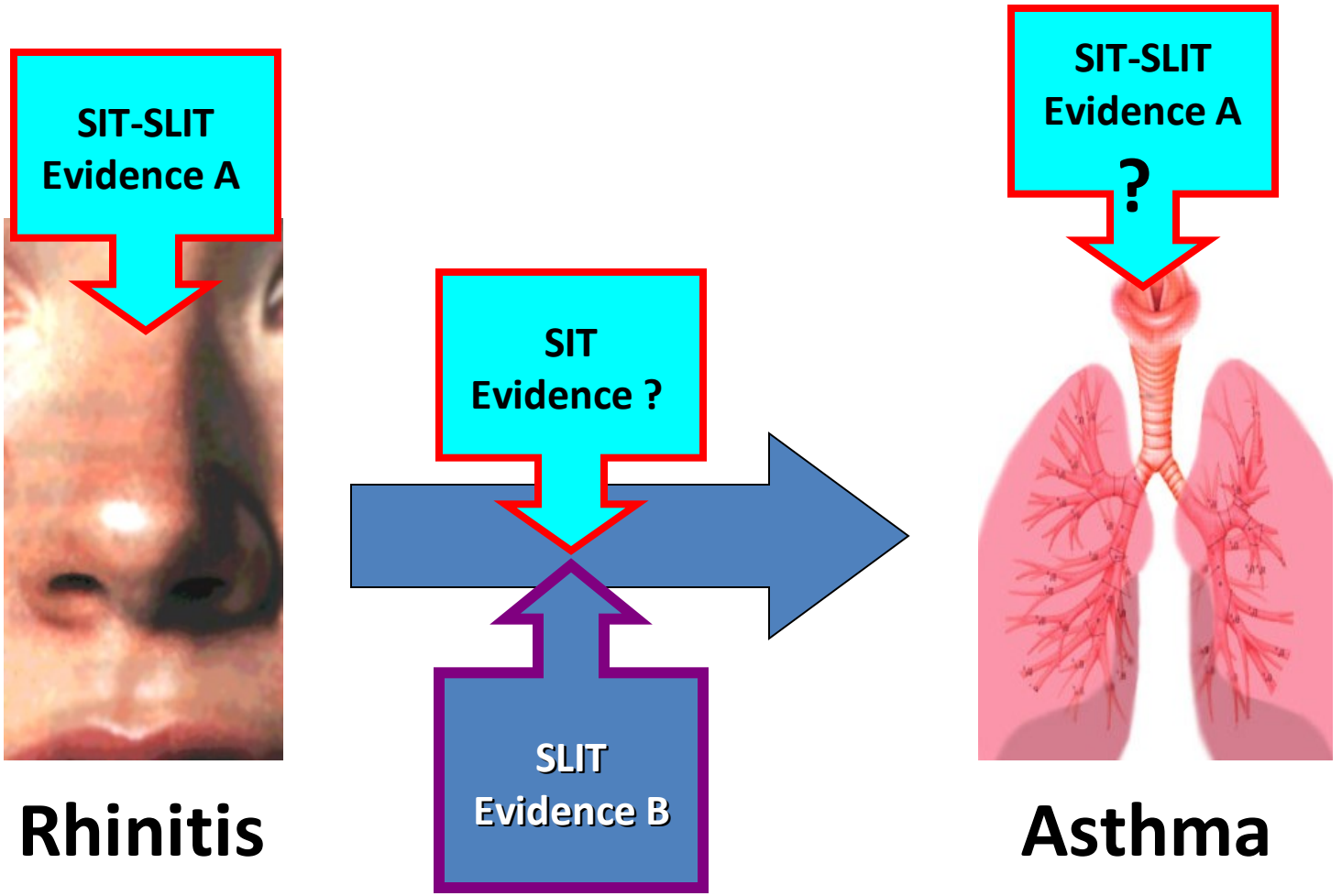
Allergic Rhinitis and Its Impact on As

Rhinitis: A Risk Factor for Asthma?

Ronald Dahl,

Aarhus University Hospital,
Denmark

Rhinitis and asthma



Onset of asthma and allergic rhinitis

49-64% rhinitis present before asthma

21-25% rhinitis and asthma started simultaneous

Settipane	1986
Maternowski	1962

Allergic Rhinitis and Asthma: Adults

- Rhinitis is a significant risk factor for asthma
  - risk of developing asthma is increased in patients with:
    - persistent or severe allergic rhinitis symptoms
    - physician-documented sinusitis
  - risk of developing asthma is 3 to 5 times higher than normal for patients with allergic rhinitis

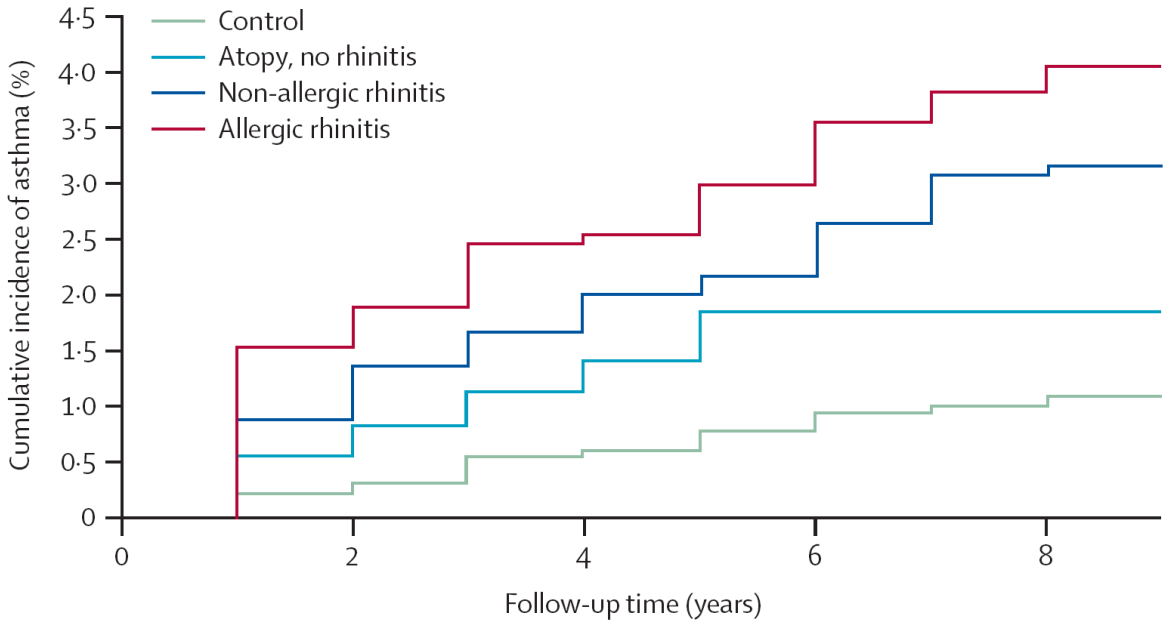
Guerra S et al. *J Allergy Clin Immunol.* 2002;109:419-25.

Allergic Rhinitis Precedes Asthma: The Allergic March

Population	Outcome	Odds Ratio
UK[1] (n = 7,225)	Asthma at 7 years	**7.1**
USA[2] (n = 770)	Asthma at 5–9 years	**2.9**
Australia[3] (n = 8,585)	Asthma at 7 years	**3.9**
USA[4] (n = 1,021)	Asthma life 23-year follow-up	**3.0**

1. **Anderson HR et al. *Thorax.* 1992;47:537-42.**
2. **Sherman CB et al. *Am J Epidemiol.* 1990;132:83-95.**
3. **Jenkins MA et al. *Br Med J.* 1994;309:90-3.**
4. **Settipane RJ et al. *Allergy Proc.* 1994;15:21-5.**

Cumulative incidence rate of asthma



Number at risk					
Control	3163	3158	3153	3064	2967
Atopy, no rhinitis	704	701	698	669	642
Non-allergic rhinitis	1377	1396	1358	1268	1199
Allergic rhinitis	1217	1208	1194	1093	1038

Probability of developing asthma, % (95% CI)					
Control	0	0·2 (0·1–0·5)	0·5 (0·3–0·9)	0·8 (0·5–1·2)	1·0 (0·7–1·5)
Atopy, no rhinitis	0	0·6 (0·2–1·5)	1·1 (0·6–2·3)	1·9 (1·1–3·2)	1·9 (1·1–3·2)
Non-allergic rhinitis	0	0·9 (0·5–1·5)	1·7 (1·1–2·5)	2·2 (1·5–3·1)	3·1 (2·3–4·1)
Allergic rhinitis	0	1·6 (1·0–2·4)	2·5 (1·7–3·5)	3·0 (2·2–4·1)	3·8 (2·9–5·1)

***Lancet* 2008; 372: 1049–57**

Baseline characteristics of participants with and without asthma onset

	No asthma onset (n=6321)	Asthma onset (n=140)	p†	Crude RR (95% CI)
Women, n (%)	3263 (50·2)	91 (65·0)	0·0005	1·84 (1·30-2·66)
Age, mean (SD)	34·2 (7·3)	34·5 (8·7)	0·591	1·06* (0·90-1·25)
Body-mass index, kg/m², mean (SD)	23·8 (3·8)	25·0(5·9)	0·017	1·28* (1·12-1·47)
Smoking, n (%)			0·607	
Non-smokers	2669 (43·2)	63 (45·7)		1·00 (reference)
Ex-smokers	1235 (20·0)	31 (22·5)		1·17 (0·75-1·83)
Moderate smokers	1397 (22·6)	25 (18·1)		0·86 (0·56-1·30)
Heavy smokers	882 (14·3)	19 (13·8)		0·85 (0·45-1·60)
Total IgE, mean (SD)	81·7(195·8)	135·5 (300·7)	0·017	1·33* (1·11-1·60)
Atopy, n (%)	1859 (29·4)	62 (44·3)	0·0001	1·91 (1·37-2·66)
Asthma-like symptoms, n (%)	1307 (20·7)	51 (36·4)	<0·0001	2·20 (1·56-3·10)
Family history of asthma, n (%)	657 (10·4)	30 (21·4)	<0·0001	2·35 (1·57-3·52)
Respiratory infection in childhood, n (%)	539 (9·0)	17 (13·4)	0·085	1·57 (0·94-2·61)
FEV_1, L/s ‡, mean (SD)	3·78(0·47)	3·57 (0·54)	<0·0001	0·64* (0·55-0·76)
Bronchial hyper-responsiveness, n (%)	414 (7·7)	27 (25·2)	<0·0001	4·06 (2·63-6·28)

FEV_1=forced expiratory volume in 1 s· *Relative risk per roughly 1 SD increase (7·1 year for age, 3·8 kg/m² for body-mass index, 1·58 for log total IgE, and 0·47 L for FEV_1)· †For difference between groups using *t* test for continuous variables and χ^2 for categorical variables· ‡FEV_1=residual FEV_1+ mean FEV_1.

***Lancet* 2008; 372: 1049–57**

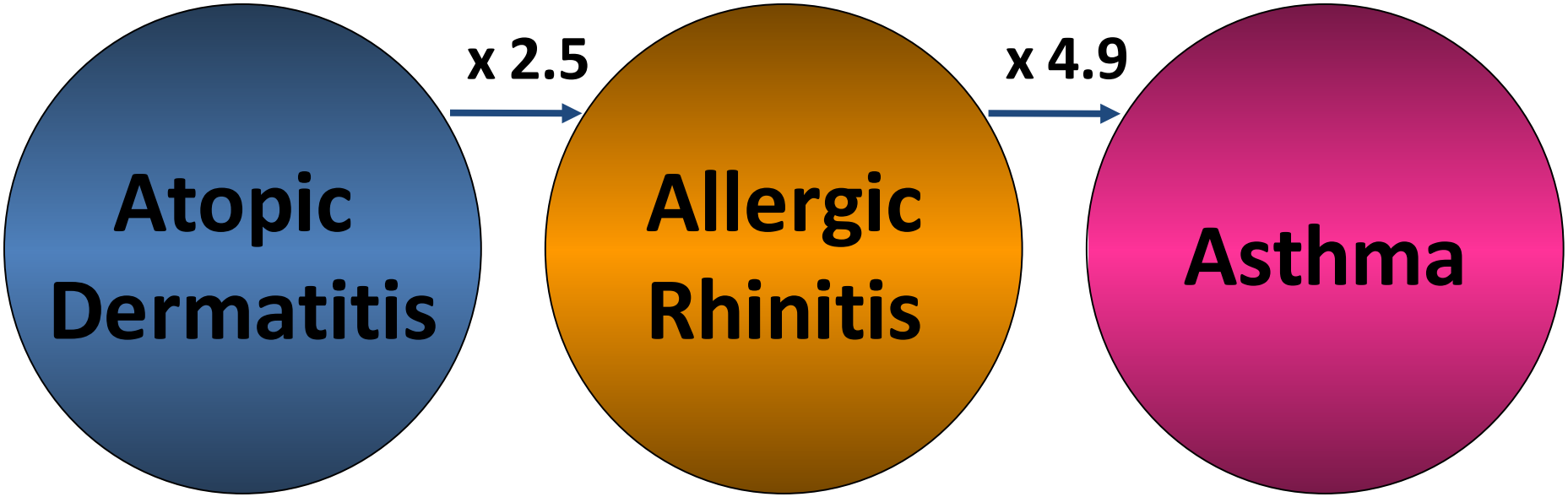
Serum ECP predicts asthma in allergic rhinitis

- 67 seasonal allergic rhinitis (grass)
- 7 years follow up
- S- ECP > 17 µg/l had a 5.4 increased risk of asthma development

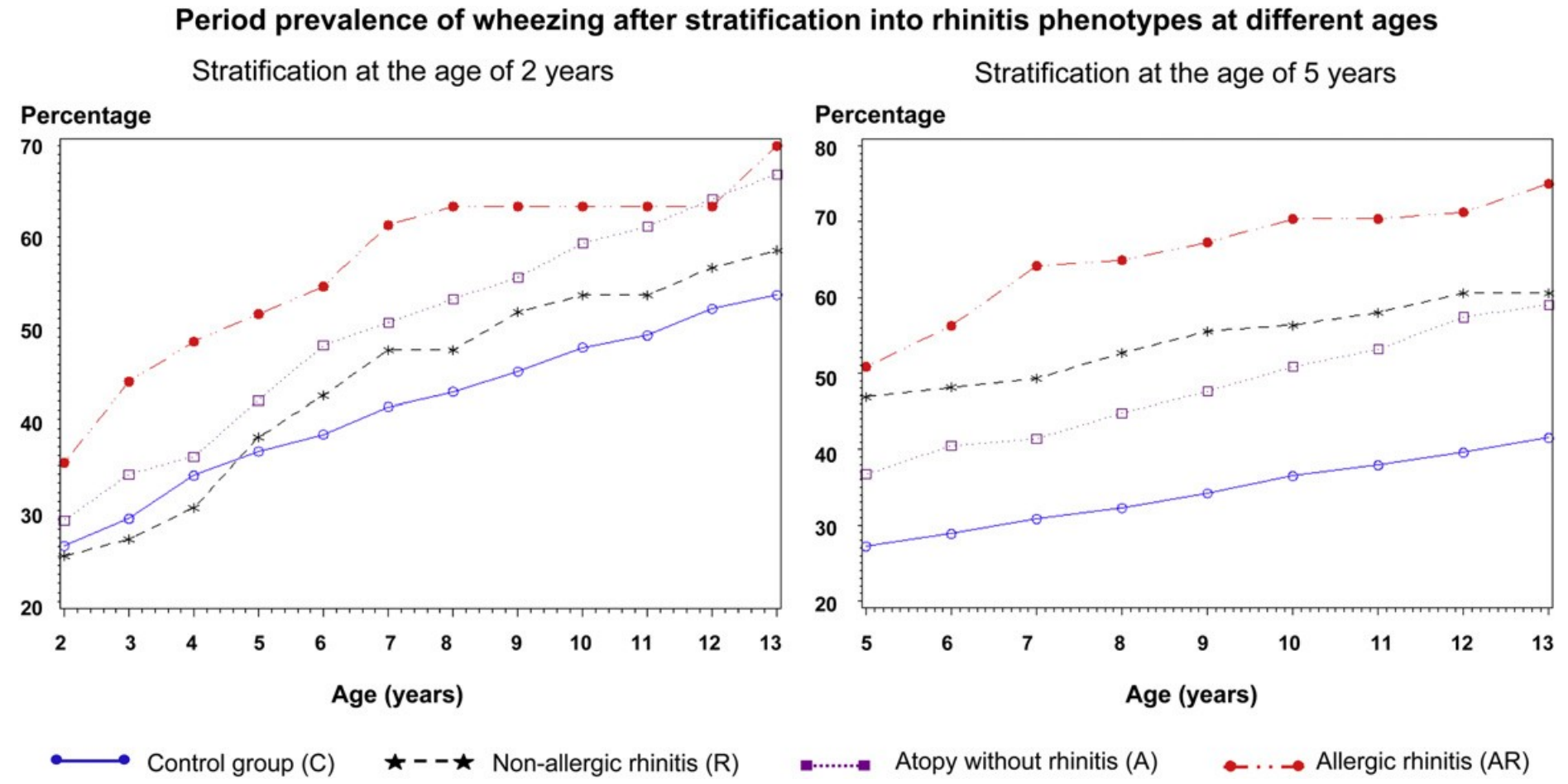
- A question of degree of allergic inflammation?

LP Nielsen et al. Allergy 2009; 64: 733-7

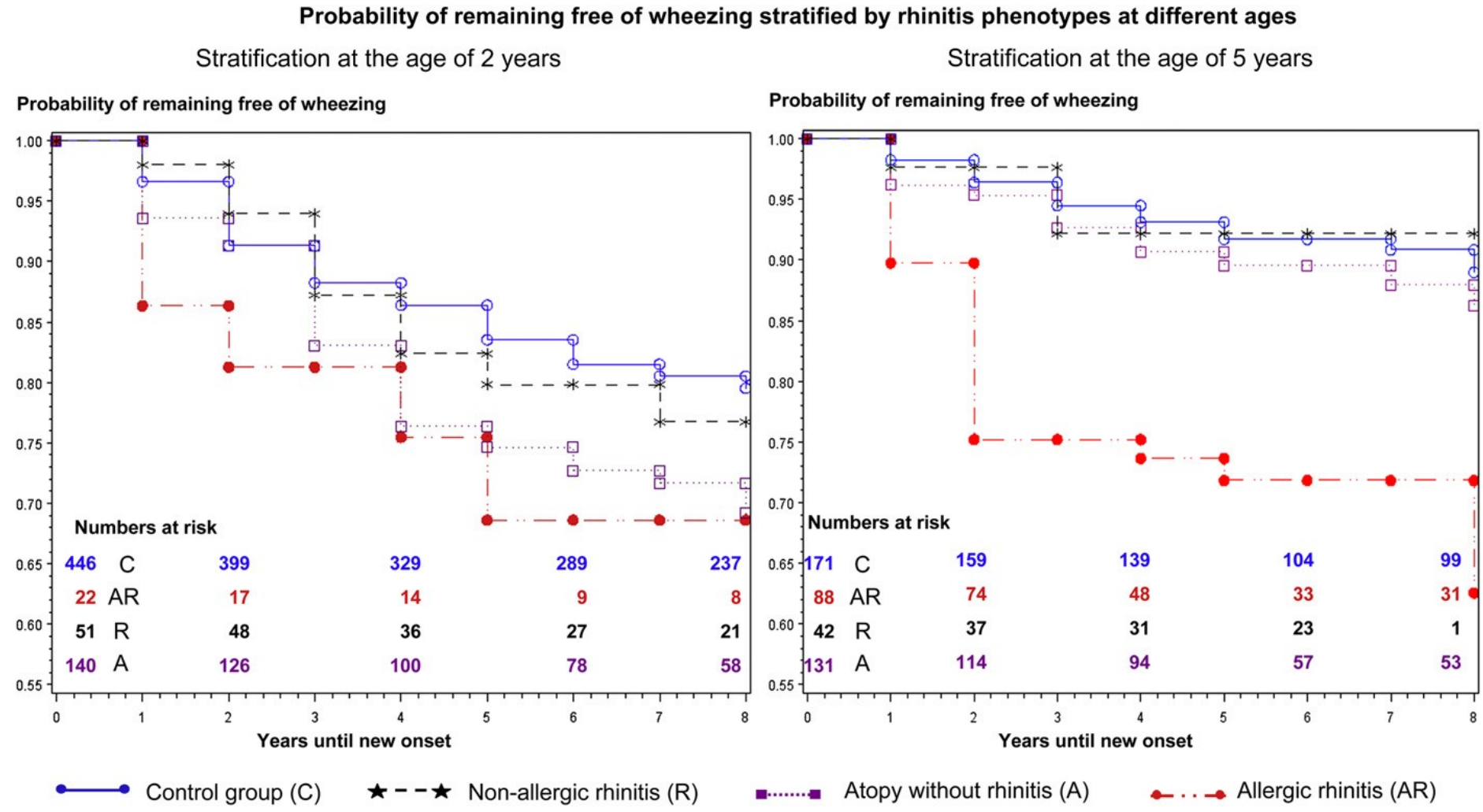
The Allergic March



Kulig M et al. *JACI* 2000;106:832-9.
Plaschke P et al. *AJRCCM* 2000;162:920-4
Linneberg A et al. Allergy 2002.



J Allergy Clin Immunol 2010;126:1170-5.



J Allergy Clin Immunol 2010;126:1170-5.

Development of asthma: Continuing smokers and nonsmokers combined

Pack years	OR (multivariate analysis)
1-10 vs 0	2.05 (0.99 – 4.27)
11 – 20 vs 0	3.71 (1.77 – 7.78)
➢21	5.05 (1.93 – 13.2)

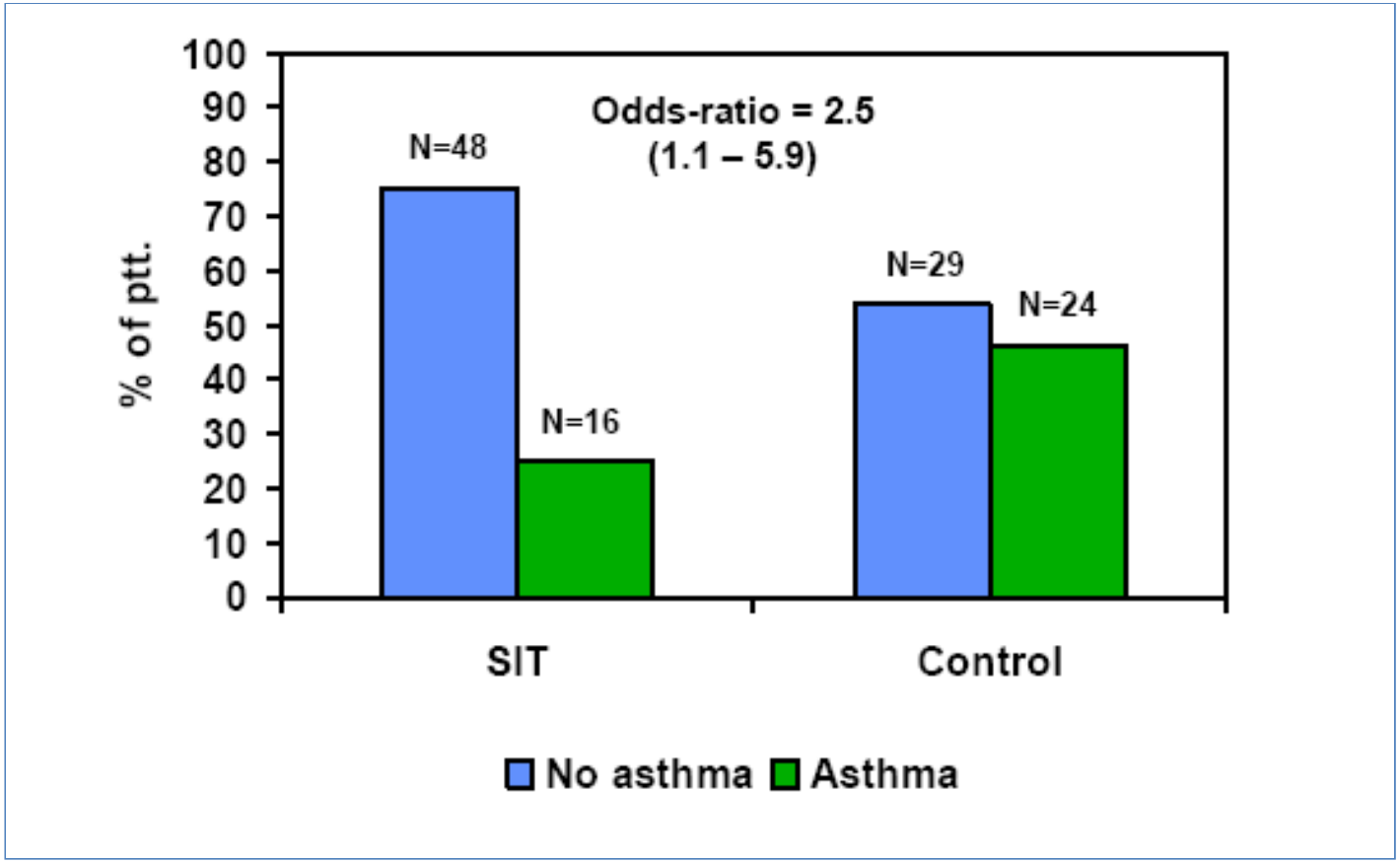
J Allergy Clin Immunol 2008;121:1428-34.

Cigarette smoking is associated with a greater risk of incident asthma in allergic rhinitis

	OR (multivariate analysis)
Smokers vs non smokers	2.98 (1.81 – 4.92)
Male vs female	0.34 (0.20 – 0.55)

J Allergy Clin Immunol 2008;121:1428-34.

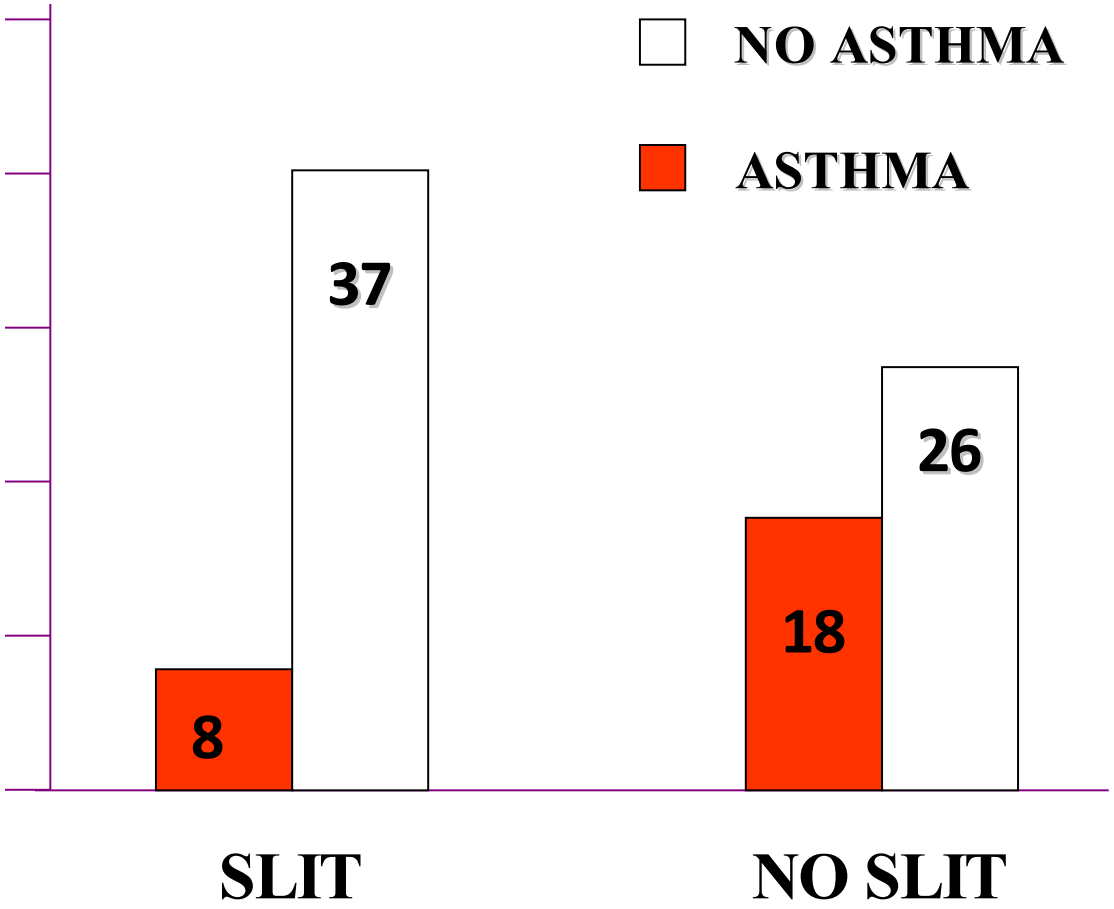
PAT study 10 year data
Risk of Asthma after 10 years



L. Jacobsen et al. Specific immunotherapy has long-term preventive effect of seasonal and perennial asthma: 10-year follow-up on the PAT-study. Allergy 2007, 62: 90 - 96.

Coseasonal SLIT reduces the development of asthma in children with allergic rhinitis.

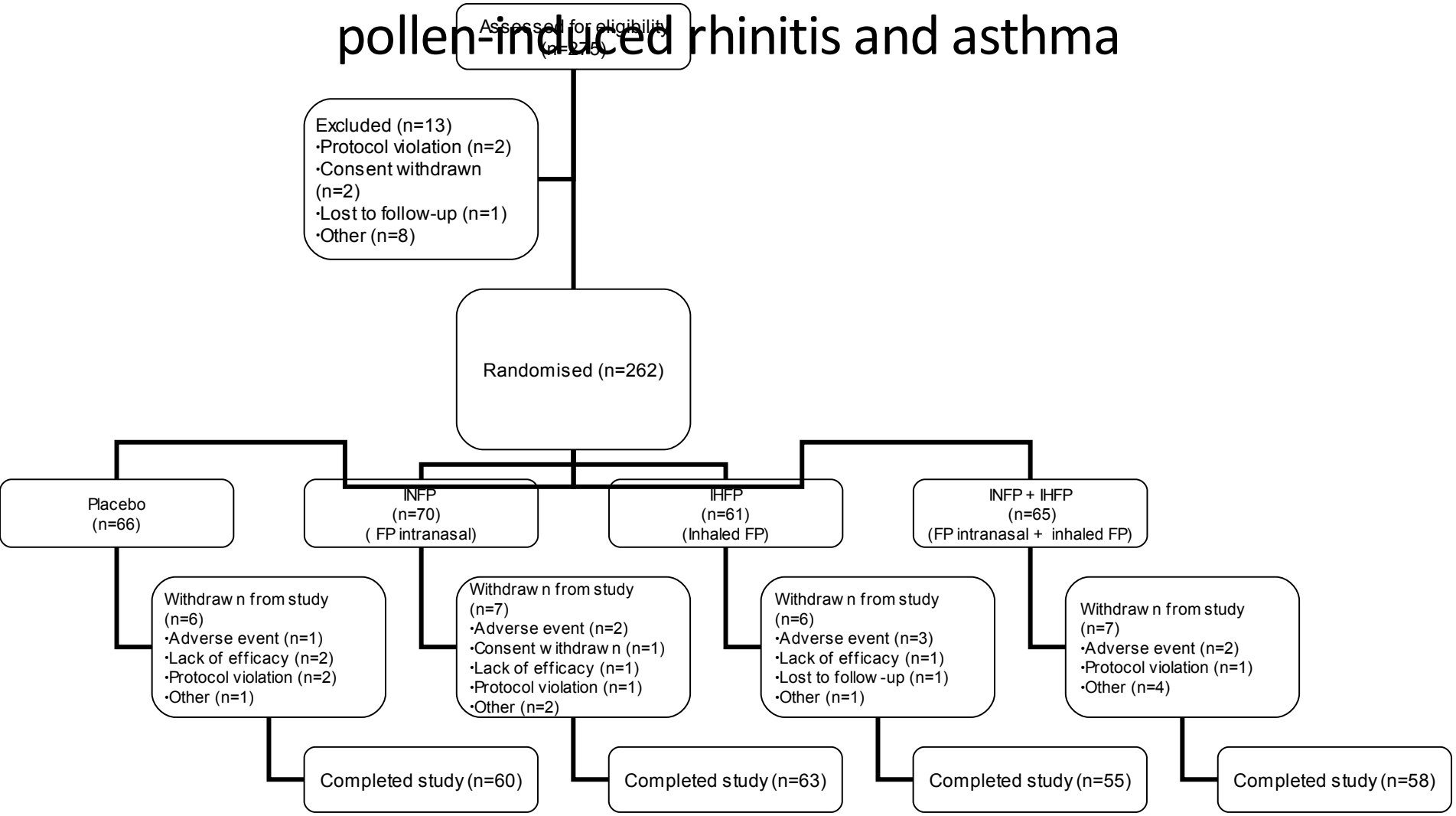
Novembre E. et al, JACI 2004



79 children
Allergic rhinitis only
Follow-up: 3 yrs

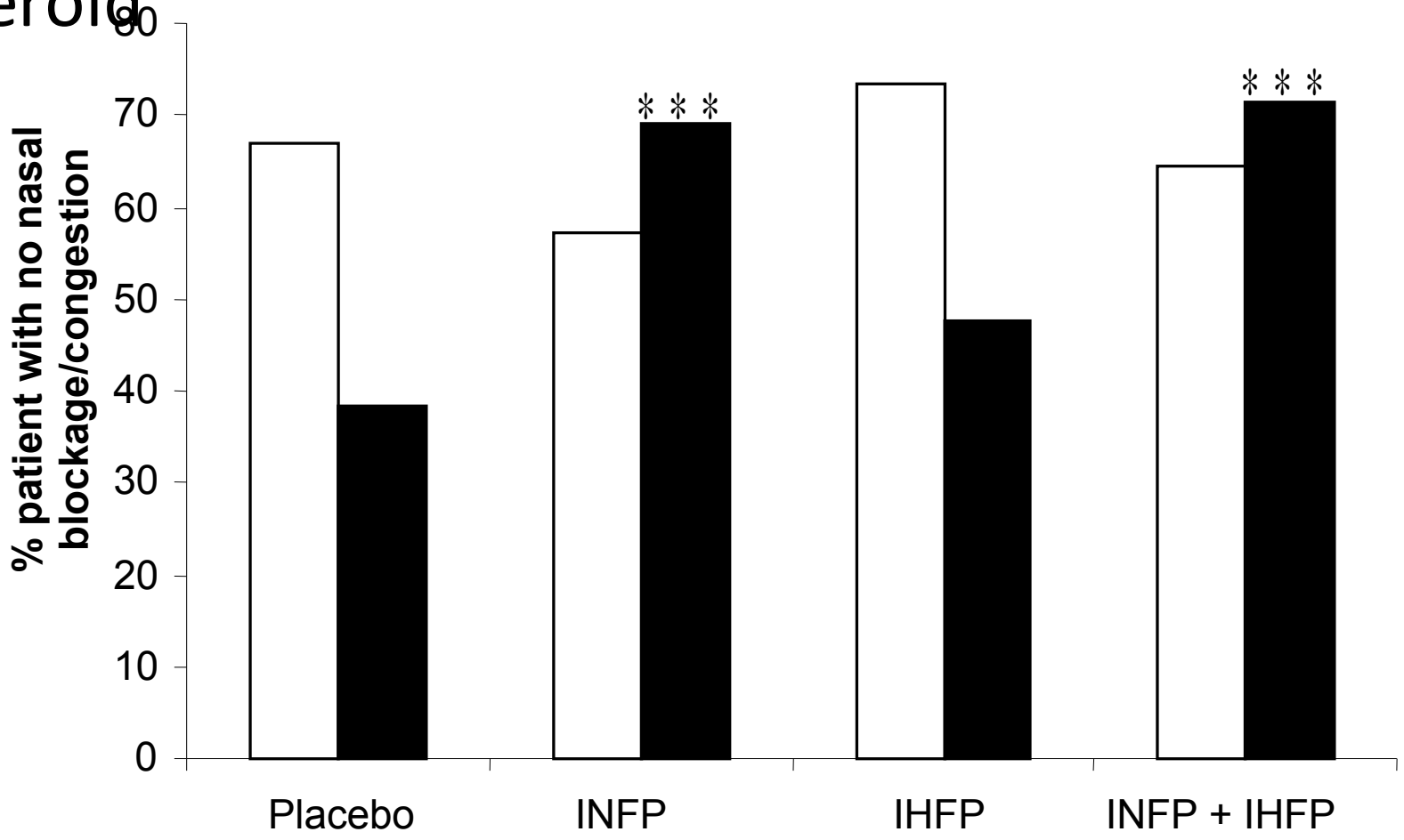
Novembre E. et al, JACI 2004

Intranasal and inhaled fluticasone propionate for pollen-induced rhinitis and asthma



Allergy 2005; 60: 875-81

Nasal symptoms are reduced by intranasal steroid

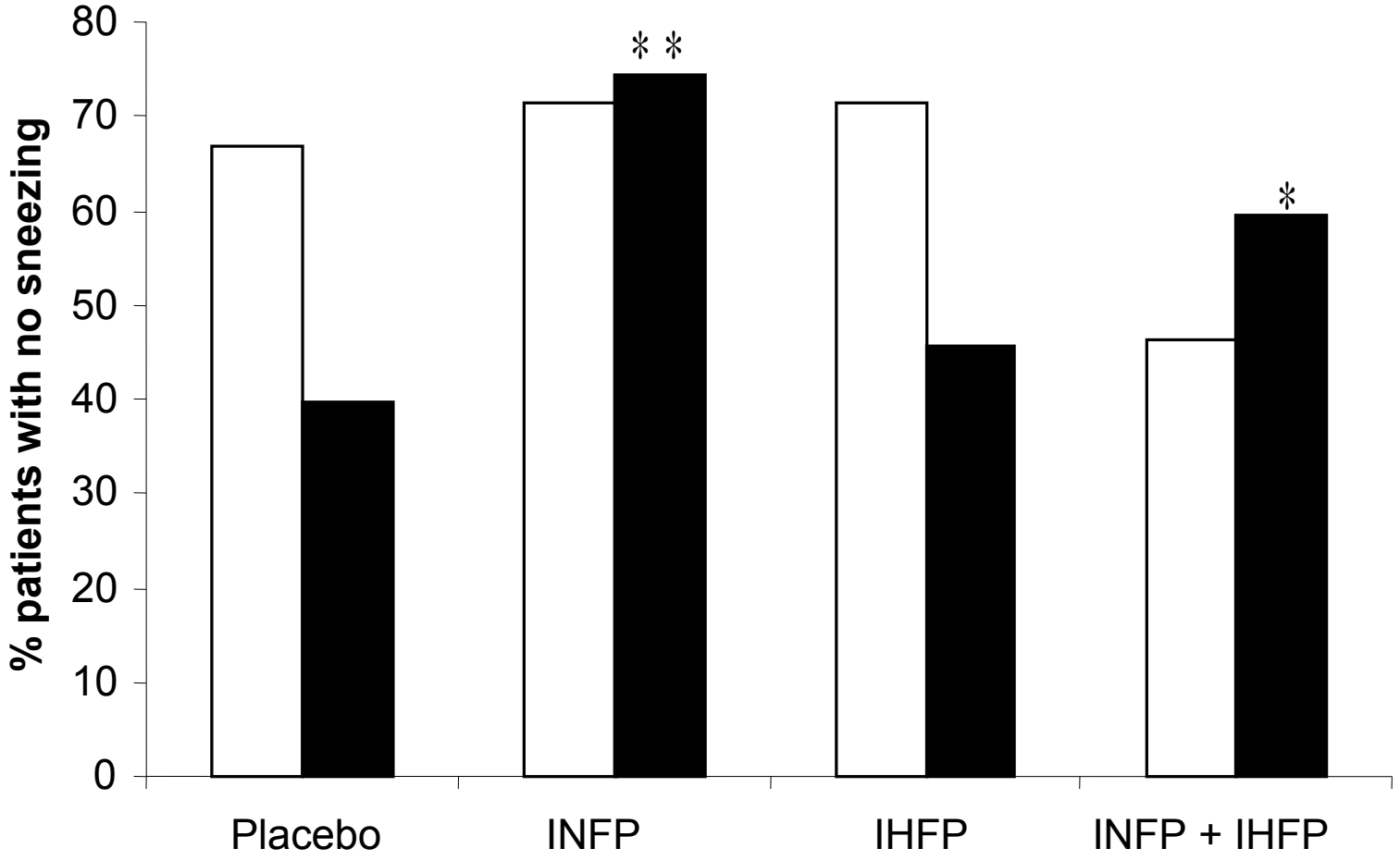


□= baseline, ■ = weeks 1-6;

* p<0·05, ** p<0·01 and *** <0·001 vs intranasal or inhaled placebo.

Allergy 2005; 60: 875-81

Nasal symptoms are reduced by intranasal steroid

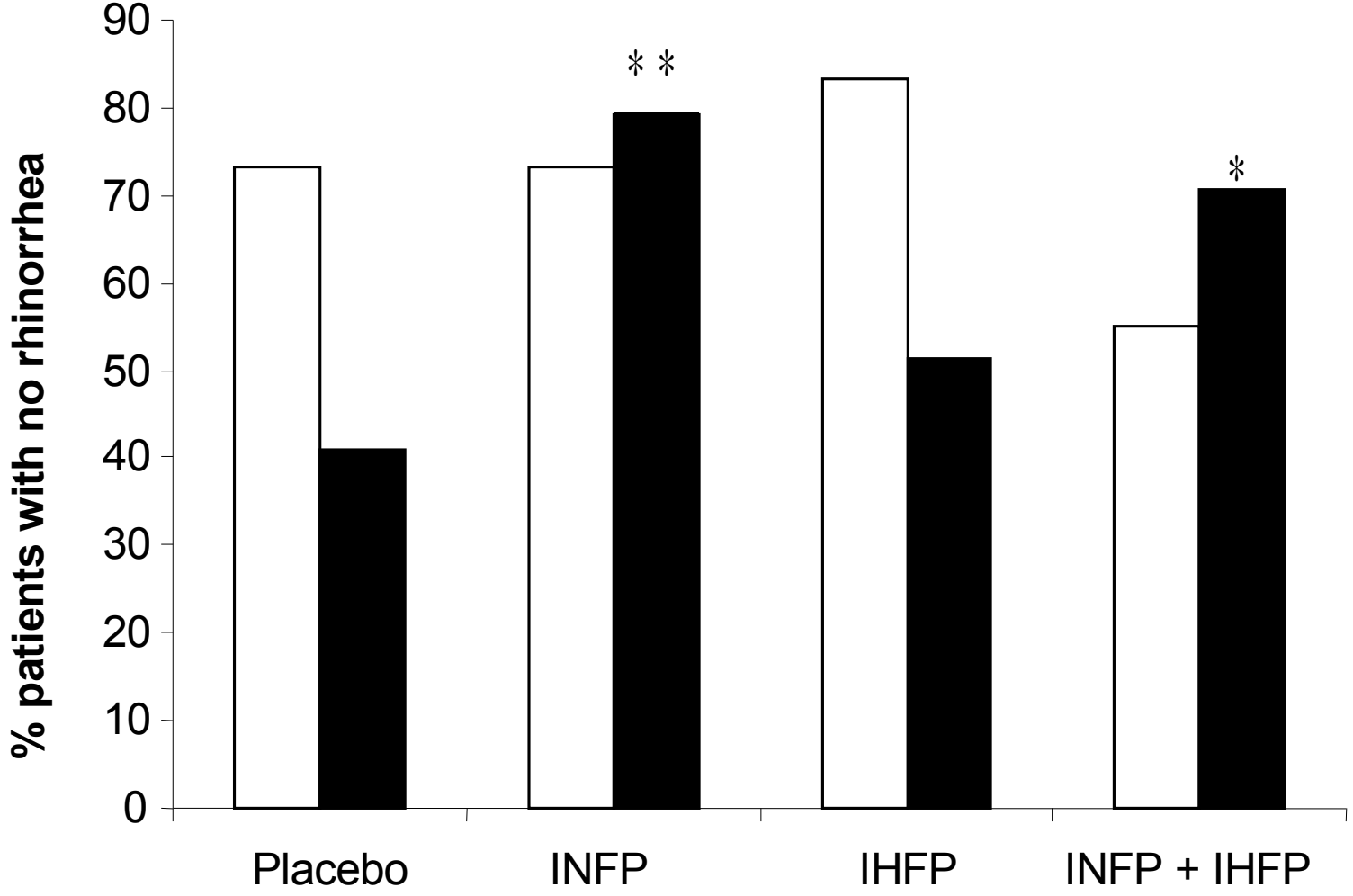


baseline (□) and after 4 weeks treatment (■)

*** = p<0·001 IHFP± INFP vs. INFP or placebo

Allergy 2005; 60: 875-81

Nasal symptoms are reduced by intranasal steroid

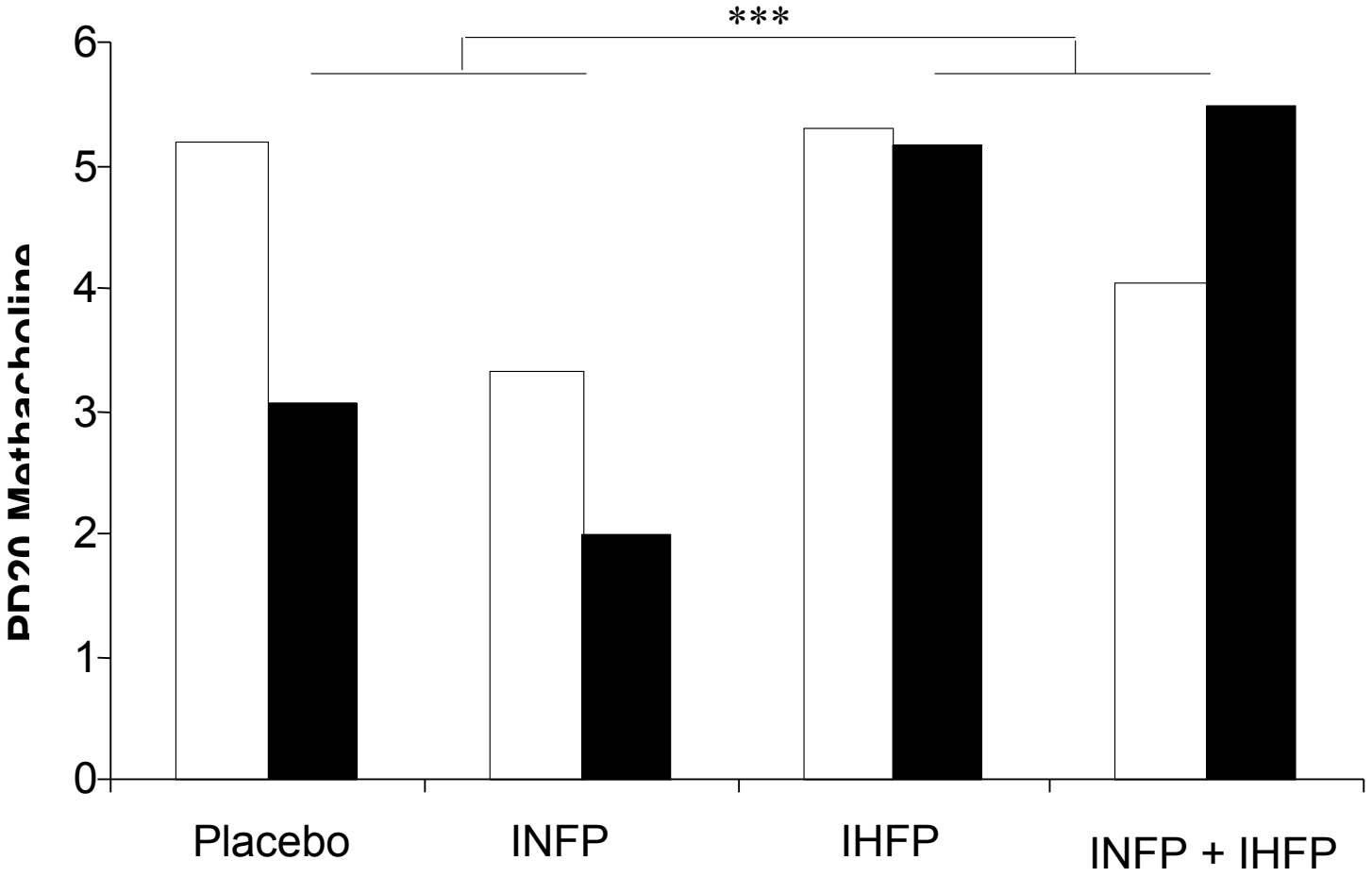


baseline (□) and after 4 weeks treatment (■)

*** = p<0·001 IHFP± INFP vs. INFP or placebo

Allergy 2005; 60: 875-81

Protection from increase in BHR by inhaled but not intranasal steroid



baseline (□) and after 4 weeks treatment (■)

*** = p<0·001 IHFP± INFP vs. INFP or placebo

Allergy 2005; 60: 875-81

Rhinitis is a major risk factor for asthma

- Allergic rhinitis is a higher risk than nonallergic rhinitis for asthma
- Those with signs of peripheral airways inflammation may be at especially high risk (s-ECP; FeNO, sputum eosinophilia?)
- Smoking in rhinitics increase the risk for asthma further
- Allergen specific immunotherapy may reduce the risk by 50%
- Preventive value of pharmacological treatments are not know

Thank you for your attention