ALEX® Case Report No. 5

Eva, 19y, from North-Western Europe

Clinical History

Allergic Rhinitis caused by allergy to grass pollen and house dust mite has been observed since late childhood.

Eva's mother has been advised to withhold peanuts and nuts during her pregnancy. Up to now Eva has avoided both peanuts and nuts, but traces of these foods were not avoided in the past. As a child she experienced atopic dermatitis and she was treated with asthma medication in case of airway infections until the age of 12.

Family History

unknown

Present situation (2019)

Last year Eva visited a general practitioner (GP) because of stomach ache and diarrhoea after ingestion of an Asian dish. She asked the GP, if allergy to peanuts could be the cause of her symptoms. Specific IgE tests (single plex) were ordered by the GP and these showed the following results:

Allergen Source	IgE Level [kU_A/L]
Almond	67.0
Hazelnut	33.2
Peanut	21.1
Coconut	6.6
Brazil Nut	0.74

Table 1: Results IgE single-plex testing

The patient was then referred to an allergologist, who repeated the in vitro tests (January 2019) with the same outcome.

Skin prick tests were performed and showed positive results for grass pollen and house dust mite. Prick to Prick tests with fresh nuts – Almond, Brazil nut, Cashew, Hazelnut, Macadamia, Pecan nut, Peanut and Pistachio – showed negative results.

Provocation testing with peanut (open oral food challenge) also showed a negative result.

An ALEX test was requested to re-evaluate the specific IgE tests from December 2018 and January 2019.

ALEX Results*

Allergen Source	Allergen	Biochemical Designation	IgE Level [kU_A/L]
Perennial Ryegrass	Lol p 1	β-Expansin	5.49
Timothy Grass	Phl p 1	β-Expansin	9.02
Cultivated Rye, pollen	Sec c	Extract	0.51
American House Dust Mite	Der f 1	Cysteine protease	6.16
European House Dust Mite	Der p 1	Cysteine protease	13.69
	Der p 5	Unknown	1.66
	Der p 23	Peritrophin-like protein domain	11.97
Wasp Venom	Ves v 5	Antigen 5	0.51

Table 2: ALEX results; * For convenience extract results are not shown, if a corresponding component was positive.

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In-depth analysis: ALEX test results with and without CCD antibody blocking

Allergen(source)	ALEX without CCD blocking [kU_A/L]	ALEX with CCD blocking (Standard Assay Protocol) [kU_A/L]
Cyn d 1, Bermuda grass	12.93	≤ 0.10
Lol p 1, Perennial ryegrass	**22.40**	**5.49**
Bahia grass	11.33	≤ 0.10
Timothy grass	**14.78**	**2.43**
Phl p 1, Timothy grass	**9.03**	**9.02**
Common reed	9.57	≤ 0.10
Cultivated Rye, pollen	**17.79**	**0.51**
Johnson grass	8.82	≤ 0.10
Maize pollen	11.73	≤ 0.10
Acacia	6.23	≤ 0.10
Hazel, pollen	2.72	≤ 0.10
Sugi	0.37	≤ 0.10
Cup a 1, cypress	7.05	≤ 0.10
Cypress	1.92	≤ 0.10
Beech	16.06	≤ 0.10
Ash	3.80	≤ 0.10
Walnut, pollen	7.58	≤ 0.10
Mountain cedar	0.66	≤ 0.10
Privet	2.54	≤ 0.10
Mulberry	5.70	≤ 0.10
Olive, pollen	0.63	≤ 0.10
London plane tree	2.83	≤ 0.10
Cottonwood	4.59	≤ 0.10
Oak	5.97	≤ 0.10
Lilac	1.05	≤ 0.10
Elm	3.73	≤ 0.10
Common pigweed	9.33	≤ 0.10
Ragweed	0.39	≤ 0.10
Mugwort	0.73	≤ 0.10
Lamb's quarter	22.31	≤ 0.10
Annual mercury	6.51	≤ 0.10
Wall pellitory	5.22	≤ 0.10
Ribwort	2.15	≤ 0.10
Sheep sorrel	22.43	≤ 0.10
Russian thistle	13.23	≤ 0.10
Nettle	5.94	≤ 0.10
Dermatophagoides farinae	**0.63**	**1.06**
Der f 1	**4.67**	**6.16**
Dermatophagoides pteronyssinus	**11.81**	**15.99**
Der p 1	**14.16**	**13.69**
Der p 5	**1.63**	**1.66**
Der p 23	**13.63**	**11.97**

Peanut	2.67	≤ 0.10
Chickpea	0.72	≤ 0.10
Soy	0.77	≤ 0.10
Lentil	3.04	≤ 0.10
White bean	8.96	≤ 0.10
Pea	1.06	≤ 0.10
Oat	1.43	≤ 0.10
Quinoa	8.22	≤ 0.10
Buckwheat	9.93	≤ 0.10
Barley	5.06	≤ 0.10
Lupine seed	2.09	≤ 0.10
Rice	3.38	≤ 0.10
Millet	10.32	≤ 0.10
Cultivated rye, flour	3.64	≤ 0.10
Wheat	0.58	≤ 0.10
Spelt	0.61	≤ 0.10
Maize	0.40	≤ 0.10
Paprika, spice	13.72	≤ 0.10
Caraway	5.43	≤ 0.10
Oregano	1.24	≤ 0.10
Parsley	1.59	≤ 0.10
Anise	4.41	≤ 0.10
Mustard	1.17	≤ 0.10
Orange	2.30	≤ 0.10
Litchi	8.60	≤ 0.10
Mal d 2, apple	1.81	≤ 0.10
Mango	8.39	≤ 0.10
Melon	5.00	≤ 0.10
Fig	4.54	≤ 0.10
Banana	0.57	≤ 0.10
Cherry	6.09	≤ 0.10
Plum	0.74	≤ 0.10
Pear	10.43	≤ 0.10
Raspberry	17.39	≤ 0.10
Blueberry	1.25	≤ 0.10
Onion	3.54	≤ 0.10
Garlic	10.51	≤ 0.10
Cabbage	22.80	≤ 0.10
Carrot	0.34	≤ 0.10
Lettuce	7.85	≤ 0.10
Avocado	14.60	≤ 0.10
Potato	10.73	≤ 0.10
Tomato	9.69	≤ 0.10
Cashew	0.78	≤ 0.10
Pecan	6.04	≤ 0.10
Hazelnut	5.10	≤ 0.10

Cor a 9, hazelnut	3.27	≤ 0.10
Cor a 11, hazelnut	3.54	≤ 0.10
Walnut	2.41	≤ 0.10
Jug r 2, walnut	9.83	≤ 0.10
Macadamia	1.25	≤ 0.10
Pistachio	2.09	≤ 0.10
Almond	2.36	≤ 0.10
Pumpkin seed	5.68	≤ 0.10
Sunflower seed	9.63	≤ 0.10
Sesame	0.95	≤ 0.10
Crabmix	0.78	≤ 0.10
Common mussel	1.29	≤ 0.10
		≤ 0.10
Honey bee venom	10.57	≤ 0.10
Api m 1, honey bee venom	13.99	≤ 0.10
Hornet venom	1.81	≤ 0.10
Wasp venom	1.17	≤ 0.10
Ves v 5, wasp venom	**0.36**	**0.51**
Latex	2.14	≤ 0.10
Weeping fig	5.33	≤ 0.10
Ana c 2, CCD marker	5.19	≤ 0.10
Hom s LF, CCD marker	17.13	≤ 0.10

Table 3: full ALEX results - with/without CCD Inhibition; positive results with both assay protocols in bold.

Interpretation

- The skin prick test results were confirmed on the molecular level for grass pollen and house dust mite.
- The major grass pollen allergens Lol p 1 and Phl p 1 were positive – an AIT could be helpful.
- Pollen extract from rye showed a positive result due to cross-reactivity to timothy perennial rye grass components Phl p 1 and Lol p 1.
- The major house dust mite allergens Der f 1 and Der p 1 were positive – an AIT could be helpful.
- On rare occasions Der p 5 is the only positive molecular allergen in mite sensitized patients, the implications for AIT prescription have not been researched yet.
- Ves v 5, one major component of wasp venom, was also positive. As the patient did not mention wasp allergy as an elicitor of symptoms, it can be assumed that the sensitization is clinically irrelevant.
- The CCD blocking of the ALEX test dramatically reduces the number of falsely elevated results: from 110 to 10.
- All dangerous plant food like peanut or tree nuts that were positive with the traditional test(single-plex) system were negative.
- The results with the CCD blocking fit the clinical picture much better.
- Hitherto avoided foods can be introduced into the diet of the patient.
- The interpretative burden of the physician has been substantially decreased by blocking CCD specific antibodies.

Summary

- Results of skin tests were confirmed by ALEX.
- AIT is a treatment option for grass pollen and mite allergy.
- ALEX without CCD blocking showed **110** positive results, with CCD blocking (ALEX standard assay protocol) **10**.
- CCD IgE-antibodies can have a dramatic impact on test results.