Clin. Lab. 2025;71:1-5

ORIGINAL ARTICLE

Comparison of Multiple Allergen Simultaneous Tests: Advansure AlloScreen Max 108 and Protia Allergy-Q 128M

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SUMMARY

Background: **Multiple allergen simultaneous test (MAST) is a convenient, cost-effective, semi-quantitative immunoassay widely used for allergy screening. However, cross-reactions, such as those caused by IgE against Bet v 1 or cross-reactive carbohydrate determinants, should be considered when interpreting MAST results. This study aimed to compare two MASTs, Advansure AlloScreen Max108 (AlloScreen assay; LG Chem Ltd., Seoul, Korea) and PROTIA Allergy-Q 128M (Allergy-Q assay; ProteomeTech Inc., Seoul, Korea).**
Methods: **A total of 89 serum samples (56 positive and 33 negative) were analyzed through AlloScreen and Allergy-Q assays for 104 common allergens. Discrepant results were confirmed using the ImmunoCAP assay (Phadia AB, Uppsala, Sweden). In addition, concomitant sIgE reactivity to plant-derived food allergens related to Bet v 1 was assessed in birch pollen-positive samples.**
Results: **The total agreement between the two MASTs was 94.4% (kappa = 0.661), and class consistency was 0.878 ($p < 0.001$). Among the 78 discrepancies assessable by ImmunoCAP, Allergy-Q showed an agreement of 51.3%, while AlloScreen showed 48.7%. In birch pollen-positive samples, Allergy-Q demonstrated a higher positivity for concomitant sIgE reactions to plant-derived food allergens (46.9%) compared to AlloScreen (23.4%).**
Conclusions: **The AlloScreen and Allergy-Q assays showed good overall agreement and class consistency. However, differences were observed in their detection of concomitant sIgE reactivity to plant-derived food allergens in birch pollen-positive samples. Further studies, incorporating clinical symptom evaluation, are needed to establish the clinical utility and reliability of these assays.**
(Clin. Lab. 2025;71:1-5. DOI: 10.7754/Clin.Lab.2024.241127)

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Manuscript accepted November 28, 2024

Supplementary Data

Table S1. Positive-negative agreement for common food allergens between AlloScreen and Allergy-Q assays after excluding CCD-positive samples.

Allergens	No.	Agreement (%)	Results AlloScreen/Allergy-Q				Kappa (95% CI)
			+/+	+/-	-/+	-/-	
Anchovy	77	100	0	0	0	77	NA
Apple	80	90	7	6	2	65	0.58 (0.32, 0.84)
Banana	77	85.7	0	1	10	66	-0.02 (-0.07, 0.02)
Barley	77	96.1	0	0	3	74	NA
Beef	77	90.9	1	4	3	69	0.17 (-0.2, 0.55)
Blue mussel	77	100	1	0	0	76	1.00 (1.00, 1.00)
Brazil nut	67	100	0	0	0	67	NA
Buckwheat	77	94.8	1	0	4	72	0.32 (-0.16, 0.79)
Cacao	80	97.5	1	2	0	77	0.49 (-0.11, 1.09)
Carrot	67	89.6	0	0	7	60	0.00 (0.00, 0.00)
Cashew nut	67	100	2	0	0	65	1.00 (1.00, 1.00)
Celery	77	92.2	5	0	6	66	0.59 (0.30, 0.88)
Cheese	77	100	2	0	0	75	1.00 (1.00, 1.00)
Chicken	77	98.7	0	1	0	76	0.00 (0.00, 0.00)
Clam	77	98.7	1	0	1	75	0.66 (0.04, 1.28)
Cocksfoot pollen	70	95.7	1	3	0	66	0.39 (-0.15, 0.92)
Coconut	67	98.5	1	1	0	65	0.66 (0.04, 1.28)
Cod	77	98.7	0	1	0	76	0.00 (0.00, 0.00)
Crab	80	96.3	4	1	2	73	0.71 (0.39, 1.02)
Cucumber	77	92.2	0	1	5	71	-0.02 (-0.06, 0.01)
Egg white	80	98.8	3	1	0	76	0.85 (0.56, 1.14)
Egg yolk	67	100	0	0	0	67	NA
Garlic	77	93.5	4	0	5	68	0.59 (0.27, 0.91)
Hazelnut	67	88.1	0	1	7	59	-0.03 (-0.07, 0.02)
Kiwi	77	90.9	0	1	6	70	-0.02 (-0.06, 0.02)
Macadamia nut	67	100	0	0	0	67	NA
Mackerel	80	98.8	0	0	1	79	0.00 (0.00, 0.00)
Maize/Corn	80	96.3	2	0	3	75	0.56 (0.11, 1.00)
Mango	77	88.3	0	0	9	68	NA
Mushroom	77	94.8	0	0	4	73	0.00 (0.00, 0.00)
Onion	77	92.2	0	0	6	71	0.00 (0.00, 0.00)
Orange	77	96.1	0	1	2	74	-0.02 (-0.04, 0.01)
Pacific flying squid	77	98.7	0	0	1	76	NA
Peach	80	90	10	2	6	62	0.66 (0.44, 0.87)
Peanut	77	98.7	7	0	1	69	0.93 (0.78, 1.07)
Pork	77	98.7	4	0	1	72	0.88 (0.65, 1.11)
Potato	80	97.5	5	0	2	73	0.82 (0.58, 1.06)

Table S1. Positive-negative agreement for common food allergens between AlloScreen and Allergy-Q assays after excluding CCD-positive samples (continued).

Allergens	No.	Agreement (%)	Results AlloScreen/Allergy-Q				Kappa (95% CI)
			+/+	+/-	-/+	-/-	
Rice	77	90.9	2	0	7	68	0.34 (-0.02, 0.69)
Salmon/Atlantic	77	96.1	1	1	2	73	0.38 (-0.17, 0.93)
Scallop	67	100	0	0	0	67	NA
Sesame seed	80	100	1	0	0	79	1.00 (1.00, 1.00)
Shrimp	80	91.2	4	0	7	69	0.50 (0.19, 0.80)
Silkworm pupae	77	96.1	6	1	2	68	0.78 (0.54, 1.02)
Skimmed cow's milk	80	95	3	0	4	73	0.58 (0.21, 0.94)
Soybean	80	96.3	2	1	2	75	0.55 (0.10, 1.00)
Sweet chestnut	77	98.7	0	1	0	76	0.00 (0.00, 0.00)
Tomato	77	94.8	3	2	2	70	0.57 (0.20, 0.95)
Tuna/Yellow fin	77	97.4	0	0	2	75	NA
Walnut	77	98.7	3	0	1	73	0.85 (0.56, 1.14)
Wheat	77	96.1	3	2	1	71	0.65 (0.27, 1.02)
White bean	67	100	1	0	0	66	1.00 (1.00, 1.00)

No. - number, NA - not available, CCD - cross-reactive carbohydrate determinants.

Table S2. Positive-negative agreement for common inhalant (sting) allergens between AlloScreen and Allergy-Q assays after excluding CCD-positive samples.

Allergens	No.	Agreement (%)	Results AlloScreen/Allergy-Q				Kappa index (95% CI)
			+/+	+/-	-/+	-/-	
Acacia pollen	70	100	2	0	0	68	1.00 (1.00, 1.00)
Acarus siro	70	82.9	4	1	11	54	0.33 (0.06, 0.60)
Alternaria	80	96.3	4	2	1	73	0.71 (0.39, 1.02)
Aspergillus	80	98.8	2	0	1	77	0.79 (0.40, 1.19)
Bentgrass pollen	70	100	0	0	0	70	NA
Bermuda grass pollen	70	97.1	1	2	0	67	0.49 (-0.11, 1.09)
Candida albicans	77	100	6	0	0	71	1.00 (1.00, 1.00)
Cat dander	80	96.3	16	2	1	61	0.89 (0.77, 1.01)
Cladosporium	80	98.8	3	0	1	76	0.85 (0.56, 1.14)
Cocklebur pollen	67	94	1	0	4	62	0.32 (-0.16, 0.79)
Cockroach	80	87.5	1	0	10	69	0.15 (-0.11, 0.41)
Common pigweed pollen	70	95.7	0	3	0	67	0.00 (0.00, 0.00)
Common ragweed pollen	80	92.5	4	5	1	70	0.53 (0.21, 0.86)
Common reed pollen	70	94.3	0	4	0	66	0.00 (0.00, 0.00)
Common silver birch pollen	80	96.3	12	0	3	65	0.87 (0.72, 1.01)
Common wasp (Yellow	70	97.1	1	1	1	67	0.49 (-0.13, 1.10)

Table S2. Positive-negative agreement for common inhalant (sting) allergens between AlloScreen and Allergy-Q assays after excluding CCD-positive samples (continued).

Allergens	No.	Agreement (%)	Results AlloScreen/Allergy-Q				Kappa index (95% CI)
			+/+	+/-	-/+	-/-	
Dandelion pollen	70	92.9	4	2	3	61	0.58 (0.24, 0.91)
Dermatophagoides farinae	80	92.5	29	2	4	45	0.84 (0.72, 0.96)
Dermatophagoides	80	88.7	21	1	8	50	0.74 (0.59, 0.90)
Dog dander	80	96.3	12	0	3	65	0.87 (0.72, 1.01)
Elm pollen	67	98.5	0	1	0	66	0.00 (0.00, 0.00)
Goldenrod pollen	70	91.4	2	3	3	62	0.35 (-0.05, 0.76)
Goosefoot pollen	67	100	0	0	0	67	NA
Grey alder pollen	80	82.5	2	0	14	64	0.19 (-0.04, 0.41)
Guinea pig epithelium	70	97.1	3	1	1	65	0.73 (0.38, 1.09)
Hamster epithelium	70	97.1	3	1	1	65	0.73 (0.38, 1.09)
Hazel pollen	65	93.8	5	3	1	56	0.68 (0.39, 0.97)
Honeybee*	70	97.1	3	1	1	65	0.73 (0.38, 1.09)
Horse dander	70	98.6	1	0	1	68	0.66 (0.04, 1.28)
Housedust	80	87.5	13	8	2	57	0.64 (0.45, 0.84)
Japanese cedar pollen	65	95.4	0	3	0	62	0.00 (0.00, 0.00)
Japanese hop pollen	80	95	6	1	3	70	0.72 (0.47, 0.98)
Latex	70	98.6	0	0	1	69	0.00 (0.00, 0.00)
Marguerite/Ox-eye daisy	70	92.9	3	2	3	62	0.51 (0.13, 0.88)
Mugwort pollen	80	91.2	4	1	6	69	0.49 (0.17, 0.81)
Oak Pollen	80	81.2	3	12	3	62	0.20 (-0.06, 0.46)
Penicillium	70	97.1	0	0	2	68	NA
Platanus pollen	70	98.6	1	1	0	68	0.66 (0.04, 1.28)
Populus pollen	70	100	2	0	0	68	1.00 (1.00, 1.00)
Rabbit epithelium	70	97.1	1	1	1	67	0.49 (-0.13, 1.10)
Rhizopus	67	98.5	0	0	1	66	NA
Ribwort plantain	70	97.1	1	2	0	67	0.49 (-0.11, 1.09)
Rye grass	80	93.8	3	5	0	72	0.52 (0.16, 0.88)
Saltwort (prickly)/Russian	70	94.3	2	3	1	64	0.47 (0.03, 0.91)
Sheep epithelium	70	98.6	1	0	1	68	0.66 (0.04, 1.28)
Sweet vernal grass pollen	70	92.9	0	5	0	65	0.00 (0.00, 0.00)
Timothy grass pollen	70	92.9	1	4	1	64	0.26 (-0.19, 0.70)
Tyrophagus putrescentiae	80	81.2	7	1	14	58	0.40 (0.17, 0.62)
White ash pollen	70	100	1	0	0	69	1.00 (1.00, 1.00)
White pine pollen	70	98.6	0	1	0	69	0.00 (0.00, 0.00)
Willow tree pollen	70	100	2	0	0	68	1.00 (1.00, 1.00)
Yeast	77	94.8	2	1	3	71	0.47 (0.04, 0.91)

No. - number, NA - not available.
*** - Injection (sting) allergen.**

Table S3. Categorized allergens according to class consistency between AlloScreen and Allergy-Q assays after excluding CCD-positive samples.

Class consistency	No. of allergens	Allergen list
Excellent	**24**	**Acacia pollen, Blue mussel, *Candida albicans*, Cashew nut, Cat dander, Cheese, *Cladosporium*, Common Silver birch pollen, Crab, *Dermatophagoides farinae*, *Dermatophagoides pteronyssinus*, Dog dander, Egg white, Guinea pig epithelium, Japanese hop pollen, Peanut, *Platanus* pollen, *Populus* pollen, Pork, Potato, Walnut, White Ash pollen, White bean, Willow tree pollen**
Good	**28**	***Alternaria*, Apple, *Aspergillus*, Bermuda grass pollen, Celery, Coconut, Common ragweed pollen, Dandelion pollen, Garlic, Hamster epithelium, Honeybee, Horse dander, Housedust, Marguerite/Ox-eye daisy pollen, Mugwort pollen, Pacific flying squid, Peach, Ribwort Plantain, Rye grass pollen, Saltwort (prickly)/Russian thistle pollen, Sesame seed, Shrimp, Silkworm pupae, Skimmed cow's milk, Soybean, Tomato, *Tyrophagus putrescentiae*, Wheat**
Moderate	**19**	**Beef, Buckwheat, Cacao, Clam, Cocklebur pollen, Cocksfoot pollen, Common wasp (Yellow jacket), Goldenrod pollen, Hazel Pollen, Maize/Corn, Onion, Rabbit epithelium, Rice, SalmoNAtlantic, Sheep epithelium, Sweet vernal grass pollen, Timothy grass pollen, White pine pollen, Yeast**
Poor	**26**	***Acarus siro*, Banana*, Barley*, Bentgrass pollen*, Carrot, Chicken*, Cockroach, Cod*, Common pigweed pollen*, Common reed pollen*, Cucumber*, Elm pollen*, Grey alder pollen*, Hazelnut*, Japanese cedar pollen*, Kiwi*, Latex*, Mackerel*, Mango*, Mushroom*, Oak pollen, Orange*, *Penicillium*, *Rhizopus**, Sweet chestnut*, Tuna/Yellow fin***
NA	**6**	**Anchovy, Brazil nut, Egg yolk, Goosefoot pollen, Macadamia nut, Scallop**

NA - not available, CCD - cross-reactive carbohydrate determinants.
*** - p > 0.05.**