Supplements

The asthma-rhinitis multimorbidity is associated with IgE polysensitization in adolescents and adults.

Figure legends

FIGURE S1. Flow chart of EGEA adults included in the present analysis

FIGURE S2. Flow chart of BAMSE children included in the present analysis

Table S1. Frequencies of IgE recognition for the 64 allergen components studied

Species		Allergen	Molecular Group	Prevalence in EGEA (%)	Prevalence in BAMSE (%)
Pollen	Birch	**Bet v 1**	PR-10	**10.6**	**25.7**
		Bet v 2	Profilin	**3.2**	2.2
		Bet v 4	Polcalcin	2.3	0.3
	Olive	**Ole e 1**	Ole e 1-related protein	**20.4**	1.2
		Ole e 7	nsLTP, type 1	1.0	0.3
		Ole e 9	Glucanase1	1.2	0.3
	Japanese cedar	**Cry j 1**	Pectate lyase	**9.2**	**5.0**
	Cypress	**Cup a 1**	Pectate lyase	**14.5**	**7.9**
	Plane tree	**Pla a 1**	Invertase Inhibitor	1.4	0.1
		Pla a 2	Polygalacturonases	**6.1**	**5.0**
		Pla a 3	nsLTP, type 1	0.5	0.1
	Timothy grass	**Phl p 1**	Grass group 1 (Beta-Expansin)	**37.1**	**30.9**
		Phl p 2	Grass group 2/3	**16.9**	**6.7**
		Phl p 5b	Grass group 5	**18.8**	**14.4**
		Phl p 6	Grass group 5/6	**12.7**	**10.1**
		Phl p 7	Calcium-binding proteins (Polcalcin)	2.7	1.1
		Phl p 11	Ole e 1-related protein	**7.0**	0.8
		Phl p 12	Profilin	2.6	0.6
	Ragweed	**Amb a 1**	Pectate lyase	**4.0**	0.1
	Mugwort	**Art v 1**	Defensin-like protein	**6.5**	**5.3**
		Art v 3	nsLTP, type 1	1.2	0.1
	Goosefoot	**Che a 1**	Ole e 1-related protein	2.3	0.1
	Plantain	**Pla l 1**	Ole e 1-related protein	**5.6**	0.1
	Wall pellitory	**Par j 2**	LTP, type 2	1.8	0
	Saltwort	**Sal k 1**	Pectin methylesterase	0.7	0.9
Latex	Latex	**Hev b 1**	Rubber elongation factor	2.0	0.3
		Hev b 3	Small rubber particle protein	**5.0**	1.0
		Hev b 5	Acidic protein	1.1	0.6
		Hev b 6.01	Hevein (Prohevein)	**7.6**	**3.9**
Molds	Alternaria	**Alt a 1**	Acidic glycoprotein	**9.3**	1.7
		Alt a 6	Enolase	2.4	0.9
	Aspergillus	**Asp f 1**	Mitogillin family (Ribonuclease)	1.3	1.3
		Asp f 3	Peroxysomal protein	2.7	0.3
		Asp f 6	Mn superoxide dismutase	0.7	0.9
	Cladosporium	**Cla h 8**	Mannitol dehydrogenase	0.5	0

Species		Allergen	Molecular Group	Prevalence in EGEA (%)	Prevalence in BAMSE (%)
Mites	**House dust mite**	**Der p 1**	Group 1 mite allergens (Cysteine protease)	**26.4**	1.3
		Der p 2	Group 2 mite allergens (NPC2 family)	**29.6**	**3.1**
		Der p 4	Group 4 mite allergens (Alpha-amylase)	**12.5**	0.3
		Der p 5	Group 5/21 mite allergens	**17.7**	1.4
		Der p 7	Group 7 mite allergens	**16.8**	1.2
		Der p 10	Group 10 mite allergens (Tropomyosin)	**15.1**	2.4
		Der p 11	Group 11 mite allergens (Paramyosin)	**4.3**	1.5
		Der p 14	Vitellogenin (Apolipophorins)	2.1	0.4
		Der p 15	Chitin-binding domain	**3.0**	0.3
		Der p 18	Chitin-binding domain	**4.5**	0.6
		Der p 21	Group 5/21 mite allergens	**11.7**	1.5
		Der p 23	Chitin-binding domain	**26.9**	1.7
		clone 16	Chitin-binding domain	**7.5**	0.8
	Storage mite	**Lep d 2**	Group 2 mite allergens (NPC2 family)	**3.8**	0.1
	Blomia tropicalis	**Blo t 5**	Group 5/21 mite allergens	**5.4**	2.0
	Cockroach	**Bla g 1**	Cockroach group 1	0.4	0
		Bla g 2	Aspartic protease	0.1	0
		Bla g 5	Glutathione S-transferase	0.1	0.1
	Anisakis	**Ani s 1**	Serine protease inhibitor	1.0	1.2
Animals	**Cat**	**Fel d 1**	Uteroglobin	**26.2**	**20.1**
		Fel d 2	Serum Albumin	**3.8**	**7.0**
		Fel d 4	Lipocalin	**5.6**	**4.8**
	Dog	**Can f 1**	Lipocalin	**7.4**	**5.5**
		Can f 2	Lipocalin	2.5	1.3
		Can f 4	Lipocalin (Odorant-binding protein)	**3.3**	0
		Can f 5	Arginine Esterase (Trypsin-like serine protease)	**11.9**	**12.5**
		Can f 6	Lipocalin	2.9	**4.2**
	Horse	**Equ c 1**	Lipocalin	**4.9**	**4.7**
	Mouse	**Mus m 1**	Lipocalin	**4.2**	1.2

Numbers in bold represent allergens recognized by >3% in the study population

Table S2. Agreement between SPT and allergen specific-IgE for those 7 allergen sources that showed a prevalence for positive SPT > 5% in the EGEA study population.

	number of components on the MeDALL chip, n	positive SPT, %	Allergen specific-IgE ≥0.3 for at least one of the allergen components, %	Cohen Kappa coefficient
Timothy Grass	8	33.5	39.4	0.76
House dust mite	15	33.5	34.7	0.83
Cat	3	21.8	23.8	0.76
Olive	3	20.6	21.2	0.79
Birch	3	10.6	13.8	0.71
Alternaria	2	8.8	9.4	0.65
Ragweed	1	5.9	3.8	0.71

Table S3. Agreement between Immunocap and the MeDALL chip regarding allergen specific-IgE for those 7 allergen sources that showed a prevalence for positive Immunocap (specific IgE≥0.35 kU/L)> 5% in the BAMSE study population.

	Number of components on the MeDALL chip, n	Immunocap allergen specific-IgE ≥0.35 kU/L, %	Allergen specific-IgE ≥0.3 for at least one of the allergen components on the MeDALL chip, %	Cohen Kappa coefficient
Timothy Grass	8	33.5	36.8	0.75
Birch	3	22.7	25.8	0.87
Dog	6	22.6	14.6	0.59
Cat	3	19.6	21.6	0.84
House dust mite	15	13.6	8.0	0.44
Mugworth	2	12.7	5.3	0.51
Horse	1	9.8	4.7	0.59

Table S4. Comparison of the population included in the present analysis to the non-included population in EGEA

	Subjects without asthma			Subjects with asthma		
	Non-Included	Included	P value	Non-Included	Included	P value
n	511	377		220	463	
Age, m (sd)	48.6 (14.2)	43.2 (17.4)	<.001	40.5 (15.9)	38.7 (16.7)	0.18
Sex, %males	235 (46)	179 (47.5)	0.66	117 (53.2)	245 (52.9)	0.95
Smoking status :			0.86			0.38
never smoker, %	251 (49.7)	190 (50.4)		101 (46.3)	238 (51.4)	
ex-smoker, %	150 (29.7)	106 (28.1)		54 (24.8)	112 (24.2)	
current smoker, %	104 (20.6)	81 (21.5)		63 (28.9)	113 (24.4)	
Center of recruitment			0.15			0.04
Paris, %	137 (26.8)	96 (25.5)		72 (32.7)	152 (32.8)	
Lyon, %	105 (20.5)	62 (16.4)		33 (15)	71 (15.3)	
Marseille, %	85 (16.6)	69 (18.3)		33 (15)	70 (15.1)	
Montpellier, %	43 (8.4)	23 (6.1)		28 (12.7)	28 (6)	
Grenoble, %	141 (27.6)	127 (33.7)		54 (24.5)	142 (30.7)	
Socio-economic status:			<.001			0.10
Unemployed, %	13 (2.6)	50 (13.3)		24 (11)	71 (15.5)	
Manager, %	193 (38.1)	132 (35.2)		81 (37)	130 (28.3)	
Technician, %	217 (42.8)	146 (38.9)		87 (39.7)	200 (43.6)	
Workers, %	84 (16.6)	47 (12.5)		27 (12.3)	58 (12.6)	
Allergic rhinitis ever, %	184 (36.0)	125 (33.2)	0.38	168 (76.4)	370 (79.9)	0.29
Allergic sensitization (≥1SPT among 12 allergens), %	155 (38.4)	125 (38.3)	0.99	116 (76.3)	332 (78.9)	0.51
Total IgE>100IU/ml, %	116 (28.7)	116 (30.8)	0.53	98 (64.5)	271 (58.5)	0.19
Blood eosinophil counts > 250 mm^3, n (%)	64 (15.9)	62 (16.5)	0.82	58 (37.2)	176 (38.3)	0.81
Atopic dermatitis ever, n (%)	137 (27)	93 (24.7)	0.43	109 (50.2)	217 (47.2)	0.46
FEV_1 < 80% of predicted value, (%)	31 (7.6)	24 (6.6)	0.57	32 (20.1)	87 (19.2)	0.79

Table S5. Comparison of the population included in the present analysis to the non-included population in BAMSE

	Non-Included	Included	P value
N (of children that participated at clinical examination at the 16 year follow up)	1,819	786	
Age, m (sd)	16.5 (0.40)	16.6 (0.26)	<0.001
Sex, % males	868 (47.7)	391 (49.8)	0.34
Smoking status :			0.02
current smoker, %	239 (13.2)	77 (9.9)	
Socio-economic status for the household:			0.27
Blue collar worker, %	283 (15.6)	114 (14.5)	
White collar worker, %	1,506 (83.1)	665 (84.8)	
Other, %	23 (1.3)	5 (0.7)	
Asthma ever, %	250 (18.0)	148 (22.9)	0.02
Allergic rhinitis ever, %	489 (35.1)	256 (38.4)	0.15
Atopic dermatitis ever, n (%)	558 (40.1)	265 (39.7)	0.89
Allergic sensitization (≥0.35 kU_A/L to a mix of food and/or inhalant allergens)*, %	806 (45.8)	364 (46.3)	0.80
Blood eosinophil counts > 250 mm^3, n (%)	307 (18.4)	138 (18.2)	0.99

***** Inhalant allergens were analyzed with Phadiatop® (cat, dog, horse, birch, timothy, mugwort, house dust mite (Dermatophagoides pteronyssinus and Dermatophagoides farinae) and mold (Cladosporium herbarum)) and food allergens with fx5® (cow's milk, hen's egg, cod, soy, peanut, and wheat) by using the ImmunoCAP System (Thermo Fisher Scientific, Uppsala, Sweden)