

Immunological partial identity between pollen allergens

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Several studies confirm that close botanical relationships among grass pollens are reflected in partial immunochemical identity revealed by means of RAST inhibition (1, 3, 4, 5, 6, 9), crossed line immunoelectrophoresis (CLIE) (7) and skin prick tests (2, 8).

Those grasses, which have proved allergenic all belong to the same order (Graminales) and family (Graminae) and a high degree of identity (> 80–90 %) between antigens extracted from different grass pollens is found, although there are quantitative variations (3, 7, 9). For example the inhibitory effects (RAST inhibition) of the isolated major Timothy allergens nos. 19 and 25 were 97, 92, 91 and 73 % for whole extracts of Timothy-, Orchard-, False Oat and Rye grass, respectively (5).

Weeds which are known to be allergenic embrace a number of orders and families. The Compositae family contains most of the important allergenic weeds, in particular the Ragweeds of the genus *Ambrosia* and the Mugworts of the genus *Artemisia*. The common Mugwort, *Artemisia vulgaris*, is the most important weed in Scandinavia from an allergenic viewpoint. A high degree of identity has been found between the pollens of common Mugwort, Oxeye daisy, Dahlia and Camomile, whilst these show a lower degree of identity with other pollens from Compositae, e.g. Ragweed, Goldenrod and Dandelion (4, 7).

Allergenic trees are botanically rather more widely distributed than weeds. Of the Betulaceae family these include Birch,

Hazel and Alder, and of the Fagaceae family they include Beech and Oak, both families being of the same order Fagales. Birch pollenosis is the major tree pollenosis occurring in Scandinavia. Birch pollen shows a high degree of identity to Hazel, a lower degree to Alder, but only very little to Beech and Oak (1, 7).

The finding, that allergenic pollen extracts contain to a large degree common components implies, that only a few individual extracts should be required for tests and possibly for treatment. In a recent Danish study (2, 8) it was found possible to reduce the number of different pollen extracts employed for skin prick test, from 39 to 12 or less. The study included 39 pollen extracts grouped according to their season for maximum allergenic activity: spring – (trees), summer – (grasses), and autumn – (weeds) (Table 1). Each patient was skin prick tested for a whole group to evaluate the extent of common reactions for more than one pollen extract. The wheals were recorded as positive, when their area was equal to or greater than that produced by the reference, histamine chloride (1 mg/ml).

The results obtained were correlated mathematically employing a computer program, compared the pollen extracts two by two, and a high degree of identity between the pollen allergens was demonstrated (2).

From a less mathematical – but rather more clinical viewpoint, this identity has been confirmed by using another computer program which ranked the pollen allergens

Table 1:
Pollen seasons.

Spring (Trees)			Summer (Grasses)			Autumn (Weeds)		
307 positive			560 positive			209 positive		
568 tests	(x)	(xx)	798 tests	(x)	(xx)	415 tests	(x)	(xx)
Birch	253	253	Meadow fescue	449	449	Mugwort	157	157
Hazel	125	24	Timothy	421	69	Reed	66	24
Elm	28	12	False cat grass	447	22	Dahlia	134	19
Ash	41	7	Couch grass	392	8	Goldenrod	100	5
Maple	32	3	Meadow foxtail	327	3	Plantain	25	4
Sallow	34	2	Rye-grass	343	3	Oxeye daisy	104	0
Aspen	18	2	White bent	308	2	Starwort	97	0
Scotch pine	8	2	Orchard grass	369	1	Dandelion	72	0
Oak	15	1	Smooth meadow grass	147	1	Orache	21	0
Juniper	6	1	Tussock grass	222	1	Goosefoot	20	0
Spruce	10	1	Cattail	22	1	Nettle	19	0
Alder	90	0	Murram grass	329	0	Heather	8	0
Beech	69	0	Spiraea	13	0	Curly dock	8	0

according to clinical relevance, shown in Table 1: Each patient was assigned a number, and for each extract the computer counted the number of patients, showing a positive reaction to each extract column (x). The numbers in column (xx) show the number of patients, who reached positive to the extract in question without reacting to any of the preceding extracts in the list. The latter figures were calculated by a cyclic computation process in which each cycle determined which pollen extract gave rise to the greatest number of positive reactions, whereafter the name of the extract was printed out together with the number of positive reactions (column xx). The computer then deleted those patients, who reacted positive to the extract in question and the whole process was repeated until there were no more positive reactions. The differences between the numbers in column (x) and column (xx) for each extract thus show how many patients were deleted because they showed positive reactions to preceding extracts in the list (8).

The results given in Table 1 demonstrate, that more than 95 % of cutaneous pollen

allergy could be reproduced by the use of 4 pollen extracts from each of the pollen groups, and more than 75 % by using only one pollen extract from each group: one grass, Birch and Mugwort.

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