™ Total IgE test*: 0,35kU/L (normal)

• ImmunoCAP Specific IgE for Peanut (f13)*2 = 0,35 kU_A/L

• ImmunoCAP Specific IgE for component Ara h 2 (f423)*3 = 14,8 kU_A/L

• ImmunoCAP Tryptase* test: 6,3 ng/mL

Diagnostic value of Tryptase in Food Allergic reactions:

The case illustrates initial reaction situation a year earlier, uninvestigated and that allowed neglect and occurrence of a second, systemic and severe reaction. In the second reaction, the child had an anaphylaxis, unidentified and sub-treated at the beginning, with aggravation in acute phase, but reversed with adequate treatment.

Tryptase dosage close to 2 hours after the reaction did not show a value above the normal, but a new collect after 2 weeks showed that basal tryptase was inferior, that is, the 46% increase in tryptase value confirmed that it was treated with massive degranulation of mast cells, causing anaphylaxis, in this case, a food one. To complete the investigation, the presence of the antigen (peanut and its allergens) has been confirmed and allows the physician to give adequate guidance of future eviction and action plan in case of future inadvertent reactions.

* ImmunoCAP Total IgE 2* ImmunoCAP Allergen f13, Peanut 3* ImmunoCAP Allergen f423, Allergen component rAra h 2 Peanut, 4* ImmunoCAP Tryptase

List of full products names - Main Allergens

ImmunoCAP Allergen f96, Avocado; ImmunoCAP Allergen f210, Pineapple; ImmunoCAP Allergen f225, Pumpkin; ImmunoCAP Allergen f47, Garlic; ImmunoCAP Allergen f255, Plum; ImmunoCAP Allergen f20, Almond; ImmunoCAP Allergen f13, Peanut; ImmunoCAP Allergen f9, Rice; ImmunoCAP Allergen f40, Tuna; ImmunoCAP Allergen f7, Oat; ImmunoCAP Allergen f17, Hazel nut; ImmunoCAP Allergen f92, Banana; ImmunoCAP Allergen f35, Potato; ImmunoCAP Allergen f300, Goat milk; ImmunoCAP Allergen f93, Cacao; ImmunoCAP Allergen f24, Shrimp; ImmunoCAP Allergen f23, Crab; ImmunoCAP Allergen f202, Cashew nut; ImmunoCAP Allergen f18, Brazil nut; ImmunoCAP Allergen f48, Onion; ImmunoCAP Allergen f31, Carrot; ImmunoCAP Allergen f242, Cherry; ImmunoCAP Allergen f6, Barley; ImmunoCAP Allergen f36, Coconut; ImmunoCAP Rare Allergen f340, Cochineal extract (Carmine red); ImmunoCAP Allergen f12, Pea; ImmunoCAP Allergen f214, Spinach; ImmunoCAP Allergen f15, White bean; ImmunoCAP Allergen f83, Chicken; ImmunoCAP Allergen f10, Sesame seed; ImmunoCAP Allergen f79, Gluten; ImmunoCAP Allergen f84, Kiwi fruit; ImmunoCAP Allergen f80, Lobster; ImmunoCAP Allergen f33, Orange; ImmunoCAP Allergen f2, Milk; ImmunoCAP Allergen f208, Lemon; ImmunoCAP Allergen f58, Pacific squid; ImmunoCAP Allergen f49, Apple; ImmunoCAP Allergen f293, Papaya; ImmunoCAP Allergen f91, Mango; ImmunoCAP Allergen f247, Honey; ImmunoCAP Allergen f87, Melon; ImmunoCAP Allergen f37, Blue mussel; ImmunoCAP Allergen f8, Maize, Corn; ImmunoCAP Allergen f44, Strawberry; ImmunoCAP Allergen f256, Walnut; ImmunoCAP Allergen f245, Egg; ImmunoCAP Allergen f1, Egg white; ImmunoCAP Allergen f75, Egg yolk; ImmunoCAP Allergen f3, Fish (cod); ImmunoCAP Allergen f94, Pear; ImmunoCAP Allergen f95, Peach; ImmunoCAP Allergen f280, Black pepper; ImmunoCAP Allergen f279, Chilipepper; ImmunoCAP Allergen f263, Green pepper (unripe seed); ImmunoCAP Allergen f218, Paprika, Sweet pepper; ImmunoCAP Allergen f26, Pork; ImmunoCAP Allergen f81, Cheese, cheddar type, ImmunoCAP Allergen f82, Cheese, mold type; ImmunoCAP Allergen f14, Soybean; ImmunoCAP Allergen f41, Salmon; ImmunoCAP Allergen f61, Sardine, Pilchard; ImmunoCAP Allergen f259, Grape; ImmunoCAP Allergen f259, Grape; ImmunoCAP Allergen f27, Beef; ImmunoCAP Allergen c8, Chlorhexidine; ImmunoCAP Allergen c261, Pholcodine; ImmunoCAP Allergen c71, Insulin bovine; ImmunoCAP Allergen c70, Insulin porcine; ImmunoCAP Allergen c73, Insulin human; ImmunoCAP Allergen c260, Morphine; ImmunoCAP Allergen c1, Penicilloyl G; ImmunoCAP Allergen c2, Penicilloyl V; ImmunoCAP Allergen m6, Alternaria alternate; ImmunoCAP Allergen m3, Aspergillus fumigatus; ImmunoCAP Allergen m5, Candida albicans; ImmunoCAP Allergen m2, Cladosporium herbarum; ImmunoCAP Allergen m209, Penicillium glabrum; ImmunoCAP Allergen m80, Staphylococcal enterotoxin A; ImmunoCAP Allergen m81, Staphylococcal enterotoxin B; ImmunoCAP Allergen m223, Staphylococcal enterotoxin C; ImmunoCAP Allergen i206, Cockroach, American; ImmunoCAP Allergen i6, Cockroach, German; ImmunoCAP Allergen i70, Fire ant; ImmunoCAP Allergen i204, Horse fly; ImmunoCAP Allergen i71, Mosquito; ImmunoCAP Allergen i1, Honey bee venom; ImmunoCAP Allergen i4, Paper wasp venom; ImmunoCAP Allergen t9, Olive; ImmunoCAP Allergen t16, White pine; ImmunoCAP Allergen t18, Eucalyptus, Gum-tree; ImmunoCAP Allergen t19, Acacia; ImmunoCAP Allergen g2, Bermuda grass; ImmunoCAP Allergen g5, Rye-grass; ImmunoCAP Allergen g6, Timothy; ImmunoCAP Allergen g8, Meadow grass, Kentucky blue; ImmunoCAP Allergen g10, Johnson grass; ImmunoCAP Allergen g17, Bahia grass; ImmunoCAP Allergen d201, House dust mite; ImmunoCAP Allergen d2, House dust mite; ImmunoCAP Allergen d3, House dust mite; ImmunoCAP Allergen d1, House dust mite; ImmunoCAP Allergen h2, House dust (Hollister-Stier Labs.); ImmunoCAP Allergen e5, Dog dander; ImmunoCAP Allergen e85, Chicken feathers; ImmunoCAP Allergen e1, Cat dander; ImmunoCAP Allergen e4, Cow dander; ImmunoCAP Allergen o1 , Cotton, crude fibers; ImmunoCAP Allergen k82, Latex; ImmunoCAP Allergen o201, Tobacco leaf; ImmunoCAP Allergen d202, Allergen component rDer p 1, House dust mite; ImmunoCAP Allergen d203, Allergen component rDer p 2, House dust mite; ImmunoCAP Allergen d205, Allergen component rDer p 10 Tropomyosin, House dust mite; ImmunoCAP Allergen f76, Allergen component nBos d 4 Alpha-lactalbumin, Milk; ImmunoCAP Allergen f77, Allergen component nBos d 5 Beta-lact oglobulin, Milk; ImmunoCAP Allergen f78, Allergen component nBos d 8 Casein , Milk; ImmunoCAP Allergen f323, Allergen component nGal d 3 Conalbumin, Egg; ImmunoCAP Rare Allergen f333, Linseed;; ImmunoCAP Allergen f98, Gliadin; ImmunoCAP Allergen f416, Allergen component rTri a 19 Omega -5 Gliadin, Wheat; ImmunoCAP Allergen f433, Allergen component rTri a 14 LTP, Wheat; ImmunoCAP Allergen f431, Allergen component nGly m 5 Beta-conglycinin, Soy; ImmunoCAP Allergen f432, Allergen component nGly m 6 Glycinin, Soy; ImmunoCAP Allergen f353, Allergen component rGly m 4 PR-10, Soy; ImmunoCAP Allergen f422, Allergen component rAra h 1 Peanut; ImmunoCAP Allergen f423, Allergen component rAra h 2 Peanut; ImmunoCAP Allergen f424, Allergen component rAra h 3 Peanut; ImmunoCAP Allergen f352, Allergen component rAra h 8 PR-10, Peanut; ImmunoCAP Allergen f443, Allergen component rAna o 3, Cashew nut; ImmunoCAP Allergen f354, Allergen component rBer e 1, Brazil nut ImmunoCAP Allergen f428, Allergen component rCor a 1 PR-10 Hazel nut; ImmunoCAP Allergen f439, Allergen component rCor a 14, Hazelnut; ImmunoCAP Allergen f25, Tomato;; ImmunoCAP Allergen f440, Allergen component nCor a 9, Hazelnut; ImmunoCAP Allergen f441, Allergen component rJug r 1, Walnut; ImmunoCAP Allergen f442, Allergen component rJug r 3 LTP, Walnut; ImmunoCAP Allergen f355, Allergen component rCyp cl Carp; ImmunoCAP Allergen f426, Allergen component rGad cl Cod; ImmunoCAP Allergen f351, Allergen component rPen a 1 Tropomyosin, Shrimp; ImmunoCAP Allergen f419, Allergen component rPru p 1 PR-10, Peach; ImmunoCAP Allergen f420, Allergen component rPru p 3 LTP, Peach; ImmunoCAP Allergen f421, Allergen component rPru p 4 Pr ofilin, Peach; ImmunoCAP Allergen e204, Allergen component nBos d 6 BSA, Cow; ImmunoCAP Rare Allergen e222, Allergen component nSus s PSA, Swine; ImmunoCAP Allergen e1OI, Allergen component rCan f 1 Dog; ImmunoCAP Allergen e102, Allergen component rCan f 2 Dog; ImmunoCAP Allergen e221, Allergen component nCan f 3 Dog serum albumin; ImmunoCAP Allergen e226, Allergen component rCan f 5, Dog; ImmunoCAP Allergen e94, Allergen component rFel d 1 Cat; ImmunoCAP Allergen e220, Allergen component rFel d 2 Cat serum albumin;; ImmunoCAP Allergen e228, Allergen component rFel d 4, Cat; ImmunoCAP Allergen e227, Allergen component rEqu c 1, Horse; ImmunoCAP Rare Allergen k215, Allergen component rHev b 1 Latex; ImmunoCAP Rare Allergen k217, Allergen component rHev b 3 Latex; ImmunoCAP Allergen k218, Allergen component rHev b 5 Latex; ImmunoCAP Rare Allergen k220, Allergen component rHev b 6.02 Latex; ImmunoCAP Rare Allergen k221, Allergen component rHev b 8 Profilin, Latex; ImmunoCAP Rare Allergen k224, Allergen component rHev b 11 Latex; ImmunoCAP Allergen i208, Allergen component rApi m 1 Phospholipase A2, Honey bee; ImmunoCAP Allergen i210, Allergen component rPol d 5 European Paper wasp; ImmunoCAP Allergen i211, Allergen component rVes v 1 Phospholipase Al, Common wasp; ImmunoCAP Allergen i209, Allergen component rVes v 5 Common wasp; ImmunoCAP Allergen m218, Allergen component rAsp f 1 Aspergillus fumigatus; ImmunoCAP Allergen m229, Allergen component rAlt a 1, Alternaria alternate; ImmunoCAP Allergen o215, Component nGal-alpha-1,3-Gal (alpha-Gal) Thyroglobulin, bovine; ImmunoCAP Allergen o214, Allergen component MUXF3 CCD, Bromelain

ImmunoCAP® ALLERGEN COMPONENTS

MAIN ALERGENS

All allergens above refers to ImmunoCAP products. You can find the legal products names on the page before.

EXTRACTS

FOOD	Code
Avocado	f96
Pineapple	f210
Pumpkin	f225
Garlic	f47
Plum	f255
Almond	f20
Peanut	f13
Rice	f9
Tuna fish	f40
Oats	f7
Hazelnut	f17
Banana	f92
Potato	f35
Goat milk	f300
Cocoa	f93
Shrimp	f24
Crab	f23
Cashew nut	f202
Chestnut	f18
Onion	f48
Carrot	f31
Cherry	f242
Barley	f6
Coconut	f36
Carmine Red Dye	f340
Pea	f12
Spinach	f214
White bean	f15
Chicken meat	f83
Sesame	f10
Gluten	f79
Kiwi	f84
Lobster	f80
Orange	f33
Milk	f2
Lemon	f208
Squid	f58
Apple	f49
Papaya	f293
Mango	f91
Honey	f247
Melon	f87
Blue Mussel	f37
Corn	f8
Strawberry	f44
Walnuts	f256
Egg	f245
Egg, clear	f1
Egg yolk	f75
Fish	f3
Wait	f94
Peach	f95
black pepper	f220
Red pepper	f279
green pepper	f263
Pepper	f218
Octopus	f59
Pork meat	f26
Cheese (type Cam, Brie, Roqf)	f82
Cheese (Cheddar type)	f81
Soy	f14
Salmon	f41
Sardine	f61
Grape	f259
Wheat	f4
Black wheat	f11
Cow meat	f27

DRUGS	Code
Chlorhexidine	c8
Folcodine	c261
Bovine Insulin	c71
Human insulin	c73
Swine Insulin	c70
Morphine	c260
Penicillin G	c1
Penicillin V	c2

MICRO-ORGANISMS/FUNGI	
Alternaria alternata	m6
Aspergillus fumigatus	m3
Aspergillus niger	m207
Candida albicans	m5
Cladosporium herbarum	m2
Penicillium notatum	m1
Penicillium glabrum	m209
S. enterotoxin A	m80
S. enterotoxin B	m81
S. enterotoxin C	m223
S. enterotoxin TSST	m226

INSECTS/VENOMS	
Sewage Cheap	i206
Cockroach	i6
Foot Washer Ant	i70
Mutuca	i204
Stilt	i71
Venom Bee (Apis melifera)	i1
Venom Vespa / Marimbond	i4

GRAS POLLEN	
Olea europaea	t9
Salix caprea	t12
Pinus strobus	t16
Eucalyptus spp.	t18
Acacia longifolia	t19
Melaleuca leucadendron	t21

TREE POLLEN	
Cynodon dactylon	g2
Lolium perenne	g5
Phleum pratense	g6
Poa pratensis	g8
Sorhum halepense	g10
Paspalum notatum	g17

DUST MITES	
Blomia tropicalis	d201
D. farinae	d2
D. microceras	d3
D. pteronyssinus	d1
House dust	h2

ANIMAL	
Dog	e5
Horse	e3
Chicken	e85
Cat	e1
Caw	e4

OTHERS	
Cotton	o1
Latex	k82
Tobacco Sheet	o201

COMPONENTS

MITES	Code	Funcionality
Der p 1 (D. pteronyssiues)	d202	Cross Reactivity
Der p 2 (D. pteronyssiues)	d203	Cross Reactivity
Der p 10, Tropomiosina (D. pteronyssiues)	d205	Cross Reactivity
FOOD		
Alfa lactalbumin (Milk)	f76	Species - Specific
Beta-lactoglobulin (Milk)	f77	Species - Specific
Casein (Milk)	f78	Species - Specific
Conalbumin (Egg)	f323	Species - Specific
Ovalbumin (Egg)	f232	Species - Specific
Ovomucoide (Egg)	f233	Species - Specific
Gliadin (Wheat)	f98	Species - Specific
Ômega-5 Gliadin, Tri a 19 (Wheat)	f416	Species - Specific
Tri a 14, LTP (Wheat)	f433	Species - Specific
Beta-conglicinin (Soy)	f431	Species - Specific
Glicinin (Soy)	f432	Species - Specific
PR-10 (Soy)	f353	Cross Reactivity
Ara h 1 (Peanut)	f422	Species - Specific
Ara h 2 (Peanut)	f423	Species - Specific
Ara h 3 (Peanut)	f424	Species - Specific
Ara h 8, PR-10 (Peanut)	f352	Cross Reactivity
Ana o 3 (Cashew nut)	f443	Species - Specific
Ber e 1 (Brazil nut)	f354	Species - Specific
Cor a 1 (Hazelnut)	f428	Species - Specific
Cor a 14 (Hazelnut)	f439	Species - Specific
Cor a 8, LTP (Hazelnut)	f425	Cross Reactivity
Cor a 9 (Hazelnut)	f440	Species - Specific
Jug r 1 (Walnuts)	f441	Species - Specific
Jug r 3, LTP (Walnut)	f442	Cross Reactivity
Parvalbumin from Carpa	f355	Cross Reactivity
Parvalbumin of Cod	f426	Cross Reactivity
Shrimp Tropomyosin	f351	Cross Reactivity
Pru p 1, PR-10 (Peach)	f419	Cross Reactivity
Pru p 3, LTP (Peach)	f420	Cross Reactivity
Pru p 4, Profilina (Peach)	f421	Cross Reactivity
ANIMAL		
Bovine serum Albumin	e204	Cross Reactivity
Pig serum albumin	e222	Cross Reactivity
Can f 1 (Dog)	e101	Species - Specific
Can f 2 (Dog)	e102	Species - Specific
Can f 3 (Dog serum albumin)	e221	Cross Reactivity
Can f 5 (Dog)	e226	Species - Specific
Fel d 1 (Cat)	e94	Cross Reactivity
Fel d 2 (Cat serum albulmin)	e220	Cross Reactivity
Fel d 4 (Cat)	e228	Species - Specific
Equ c1 (Horse)	e227	Species - Specific
LATEX		
Hev b 1 (Latex)	k215	Species - Specific
Hev b 3 (Latex)	k217	Species - Specific
Hev b 5 (Latex)	k218	Cross Reactivity
Hev b 6.02 (Latex)	k220	Cross Reactivity
Hev b 8, Profiina (Latex)	k221	Cross Reactivity
Hev b 11 (Latex)	k224	Cross Reactivity
VENOMS		
Api m 1 - Fosfolipase A2 (Bee)	i208	Species - Specific
Pol d 5 (Marimbond)	i210	Species - Specific
Ves v 1 - Fosfolipase A1 (Wasp)	i211	Species - Specific
Ves v 5 (Wasp)	i209	Species - Specific
FUNGI		
Asp f 1 (Aspergillus fumigatus)	m 218	Species - Specific
Alt a 1 (Alternaria alternata)	m 229	Species - Specific
MISCELLANEOUS		
Alfa-Gal	o215	Cross Reactivity
CCD (MUXF3, Bromelian)	o214	Cross Reactivity

References: **1.** Evaluation of sensitization to Der p 1 and Der p 2 in a pediatric population in northern Portugal. Peixoto S, Soares J, Monteiro T, Carvalho M, Santos M, Simões C, et al. An Pediatr (Brac) 2018;89(3):162-9. **2.** Development of a prediction model for severe wheat allergy. Sugiura S, Matsui T, Furuta T, Sasaki K, Kando N, Ito K. Pediatric Allergy and Immunology, v. 29, n. 1, p. 93-96, 2018. **3.** Diagnostic value of Tryptase in Food Allergic reactions: A prospective study of 160 adult peanut challenges. Dua S, Dowey J, Foley L, Islam S, King Y, Ewan P, Clark AT. J Allergy Clin Immunol Pract. 2018 Sep - Oct;6(5): 1692 - 1698. e1. doi: 10.1016/j.jaip.2018.01.006. **4.** Thomas WR. Human Vaccines & Immunotherapeutics 2012;8(10):1469-78. **5.** Bessot JC and Pauli G. Eur Ann Allergy Clin Immunol. 2011;43:141-56. **6.** Ito K, Futamura M, Borres MP, et al. IgE antibodies to omega-5 gliadin associate with immediate symptoms on oral wheat challenge in Japanese children. Allergy. 2008;63:1536-1542.

thermo scientific