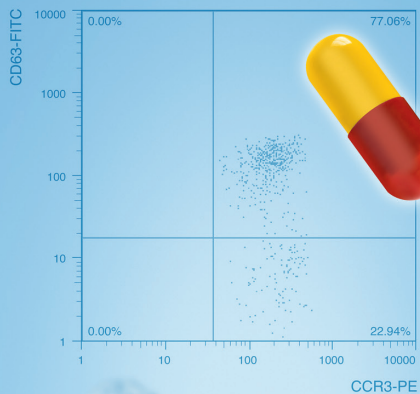


# Basophil Activation Test

## Flow CAST® Applications

There is more  
to allergy than  
just IgE



### Challenge Test for

- Drugs
- Food
- Venoms

More than 160 allergens

Non-IgE- & IgE-mediated  
allergies\*

Immunotherapy follow-up\*

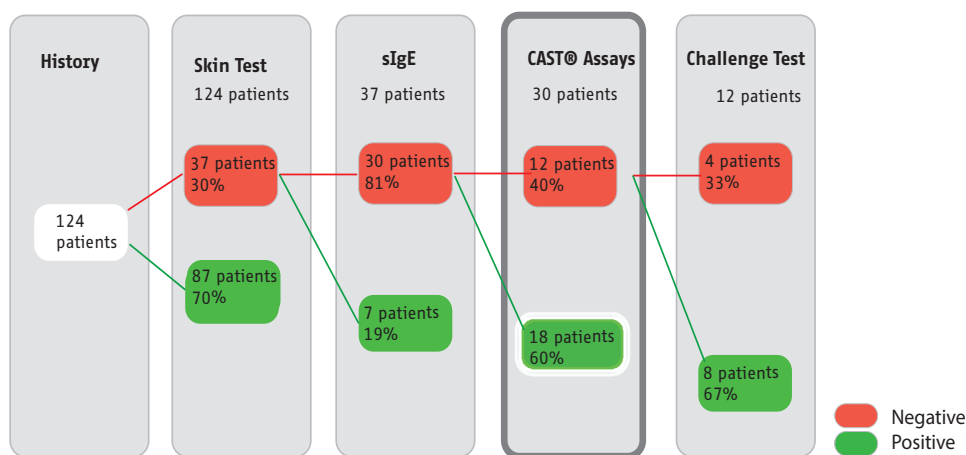
\*US: Available For Research Use  
Only for determination of CD63  
surface marker on basophils in  
whole blood samples. Not for  
use in diagnostic procedures.

## Beta-Lactam Antibiotics

## Multicenter Study, De Weck et al. 2009

The aim of the study was to evaluate the diagnostic workup in case of immediate-type beta-lactam allergy using the test systems mentioned in the figure below for PPL, MDM, benzylpenicillin, amoxicillin and ampicillin. 10 European centers with KOLs in drug allergology participated and followed the same ENDA protocol.

By adding the CAST® assays to the routine protocol, 60% of challenges could be avoided. If only skin prick test and sIgE had been applied, 30 instead of 12 challenges would have been necessary.



Summary of diagnostic workup with commercially available in vitro and in vivo diagnostic tests.

## Beta-Lactam Antibiotics

## A new Basophil Activation Test using CD63 and CCR3 in Allergy to Antibiotics, Eberlein et al. 2010

24 patients with clear history of immediate type beta-lactam allergy (penicillin, amoxicillin, cefuroxime, ciprofloxacin) were recruited and skin prick test, sIgE and Flow CAST® were carried out.

	Flow CAST®
Sensitivity (Overall)	55%
Specificity (Overall)	80%
Sensitivity (Cefuroxim)	70%
Specificity (Cefuroxim)	100%

## Aspirin

## Basophil Activation Test in Diagnosis of Patients with Aspirin Hypersensitivity, Poster: Schneider et al. 2012

18 patients and 11 healthy controls with aspirin hypersensitivity with urticarial and/or angioedema were tested with Flow CAST®.

	Flow CAST® highsens
Sensitivity (Aspirin)	44%
Specificity (Aspirin)	91%
Sensitivity (Salicylic Acid)	61%
Specificity (Salicylic Acid)	91%

Sensitivity & Specificity of Flow CAST® are outstanding compared to other commercially available IVD tests.

## Food Hypersensitivity

### Basophil Activation Test in Children Allergic to Peanut: a functional Blood Test can reduce Oral Food Challenges, Santos et al. 2014

In this study the test performance of BAT to discriminate between peanut allergy and peanut tolerance was evaluated in comparison with SPTs, specific IgE to peanut and Ara h 2 in a Oral Food Challenge (OFC) defined population of 104 patients.

BAT parameter	Cut off	Sensitivity	Specificity	NPV	PPV	Diagnostic Accuracy
% CD63 peanut extract 100 ng/ml	8.11	97%	96%	98	95	96%

With impressive sensitivity and specificity, BAT proved to be superior to other diagnostic tests in discriminating patients with peanut allergy and tolerance.

Especially in difficult cases, BAT reduced the need of OFCs to achieve the correct allergy diagnosis.

Starting from this exhaustive clinical validation *'future studies will determine whether BAT can add to the OFC as an in vitro gold standard'*.

Single diagnostic test	Correct diagnosis	No. BAT	No. OFCs	Changes in the no. of OFCs
SPT	78 (75)	----	24 (23)	-12 (-33)
P-sIgE	57 (55)	----	41 (39)	+5 (+13)
Ara h 2	82 (79)	----	19 (18)	-17 (-46)
BAT	89 (86*)	104 (100)	12 (12)	-24 (-67)

BAT as a second step in diagnostic process				
SPT / BAT	98 (94)	24 (23)	1 (1)	-35 (-97)
P-sIgE / BAT	93 (89)	41 (39)	3 (3)	-33 (-92)
Ara h 2 / BAT	99 (95)	19 (18)	1 (1)	-35 (-97)

results are presented as number of patients (% of total study population)  
reduction in the number of OFCs was calculated in comparison with the number of OFCs after SPT and sIgE  
\*for BAT, excluding nonresponders, the proportion of correct diagnosis is 97%

**Performance of allergy tests in the diagnosis of peanut allergy.**

## Food Hypersensitivity

### Basophil Activation Tests in Allergic Children in deciding when to reintroduce Milk in Children, Rubio et al. 2010

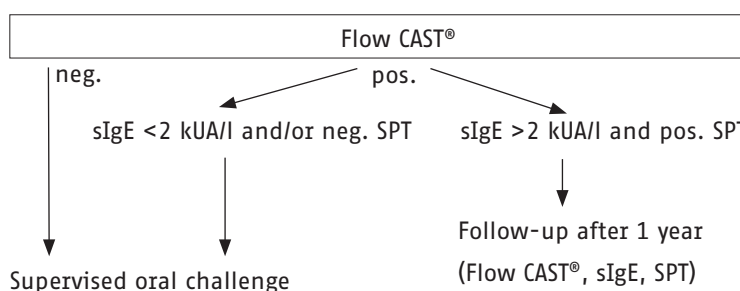
The benefit of Flow CAST® in predicting a child's reaction to oral challenge was evaluated and compared to skin prick test (SPT) and sIgE.

Test	Sensitivity	Specificity	NPV	PPV
Flow CAST®	91%	90%	96%	81%
sIgE	67%	67%	89%	37%
SPT	100%	20%	100%	40%

NPV and PPV of Flow CAST® is superior to sIgE. Therefore it is the test of choice for decision making when milk can be reintroduced into the diet of affected children.

The severity of the clinical reaction (absent, mild, moderate, severe) extremely well correlated with the intensity of the basophil activation.

Flow CAST® is a valuable tool in helping decide when oral challenge can safely be undertaken during the follow-up of cow milk allergy.



**Diagnostic algorithm using Flow CAST®, sIgE and SPT.**

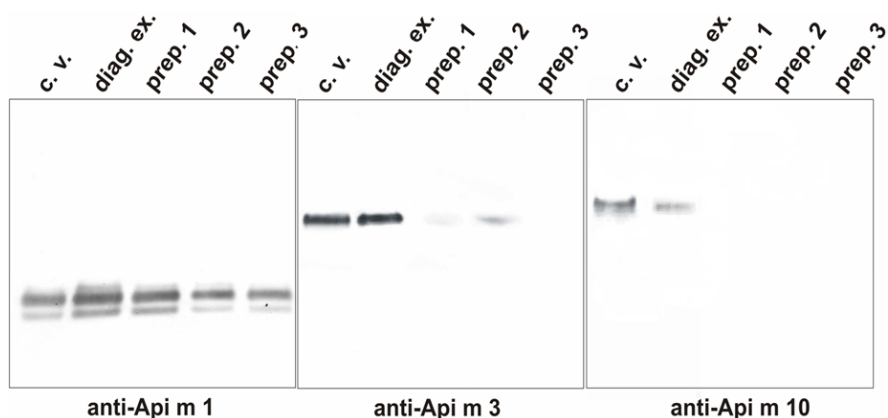
## Bee & Wasp Venom

The presence of the most relevant honey bee (*Apis mellifera*) and yellow jacket (*Vespa vulgaris*) venom allergen components in different diagnostic and therapeutic venom preparations were analyzed via immunoblotting.

The BÜHLMANN yellow jacket and honey bee venom allergens were the only ones which contain major allergen components, such as Api m 1, Api m 2, Api m 3 and Api m 10.

These allergen components are being relevant. If only Api m 1 is used, genuine sensitization to other major allergens might be missed.

## Allergen Composition of Therapeutic and Diagnostic Venom Preparations, Poster: Blank et al. 2011



c.v. = crude venom extract from *Apis mellifera*  
 diag. ex. = BÜHLMANN honey bee venom allergen (BAG2-I1)  
 prep.1-3 = therapeutical preparations for immunotherapy from 3 different manufacturers

### Immunoblottings of different extracts.

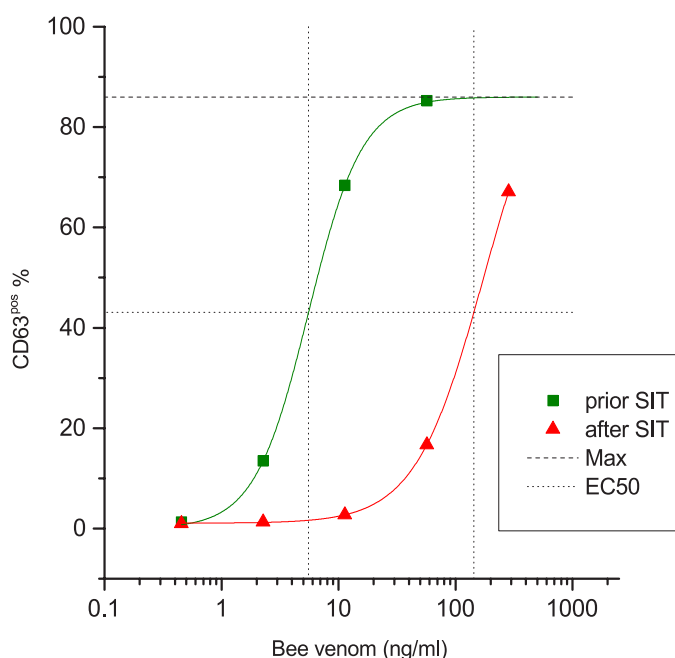
## SIT Follow-up

In this study, CAST® assays (Flow CAST® and CAST® ELISA) were used to investigate their suitability as follow-up markers for specific immunotherapy (SIT).

A decreased basophil responsiveness could be demonstrated in bee venom allergic patients after SIT compared to patients before SIT.

Furthermore, using Flow CAST® with different bee venom concentrations allows to identify those bee venom allergic subjects who need higher SIT doses or a longer duration of SIT for full protection.

## Basophil Activation Tests in Bee Venom Immunotherapy, Poster: Hausmann et al. 2014



### Immunotherapy follow-up with honey bee and yellow jacket venom.



BÜHLMANN Laboratories AG  
 Switzerland  
 info@buhlmannlabs.ch  
 www.buhlmannlabs.ch  
 Phone +41 61 487 12 12

BÜHLMANN Diagnostics Corp.  
 USA / Canada  
 info@buhlmannlabs.com  
 www.buhlmannlabs.com  
 Phone 844 300 9799

Flow CAST® (FK-CCR), CAST® ELISA (EK-CAST/EK-CAST5) and CAST® allergens are available For Research Use Only in the US. Not for use in diagnostic procedures.

#### Ordering code:

Flow CAST®	FK-CCR	100 tests
CAST® ELISA	EK-CAST	192 wells
	EK-CAST5	480 wells

CAST® is a registered trademark of BÜHLMANN in many countries.