Σοβαρό άσθμα

Στέλιος Λουκίδης MD Phd FCCP FERS
ERS educational council
Ιατρική σχολή ΕΚΠΑ

Ορισμός
ATS/ERS task force 2014

Asthma which requires treatment with guidelines suggested medications for GINA steps 4–5 asthma (high dose ICS# and LABA or leukotriene modifier/theophylline) for the previous year or systemic CS for ≥50% of the previous year to prevent it from becoming "uncontrolled" or which remains "uncontrolled" despite this therapy

Uncontrolled asthma defined as at least one of the following:

1) Poor symptom control: ACQ consistently >1.5, ACT <20 (or "not well controlled" by NAEPP/GINA guidelines)
2) Frequent severe exacerbations: two or more bursts of systemic CS (>3 days each) in the previous year
3) Serious exacerbations: at least one hospitalisation, ICU stay or mechanical ventilation in the previous year
4) Airflow limitation: after appropriate bronchodilator withhold FEV1 <80% predicted (in the face of reduced FEV1/FVC defined as less than the lower limit of normal)

Controlled asthma that worsens on tapering of these high doses of ICS or systemic CS (or additional biologics)

Αποκλεισμός παθήσεων
Παρακολούθηση 6 μηνών

International ERS/ATS guidelines on definition, evaluation and treatment of severe asthma

Ορισμός: Τι είναι πραγματικά το σοβαρό άσθμα

Τι σημαίνει "uncontrolled" – μη ελεγχόμενο άσθμα?

Οποιοδήποτε από τα παρακάτω 4 κριτήρια:

- Κακός έλεγχος συμπτωμάτων: σταθερά τιμές ACQ >1.5 ή ACT <20
- Συχνές παροξύνσεις: 2 ή περισσότερες ώσεις OCS το προηγούμενο έτος
- Σοβαρές παροξύνσεις: ≥ 1 νοσηλεία για παρόξυνση το προηγούμενο έτος
- Μόνιμη απόφραξη των αεραγωγών: FEV_1<80% προβλεπόμενης.

* *Ο ορισμός ERS/ATS δεν περιλαμβάνει το "σοβαρό" άσθμα που δεν λαμβάνει θεραπεία (WHO)*

ΠΡΑΓΜΑΤΙΚΟΤΗΤΑ: *Στην κλινική πράξη οι περισσότεροι με τον όρο σοβαρό άσθμα εννοούν το ΜΗ ΕΛΕΓΧΟΜΕΝΟ (με συμπτώματα και παροξύνσεις) σοβαρό άσθμα.*
Είναι ο ασθενής που λαμβάνει SALM/FP 100/1000 με ACT 24 σοβαρό άσθμα?
Είναι ο ασθενής με FEV1 70-80% μη ελεγχόμενος αν δεν έχει παροξύνσεις ή συμπτώματα?

ERS/ATS Guidelines Severe Asthma Eur Respir J. 2014

Ορισμός σοβαρού άσθματος : 5 βασικά διαχειριστικά στοιχεία

- Σκεφτόμαστε βήματα GINA 4& 5
- Η μείωση της ροής των αεραγωγών δεν είναι κύριο κριτήριο.
- Δόση ICS
- Παρακολούθηση 6 μηνών
- Μην θεωρείται το υπο/μη θεραπευόμενο σαν σοβαρό άσθμα

Αλγόριθμος διάγνωσης

Μη ελεγχόμενο άσθμα ή/και ≥ 2 παροξύνσεις/χρόνο

↓

Ο ασθενής λαμβάνει υψηλές δόσεις εισπνεόμενων κορτικοστεροειδών με ή χωρίς συστηματικά κορτικοστεροειδή → ↑ δόσεις ICS και LABA στο max

↓

Η διάγνωση του άσθματος έχει επιβεβαιωθεί

↓

Ο ασθενής χρησιμοποιεί σωστά τις συσκευές εισπνεόμενων κορτικοστεροειδών και έχει λάβει επαρκή εκπαίδευση για το → Ενημέρωσε τον ασθενή και έλεγξε την σωστή χρήση των συσκευών ICS

Ο ασθενής συμμορφώνεται με τη θεραπεία του → Μέτρηση CS στο πλάσμα

↓

Αποκλεισμός εναλλακτικής διάγνωσης

↓

Αποκλεισμός έκθεσης σε επιβαρυντικούς περιβαλλοντικούς παράγοντες (σε χώρους δουλειάς, σχολείο, σπίτι) -**Κάπνισμα**

↓

Διακοπή φαρμάκων που προκαλούν βρογχόσπασμο → Διακοπή αν είναι δυνατόν των ΜΣΑΦ, β-blockers, θεραπεία ορμονικής υποκατάστασης

↓

Πιθανές συννοσηρότητες έχουν αντιμετωπιστεί κατάλληλα

↓

Παρακολούθηση και επανεκτίμηση του ασθενούς για τουλάχιστον 6 μήνες

↓

Ο ασθενής έχει σοβαρό στη θεραπεία άσθμα

Bel EH et al. Thorax 2011

ΔΔ ATS/ERS task force 2014

TABLE 6 Diseases which can masquerade as severe asthma

Children
- Dysfunctional breathing/vocal cord dysfunction
- Bronchiolitis
- Recurrent (micro)aspiration, reflux, swallowing dysfunction
- Prematurity and related lung disease
- Cystic fibrosis
- Congenital or acquired immune deficiency
- Primary ciliary dyskinesia
- Central airways obstruction/compression
- Foreign body
- Congenital malformations including vascular ring
- Tracheobronchomalacia
- Carcinoid or other tumour
- Mediastinal mass/enlarged lymph node
- Congenital heart disease
- Interstitial lung disease
- Connective tissue disease

Adults
- Dysfunctional breathlessness/vocal cord dysfunction
- Chronic obstructive pulmonary disease
- Hyperventilation with panic attacks
- Bronchiolitis obliterans
- Congestive heart failure
- Adverse drug reaction (*e.g.* angiotensin-converting enzyme inhibitors)
- Bronchiectasis/cystic fibrosis
- Hypersensitivity pneumonitis
- Hypereosinophilic syndromes
- Pulmonary embolus
- Herpetic tracheobronchitis
- Endobronchial lesion/foreign body (*e.g.* amyloid, carcinoid, tracheal stricture)
- Allergic bronchopulmonary aspergillosis
- Acquired tracheobronchomalacia
- Churg–Strauss syndrome

Συν-νοσηρότητες

TABLE 7 Comorbidities and contributory factors

1) Rhinosinusitis/(adults) nasal polyps
2) Psychological factors: personality trait, symptom perception, anxiety, depression
3) Vocal cord dysfunction
4) Obesity
5) Smoking/smoking related disease
6) Obstructive sleep apnoea
7) Hyperventilation syndrome
8) Hormonal influences: premenstrual, menarche, menopause, thyroid disorders
9) Gastro-oesophageal reflux disease (symptomatic)
10) Drugs: aspirin, non-steroidal anti-inflammatory drugs (NSAIDs), β-adrenergic blockers, angiotensin-converting enzyme inhibitors

Suspected alternative or additional diagnoses in adults	Diagnostic test
Intrabronchial obstruction	Bronchoscopy
Vocal cord dysfunction	Laryngoscopy during attack
Dysfunctional breathing/panic attacks	Blood gases during attack
	Hyperventilation provocation test
Recurrent microaspiration	Proximal oesophageal pH measurement
	Bile salts in bronchoalveolar lavage fluid
Cystic fibrosis (CF)	Sweat test
Allergic bronchopulmonary aspergillosis (ABPA)	Aspergillus IgE/precipitins/sputum culture
Emphysema	High resolution CT scan
Hypersensitivity pneumonitis	
Bronchiectasis (including ABPA, CF)	
Recurrent pulmonary embolism	CT pulmonary angiography
Pulmonay arterial hypertension	
Bronchiolitis	Transbronchial or thoracoscopic lung biopsy
Sarcoidosis	
Systemic	
Churg—Strauss syndrome	Biopsy of affected organ(s)
	Antineutrophilic cytoplasmic antibodies

ICS: Η δόση για το σοβαρό άσθμα

TABLE 4 Definition of high daily dose of various inhaled corticosteroids in relation to patient age

Inhaled corticosteroid	Threshold daily dose in μg considered as high	
	Age 6–12 years	Age >12 years
Beclomethasone dipropionate	⩾800 (DPI or CFC MDI) ⩾320 (HFA MDI)	⩾2000 (DPI or CFC MDI) ⩾1000 (HFA MDI)
Budesonide	⩾800 (MDI or DPI)	⩾1600 (MDI or DPI)
Ciclesonide	⩾160 (HFA MDI)	⩾320 (HFA MDI)
Fluticasone propionate	⩾500 (HFA MDI or DPI)	⩾1000 (HFA MDI or DPI)
Mometasone furoate	⩾500 (DPI)	⩾800 (DPI)
Triamcinolone acetonide	⩾1200	⩾2000

Notes: 1) Designation of high doses is provided from manufacturers' recommendations where possible. 2) As chlorofluorocarbon (CFC) preparations are being taken from the market, medication inserts for hydrofluoroalkane (HFA) preparations should be carefully reviewed by the clinician for the equivalent correct dosage. DPI: dry powder inhaler; MDI: metered-dose inhaler.

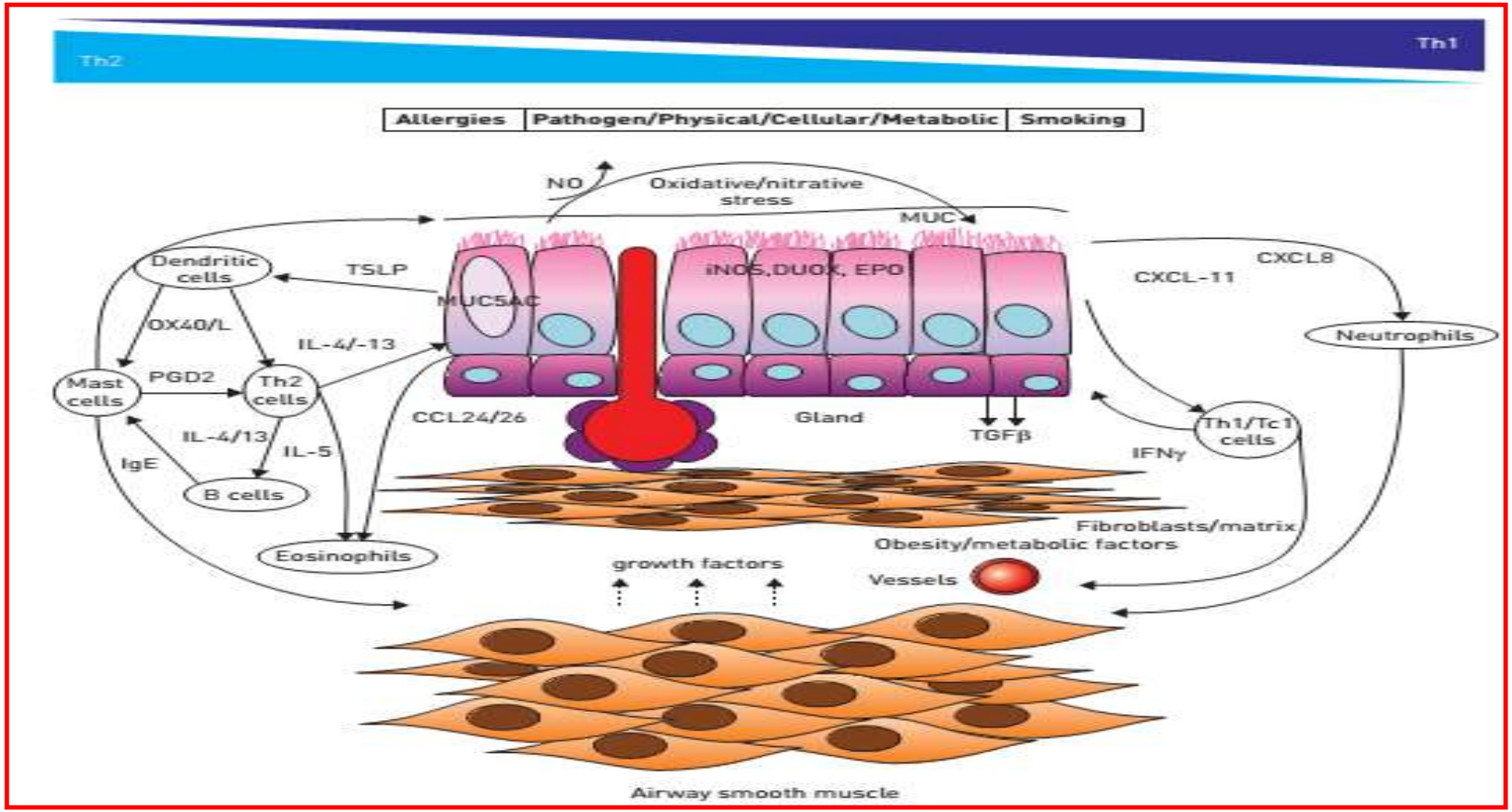
International ERS/ATS guidelines on definition, evaluation and treatment of severe asthma

Η άποψη της GINA

Inhaled corticosteroid	Adults and adolescents			Children 6–11 years		
	Low	Medium	High	Low	Medium	High
Beclometasone dipropionate (CFC)*	200–500	>500–1000	>1000	100–200	>200–400	>400
Beclometasone dipropionate (HFA)	100–200	>200–400	>400	50-100	>100-200	>200
Budesonide (DPI)	200–400	>400–800	>800	100–200	>200–400	>400
Budesonide (nebules)				250–500	>500–1000	>1000
Ciclesonide (HFA)	80–160	>160–320	>320	80	>80-160	>160
Fluticasone furoate (DPI)	100	n.a.	200	n.a.	n.a.	n.a.
Fluticasone propionate(DPI)	100–250	>250–500	>500	100–200	>200–400	>400
Fluticasone propionate (HFA)	100–250	>250–500	>500	100–200	>200–500	>500
Mometasone furoate	110–220	>220–440	>440	110	≥220–<440	≥440
Triamcinolone acetonide	400–1000	>1000–2000	>2000	400–800	>800–1200	>1200

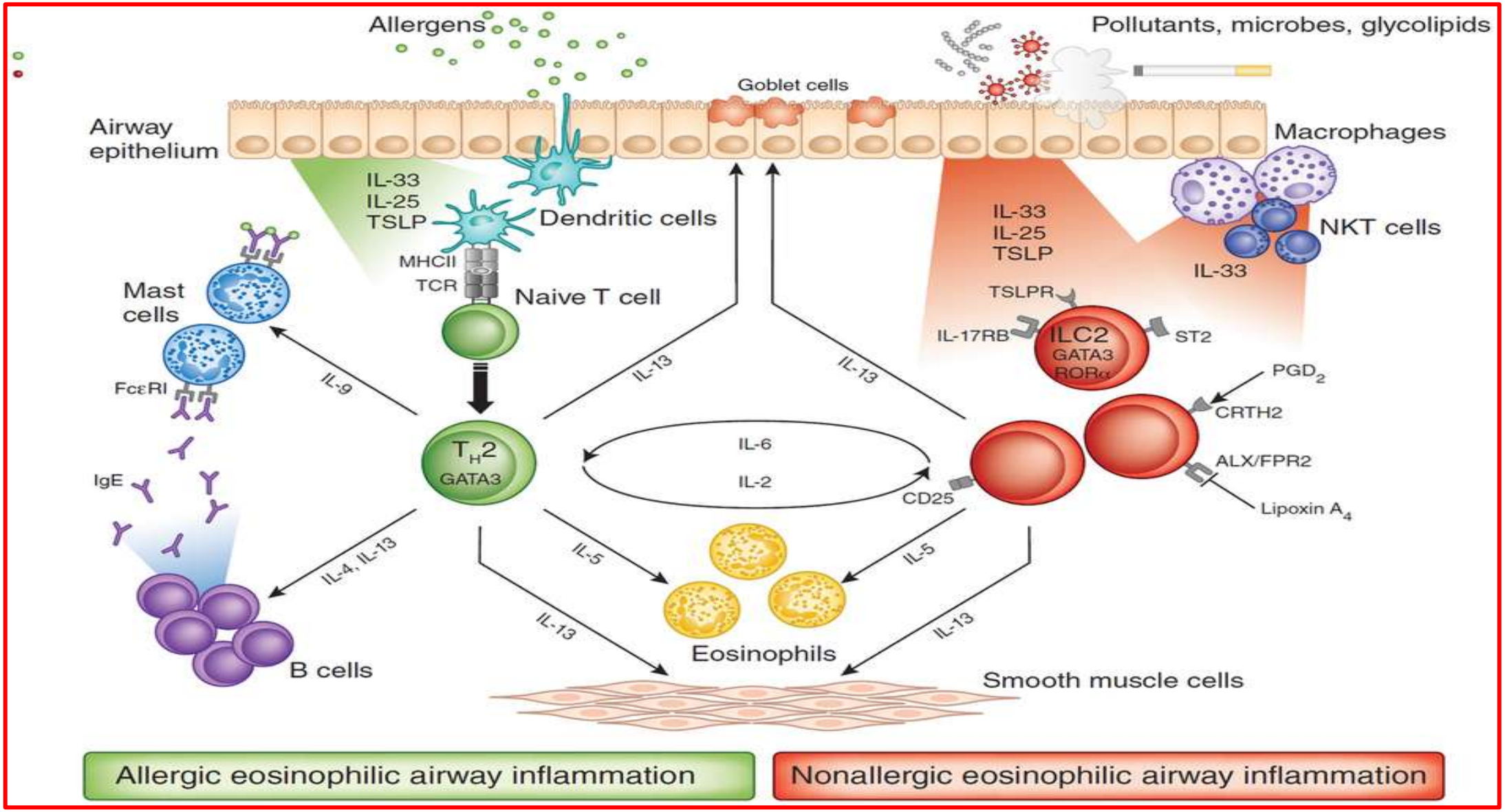
http://ginasthma.org/

Φλεγμονή στο σοβαρό άσθμα



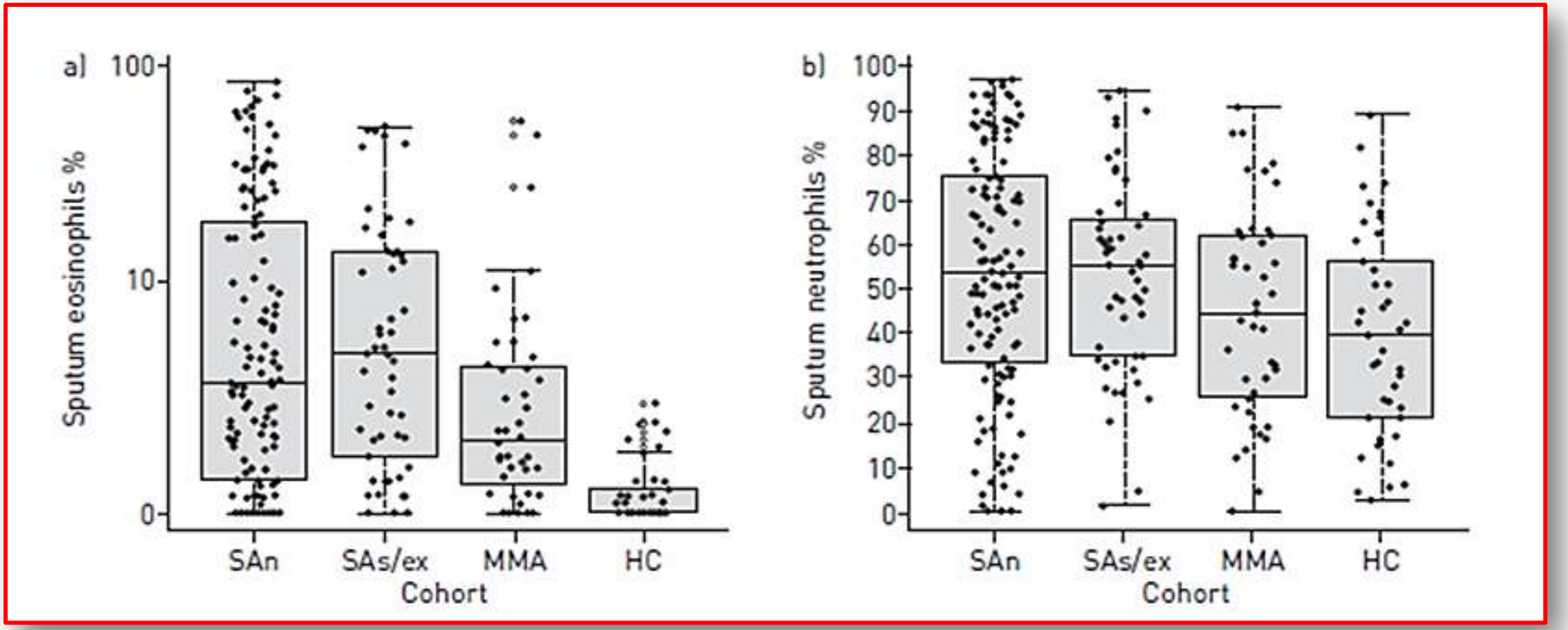
ERS/ATS Guidelines Severe Asthma Eur Respir J. 2014

Υπάρχει και άλλος ηωσινοφιλικός δρόμος στο άσθμα?



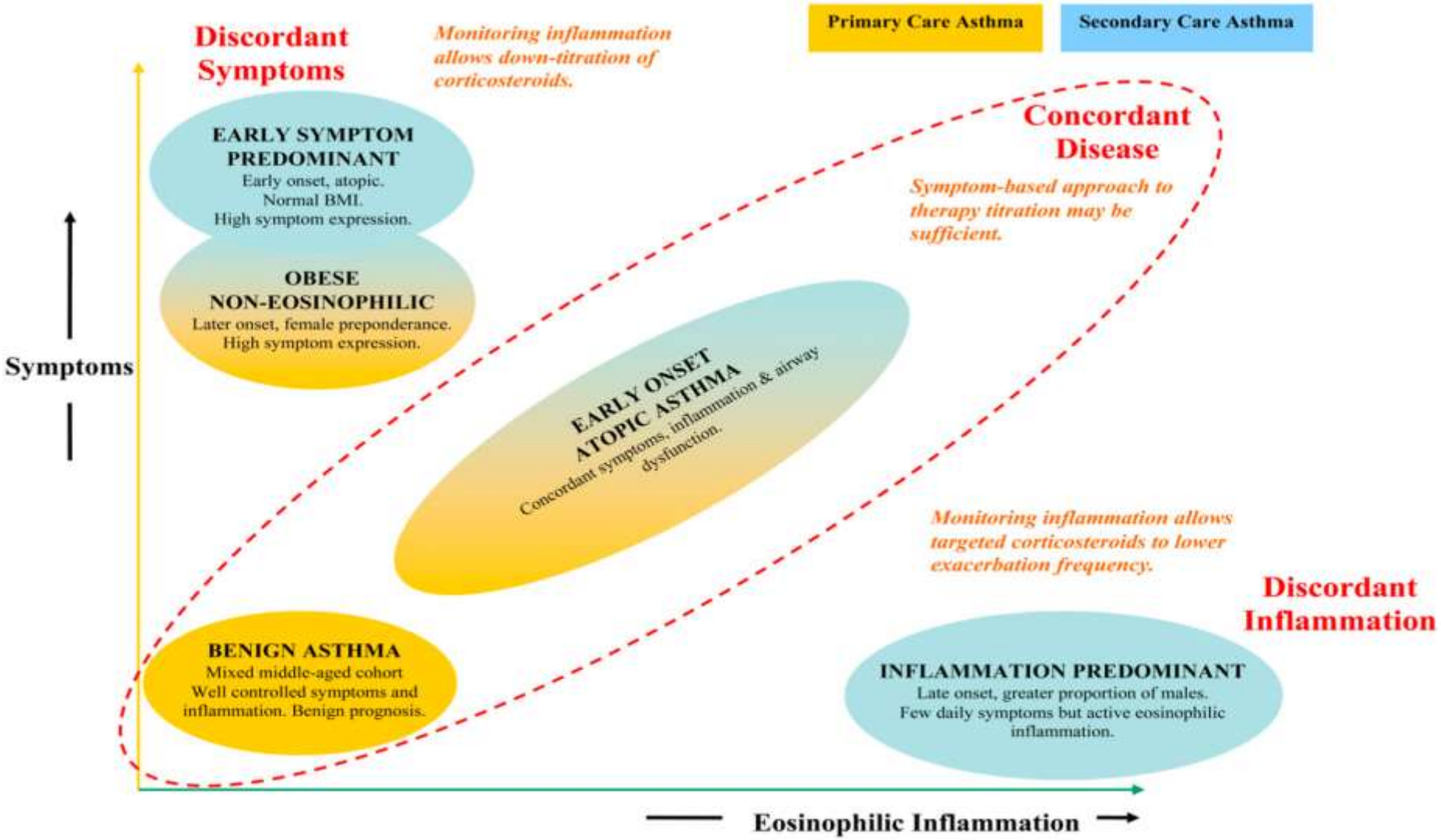
Brusselle G et al Nat Med 2013

Clinical and inflammatory characteristics of the European U-BIOPRED adult severe asthma cohort



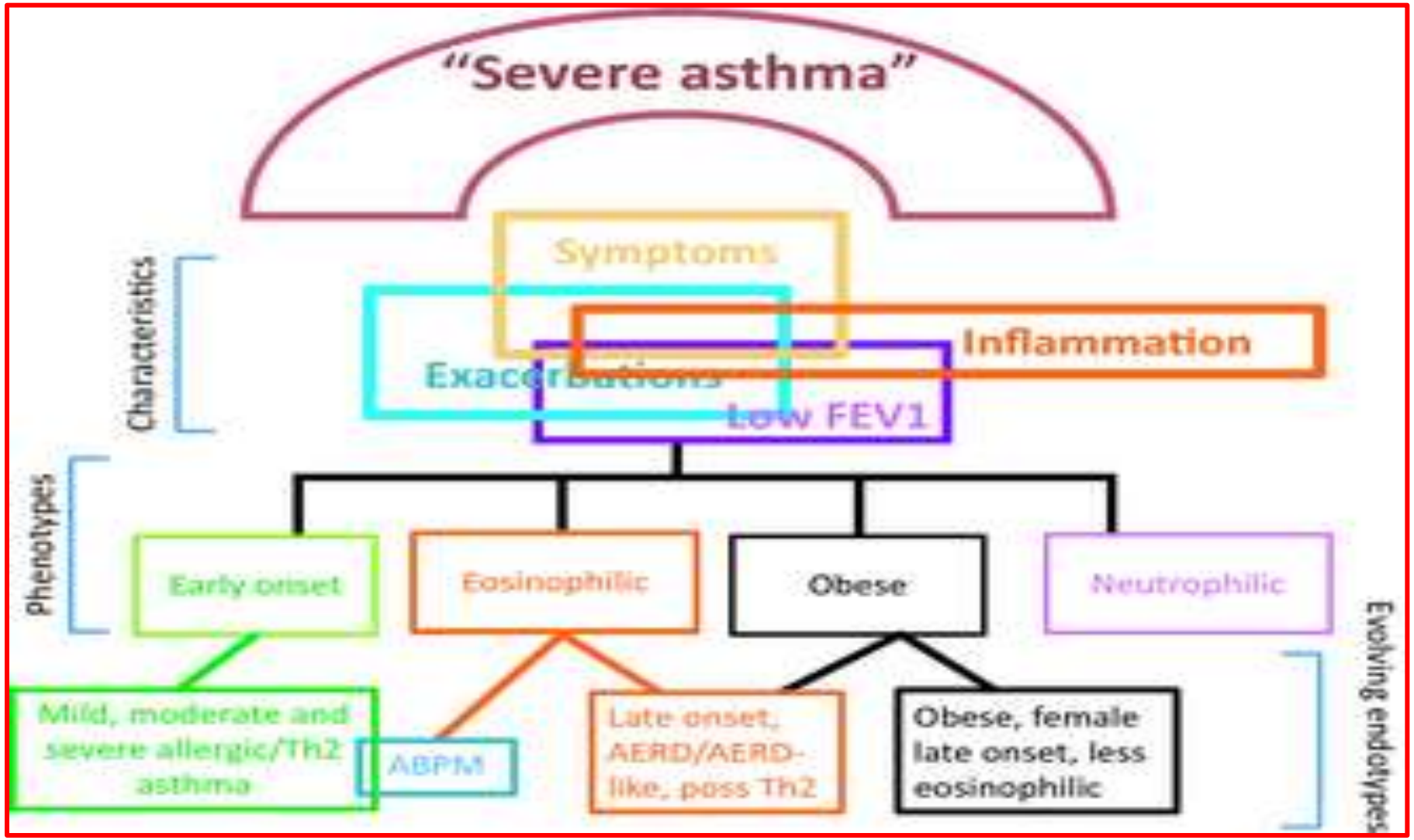
Shaw DE et al, Eur Respir J 2015

Το κλινικό πρόβλημα: Ασυμφωνία συμπτωμάτων & φλεγμονής στο SRA.



Haldar P, AJRCCM 2008

Η πολυπλοκότητα των φαινοτύπων



Clinical & Experimental Allergy Wenzel S
pages n/a-n/a, 18 JAN 2012 DOI: 10.1111/j.1365-2222.2011.03929.x
http://onlinelibrary.wiley.com/doi/10.1111/j.1365-2222.2011.03929.x/full#cea3929-fig-0001

Η μόνιμη απόφραξη των αεραγωγών

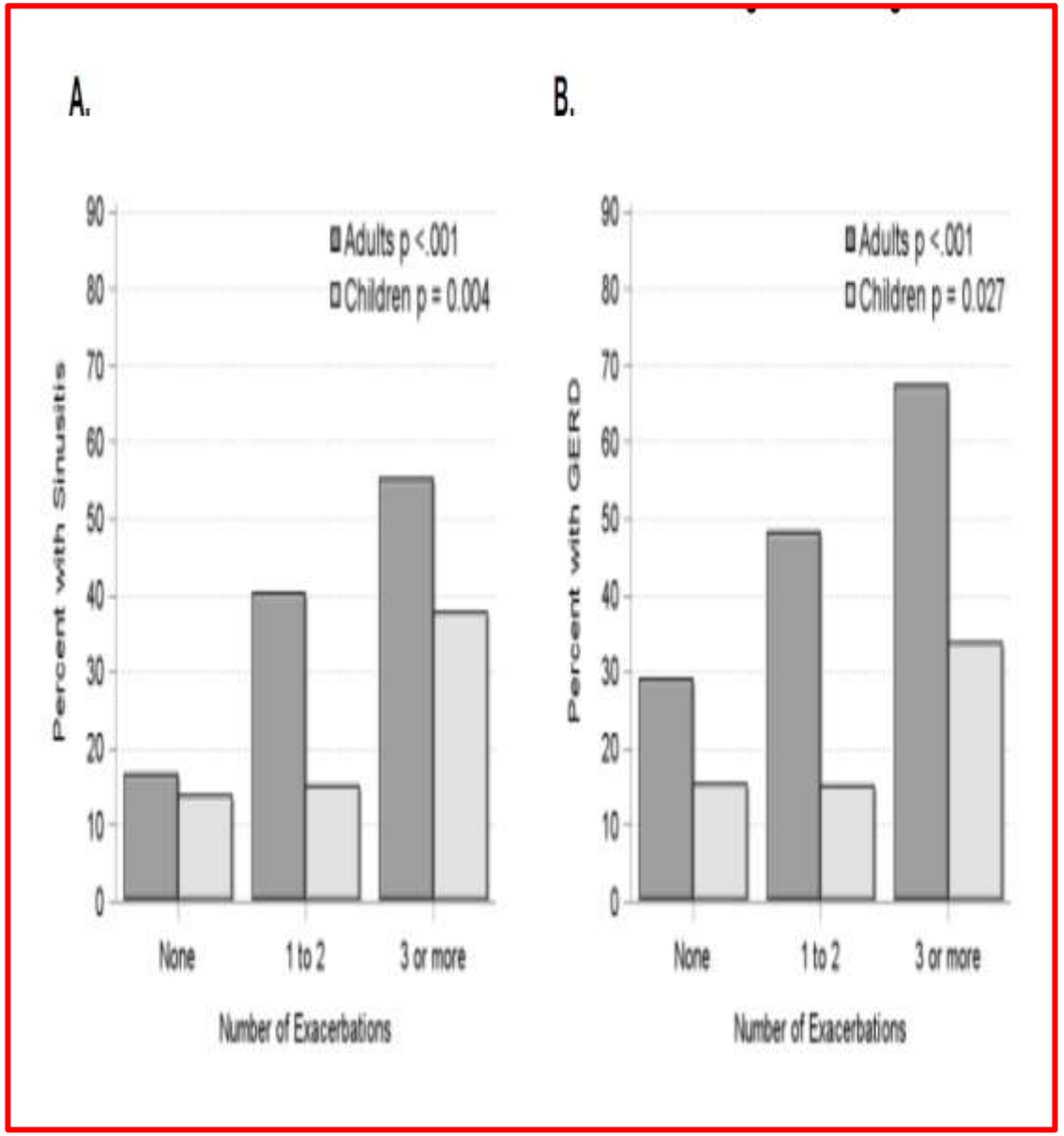
Table 2

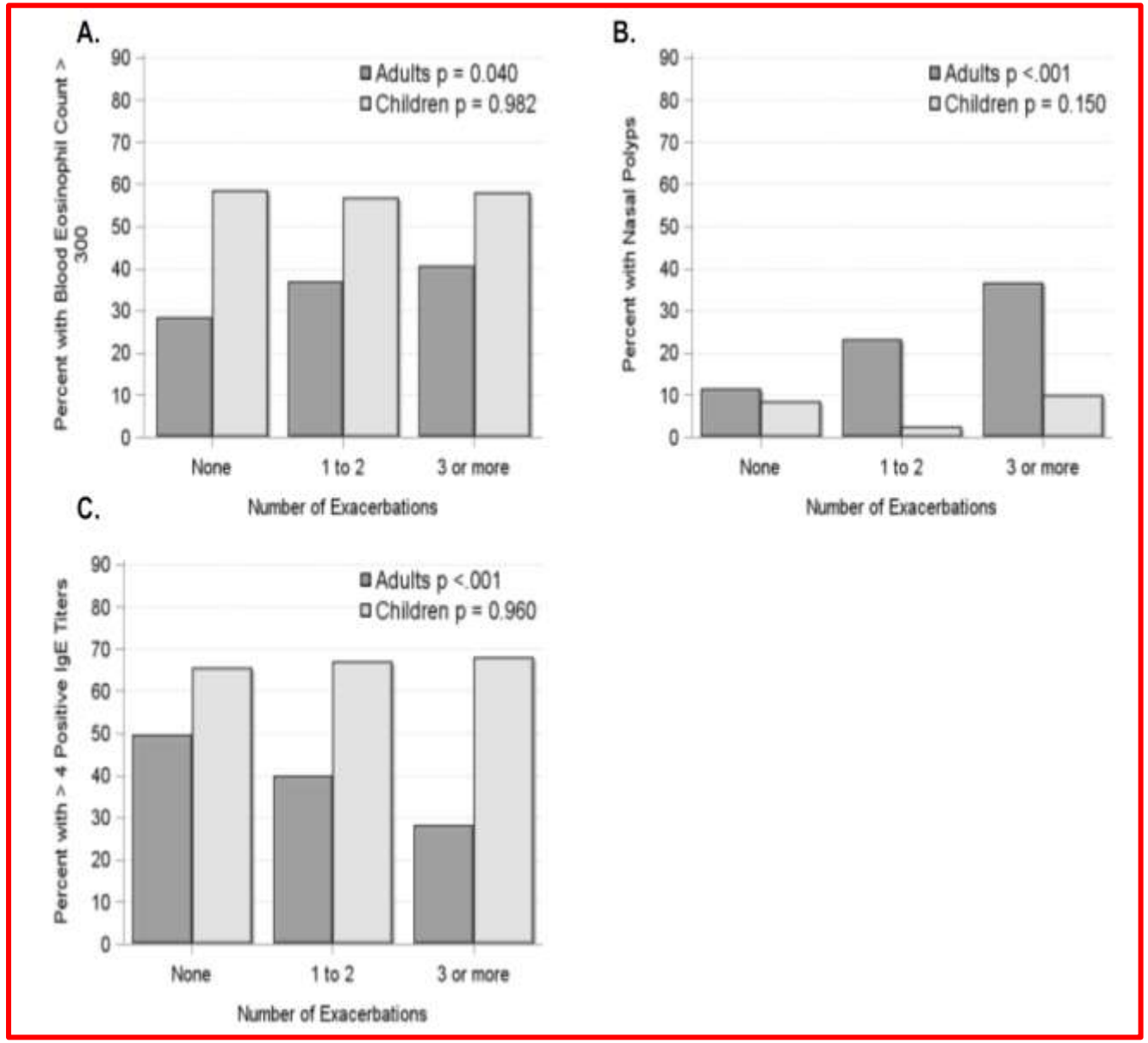
Characteristics of the three clusters of asthmatic patients and their relation to the presence of persistent airflow obstruction.

Cluster	Cluster 1	Cluster 2	Cluster 3
Size (%)	56 (32.9%)	53 (31.2%)	61 (35.9%)
Features	Low dose ICS (100%)	High dose ICS (100%)	Low dose ICS (100%)
	No criteria for SRA (100%)	Criteria for SRA (90.6%)	No criteria for SRA (100%)
	No atopy (100%)	Atopy (54.7%)	Atopy (100%)
	No oral CS (100%)	Oral CS (64.2%)	No oral CS (100%)
	No persistent airflow obstruction (85.7%)	Persistent airflow obstruction (83%)	No persistent airflow obstruction (86.9%)

Konstantellou E et al Resp Med 2015

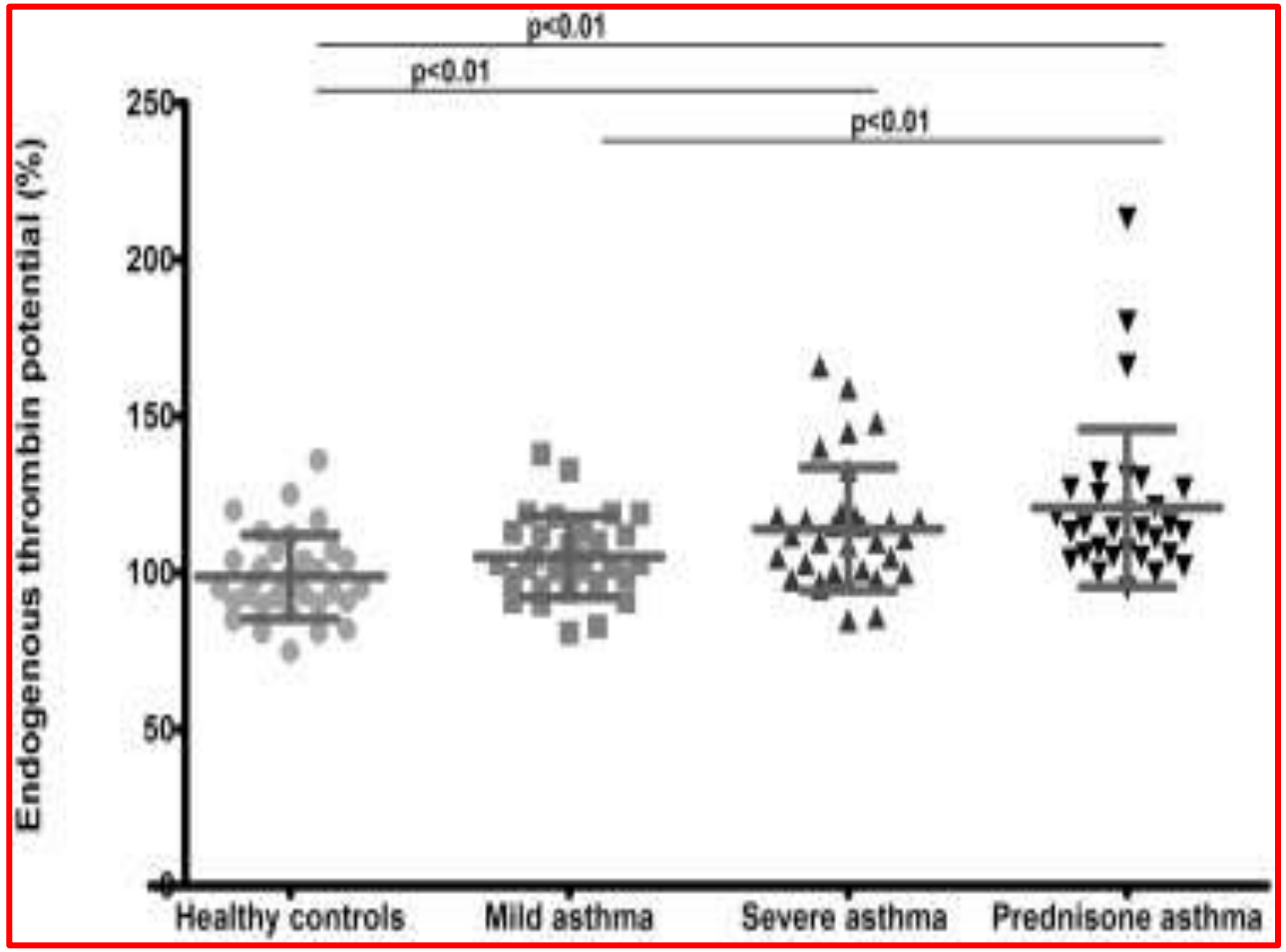
Ο συχνός παροξυντής: Από το παιδί στον ενήλικα

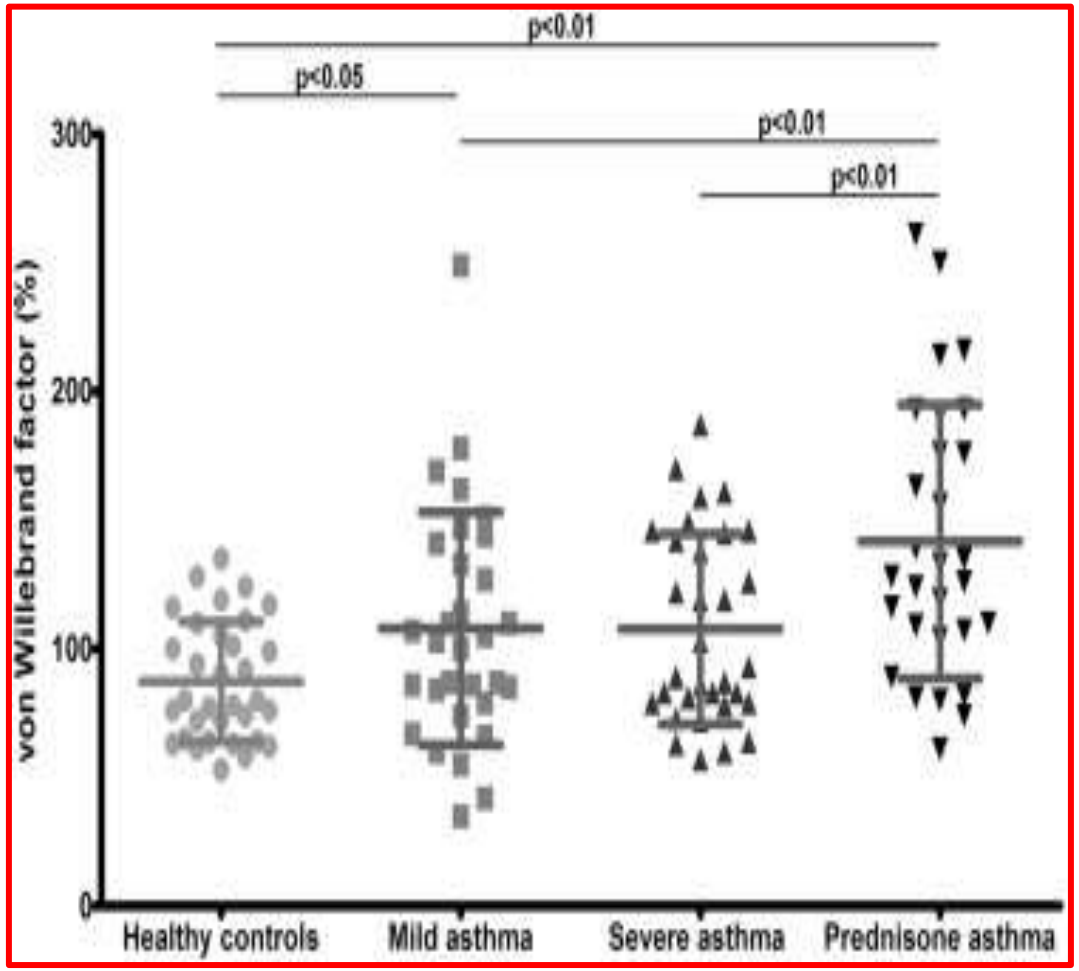




Delinger L et al AJRCCM 2016

Προθρομβωτικό status στο σοβαρό άσθμα: Ένας ενδιαφέρον ενδότυπος?





Marlous M.S. Sneeboer, et al Journal of Allergy and Clinical Immunology, 2016

ERS/ATS Severe Asthma Guidelines: Biomarkers to guide therapy

Question 3

Should treatment guided by FeNO in addition to clinical criteria, rather than treatment guided by clinical criteria alone, be used in patients with severe asthma?

Recommendation 3

We suggest that clinicians do *not* use FeNO to guide therapy in adults or children with severe asthma (conditional recommendation, very low quality evidence)

This recommendation places a higher value on avoiding additional resource expenditure and a lower value on uncertain benefit from monitoring FeNO

Question 2

Should **treatment guided by sputum eosinophil count**, rather than treatment guided by clinical criteria alone, be used in patients with severe asthma?

Recommendation 2

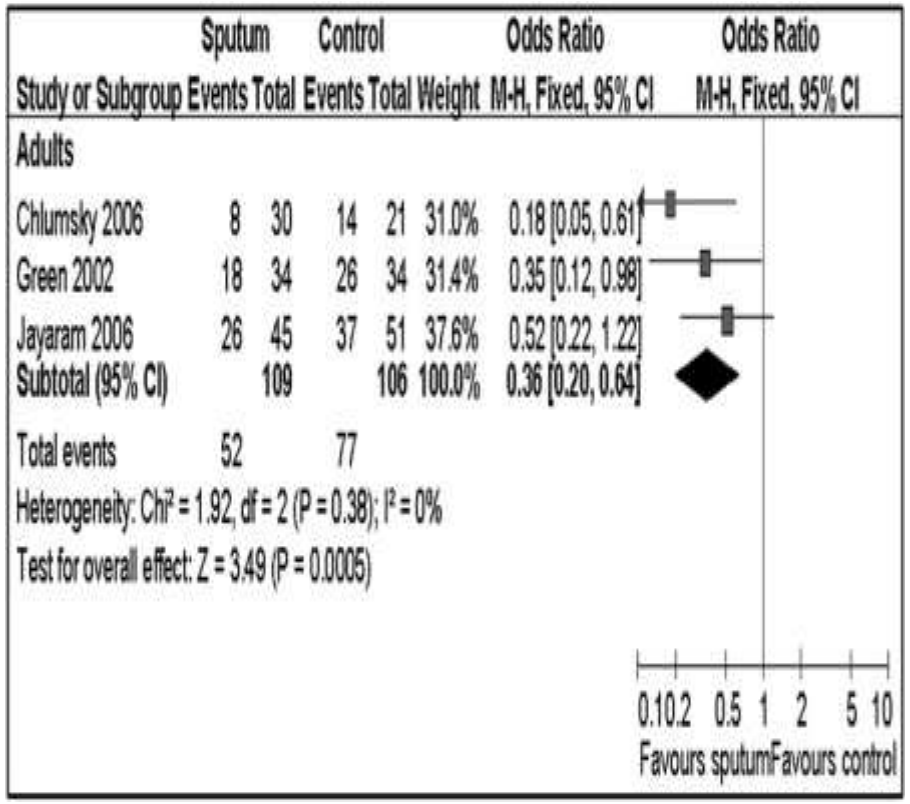
In adults with severe asthma, we suggest treatment guided by clinical criteria and sputum eosinophil counts **performed in centers experienced in using this technique** rather than by clinical criteria alone (**conditional recommendation**, **very low quality evidence**)

Patients likely to benefit: those who can produce sputum, **persistent or at least intermittent eosinophilia** and have severe asthma with **frequent exacerbations**

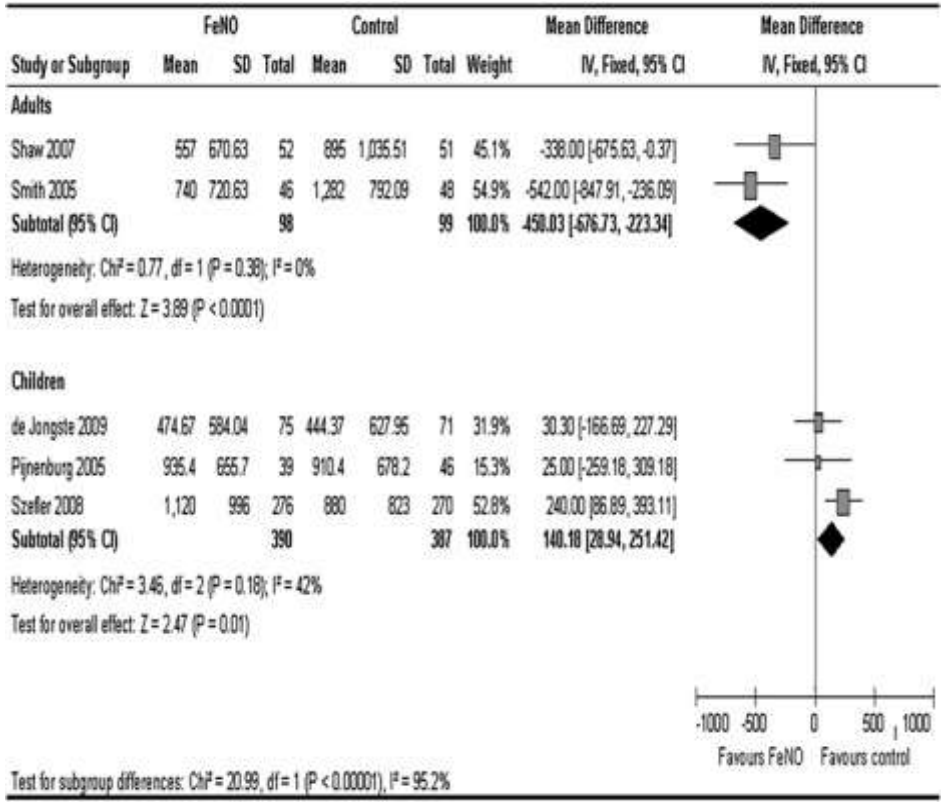
Chung KF, ERJ 2014 (ERS/ATS Guidelines)

Ηωσινόφιλα πτυέλων ή FeNO στη θεραπευτική διαχείριση?

Sputum eosinophils



FeNO



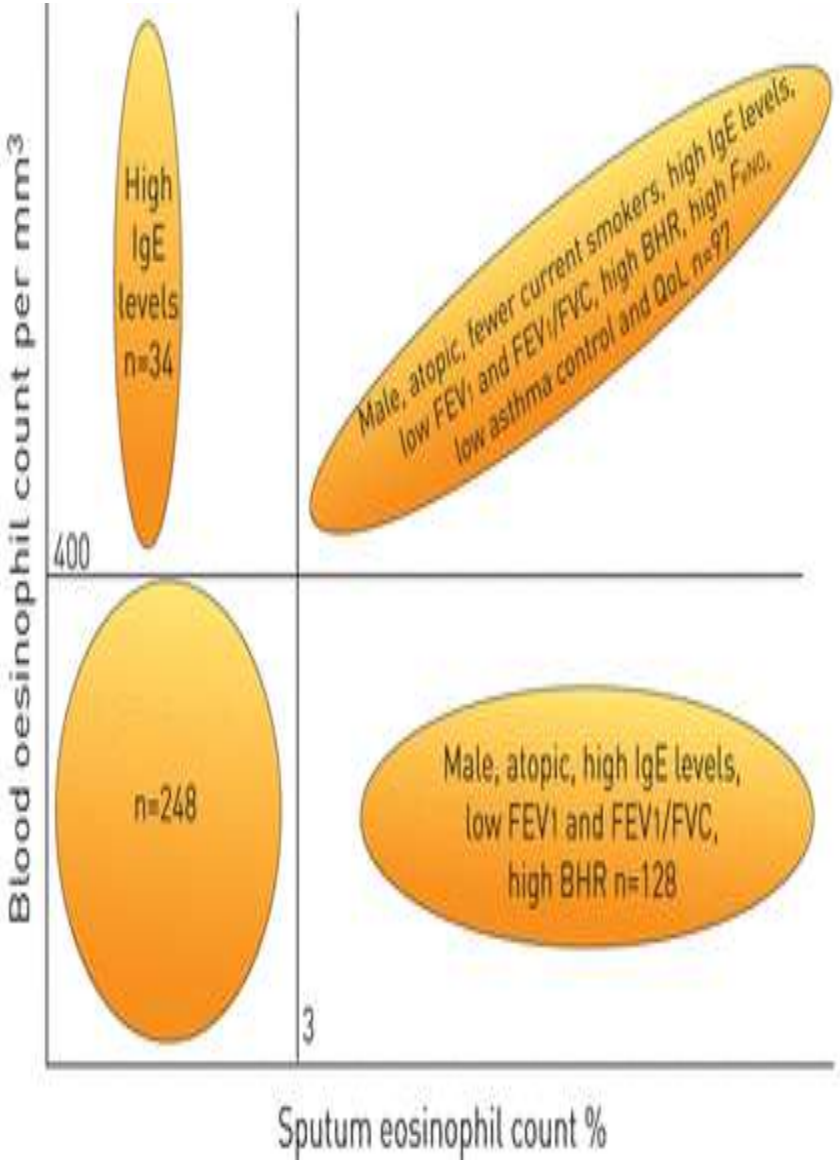
Reduction in exacerbations

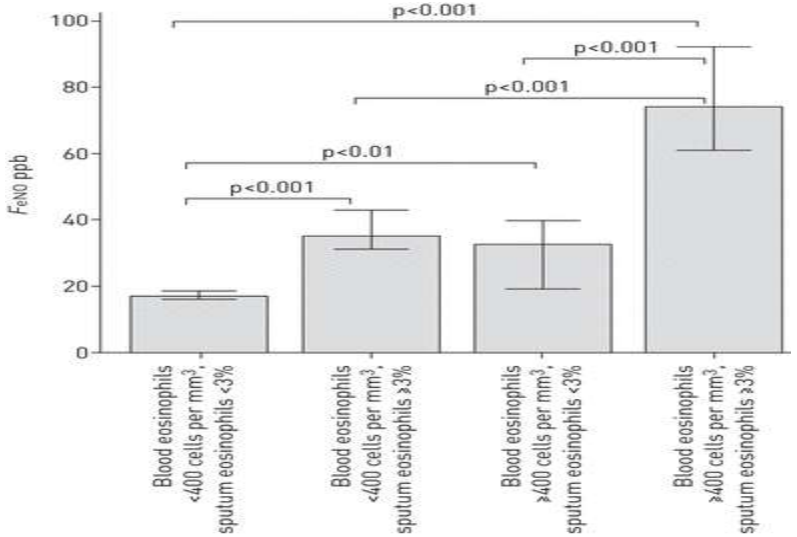
Reduction in ICS dose in adults

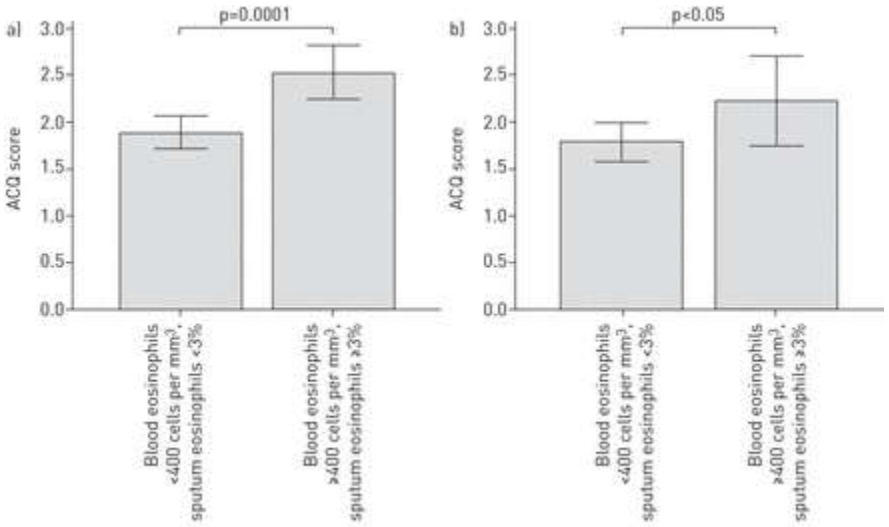
CI = confidence interval;
FeNO = fractional exhaled nitric oxide.

Petsky HL, Thorax 2012

Ηωσινοφιλία στο σοβαρό άσθμα: Αεραγωγοί & περιφέρεια







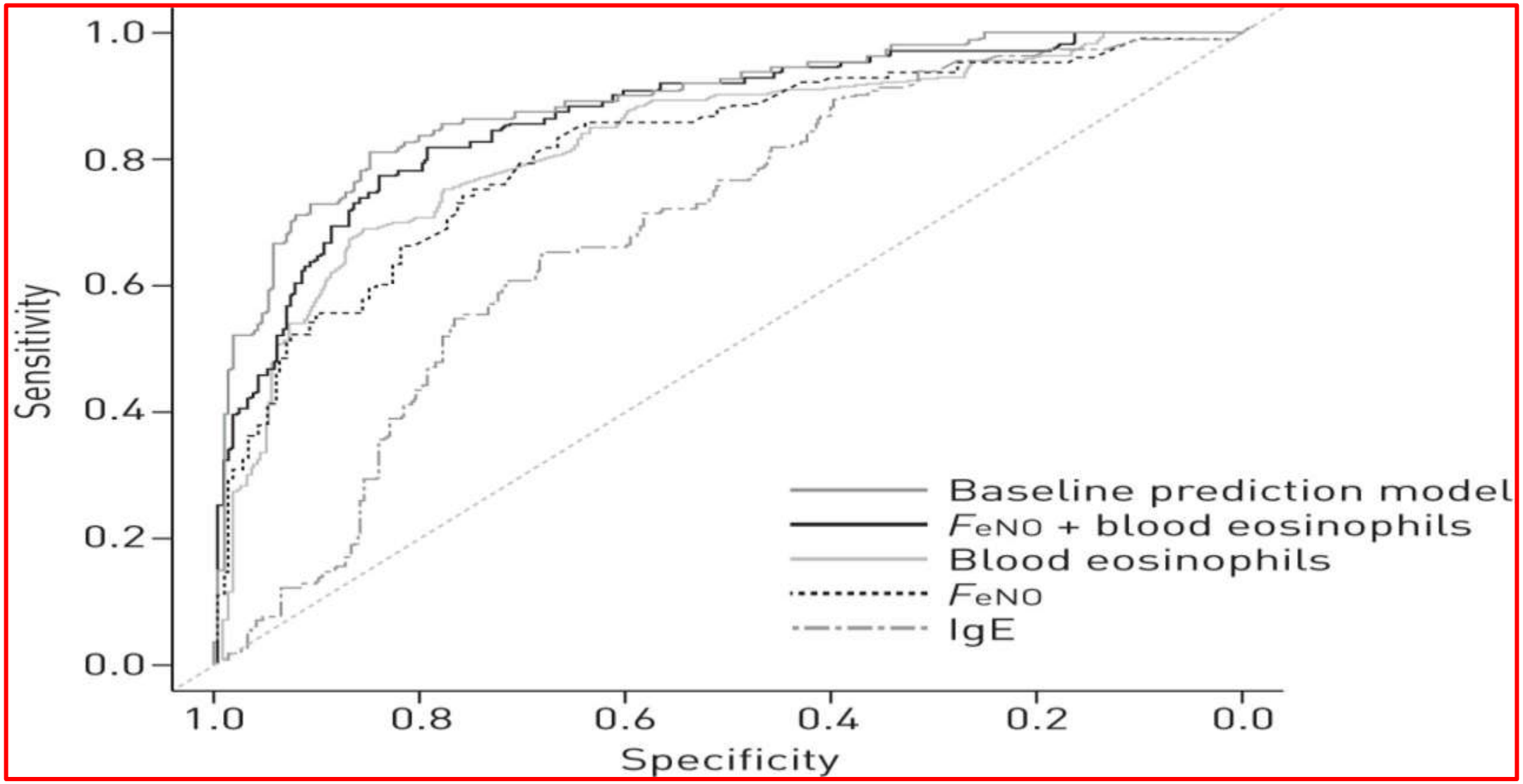
EDITORIAL ASTHMA

Airway and systemic eosinophilia in asthma: does site matter?

Konstantinos Kostikas, Eleftherios Zervas and Mina Gaga

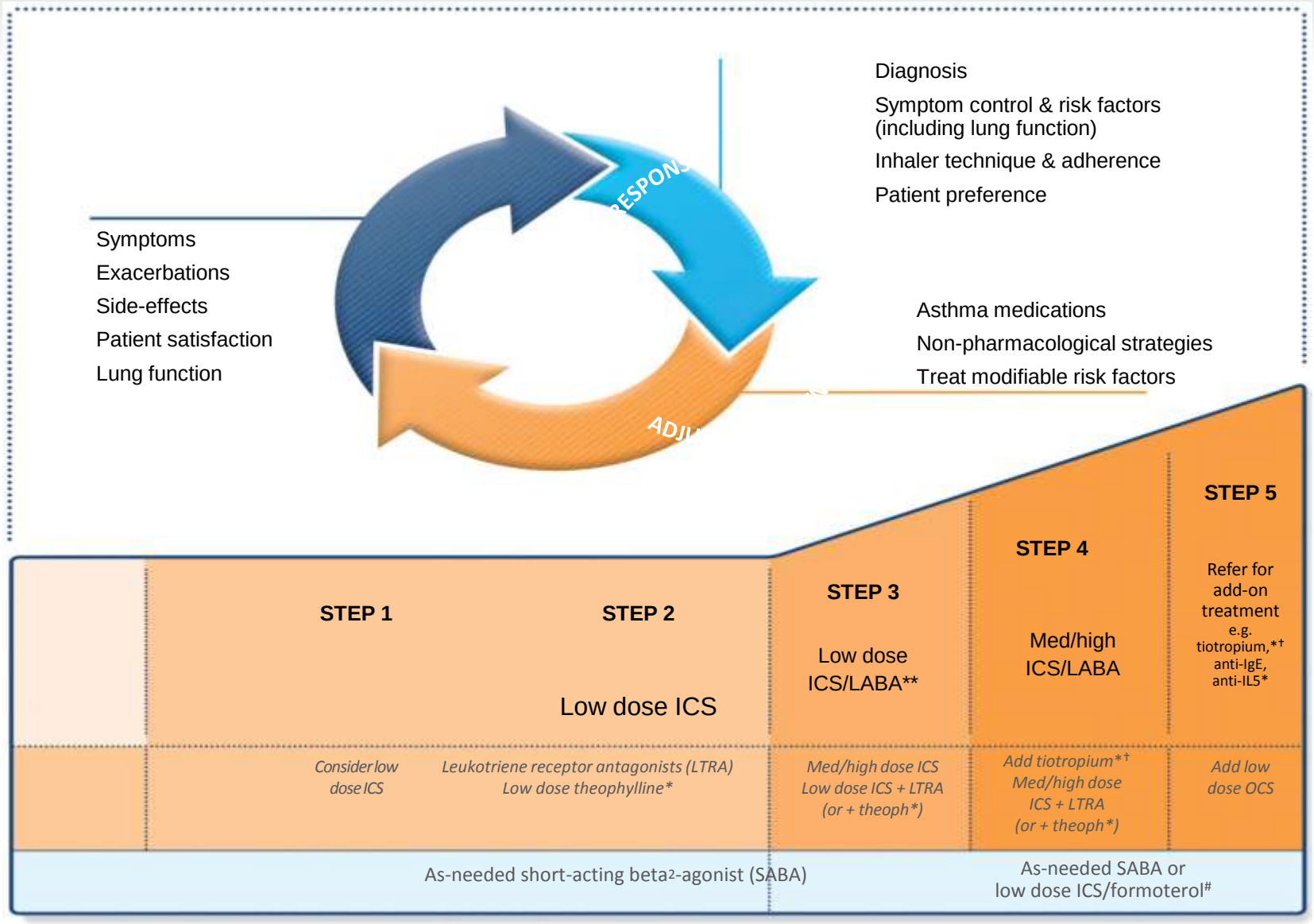
Schleich FN, ERJ 2014; Kostikas K, ERJ 2014

Γενική αίματος: Εξέταση ρουτίνας?



Guus A. Westerhof et al. Eur Respir J 2015;46:688-696

2018 Φαινοτυπική και θεραπευτική προσέγγιση



*Not for children <12 years

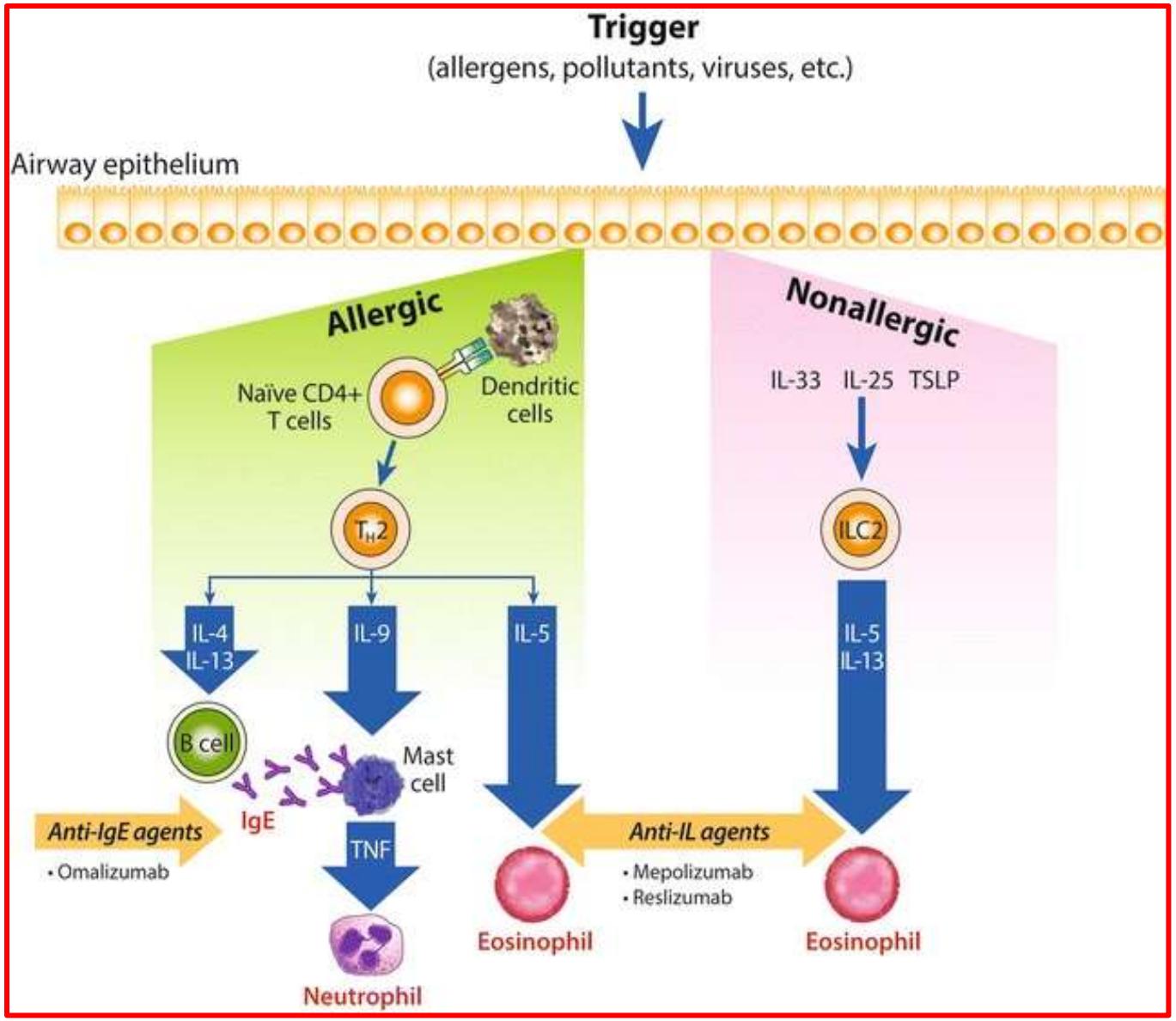
**For children 6-11 years, the preferred Step 3 treatment is medium dose ICS

#For patients prescribed BDP/formoterol or BUD/formoterol maintenance and reliever therapy

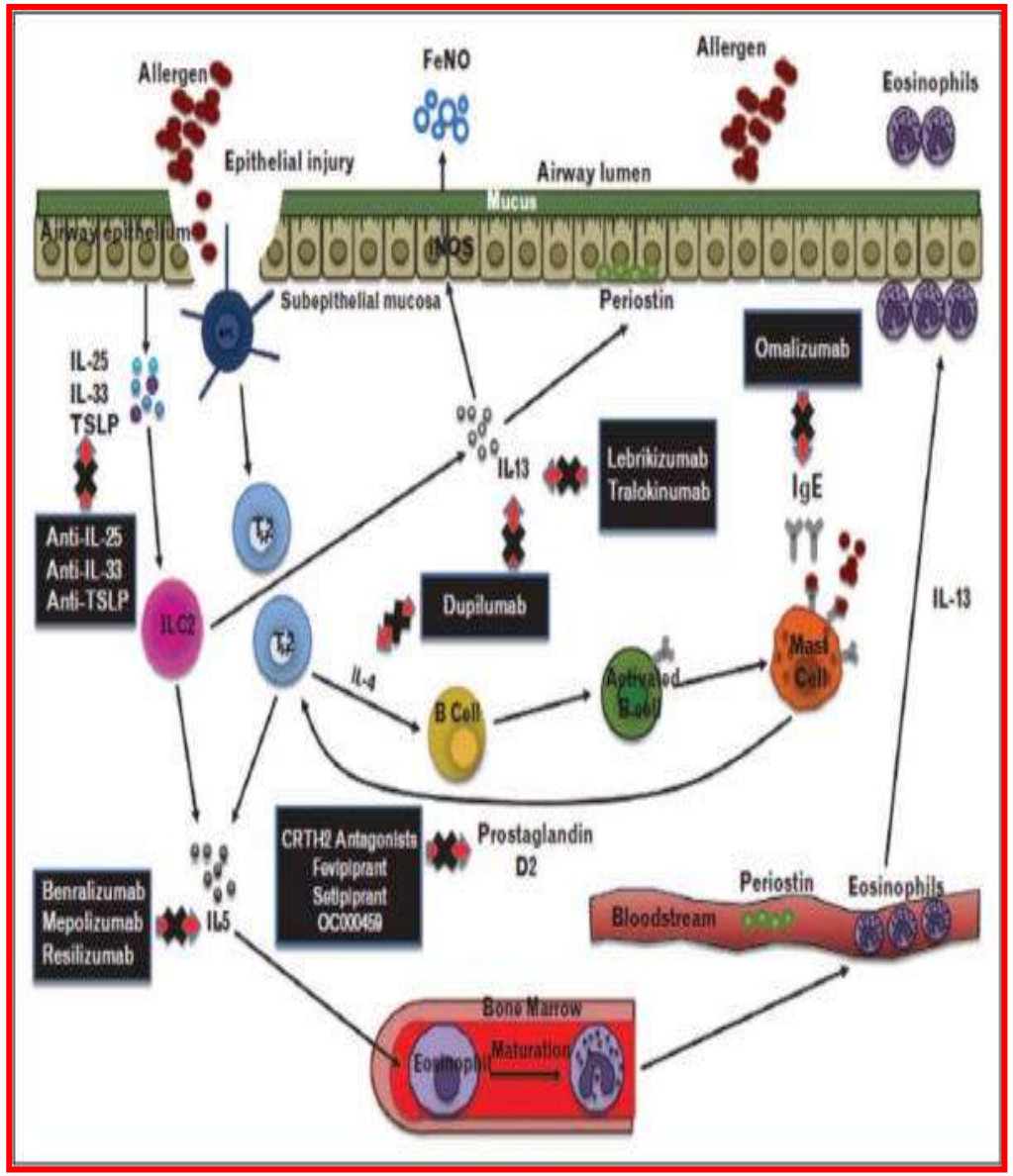
† Tiotropium by mist inhaler is an add-on treatment for patients ≥12 years with a history of exacerbations

© Global Initiative for Asthma www.ginasthma.org

Ενδότυποι

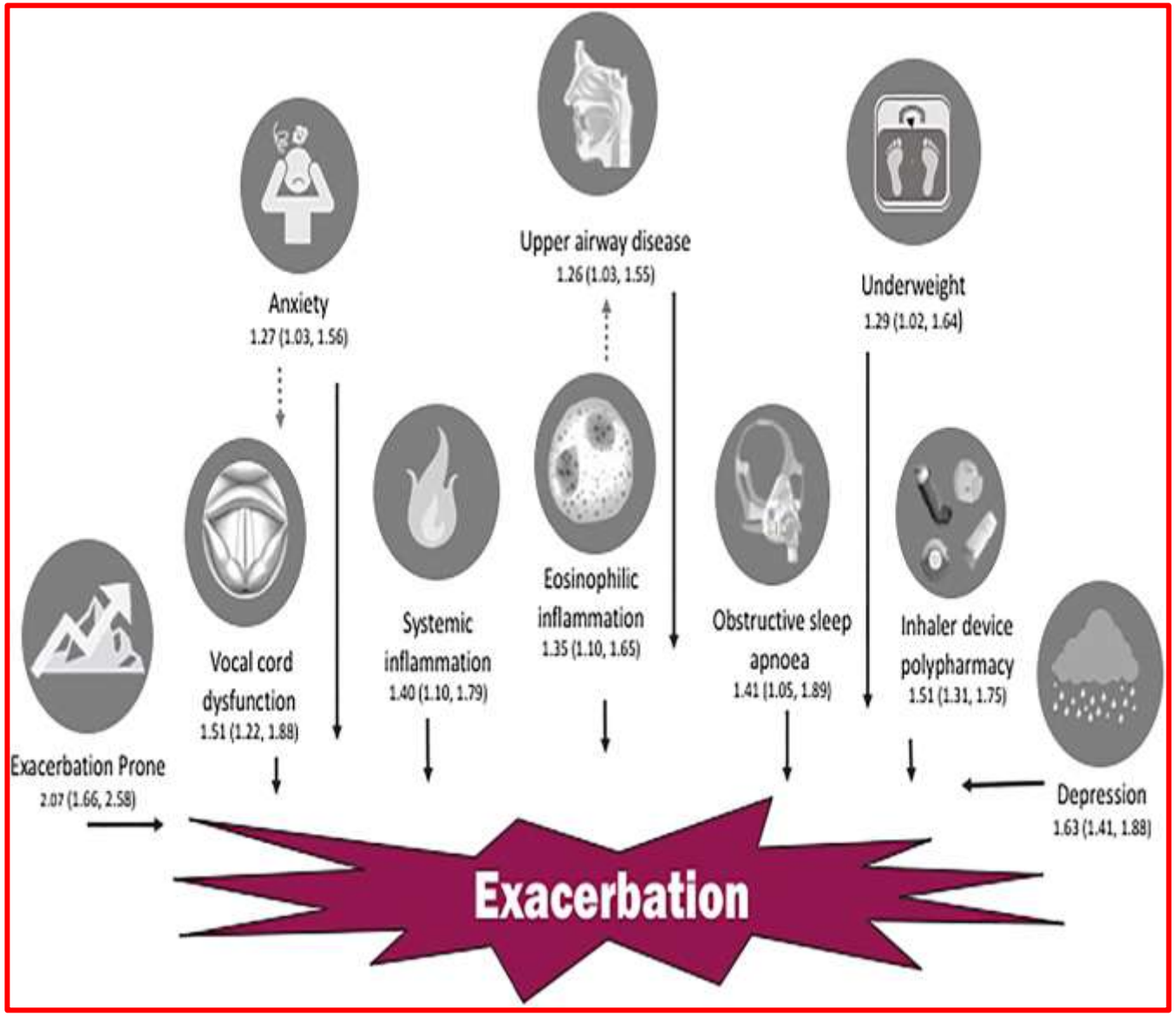


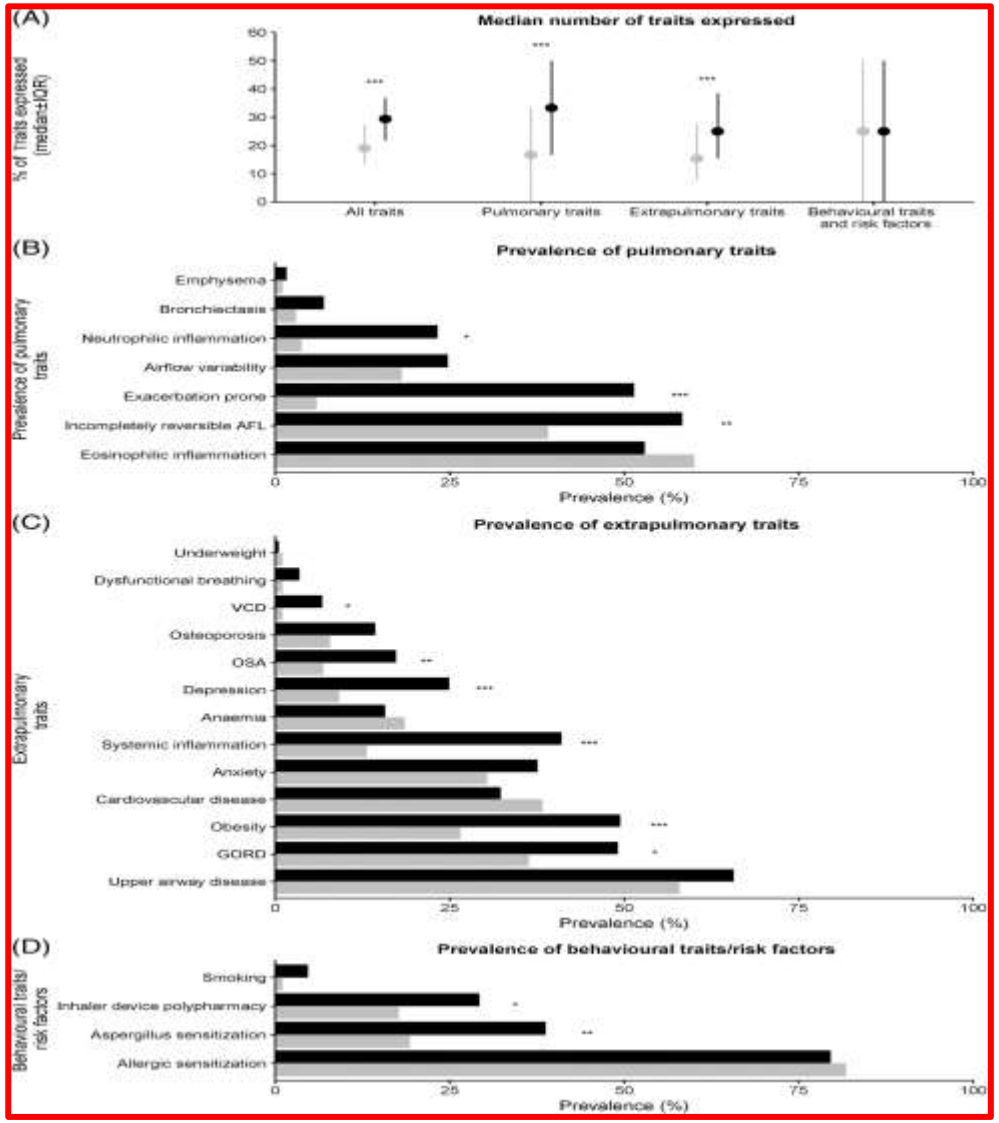
Kim H et al Allergy Asthma Clin Immunol 2017



Humbert M et al Cur Opinion Pulm Med 2018

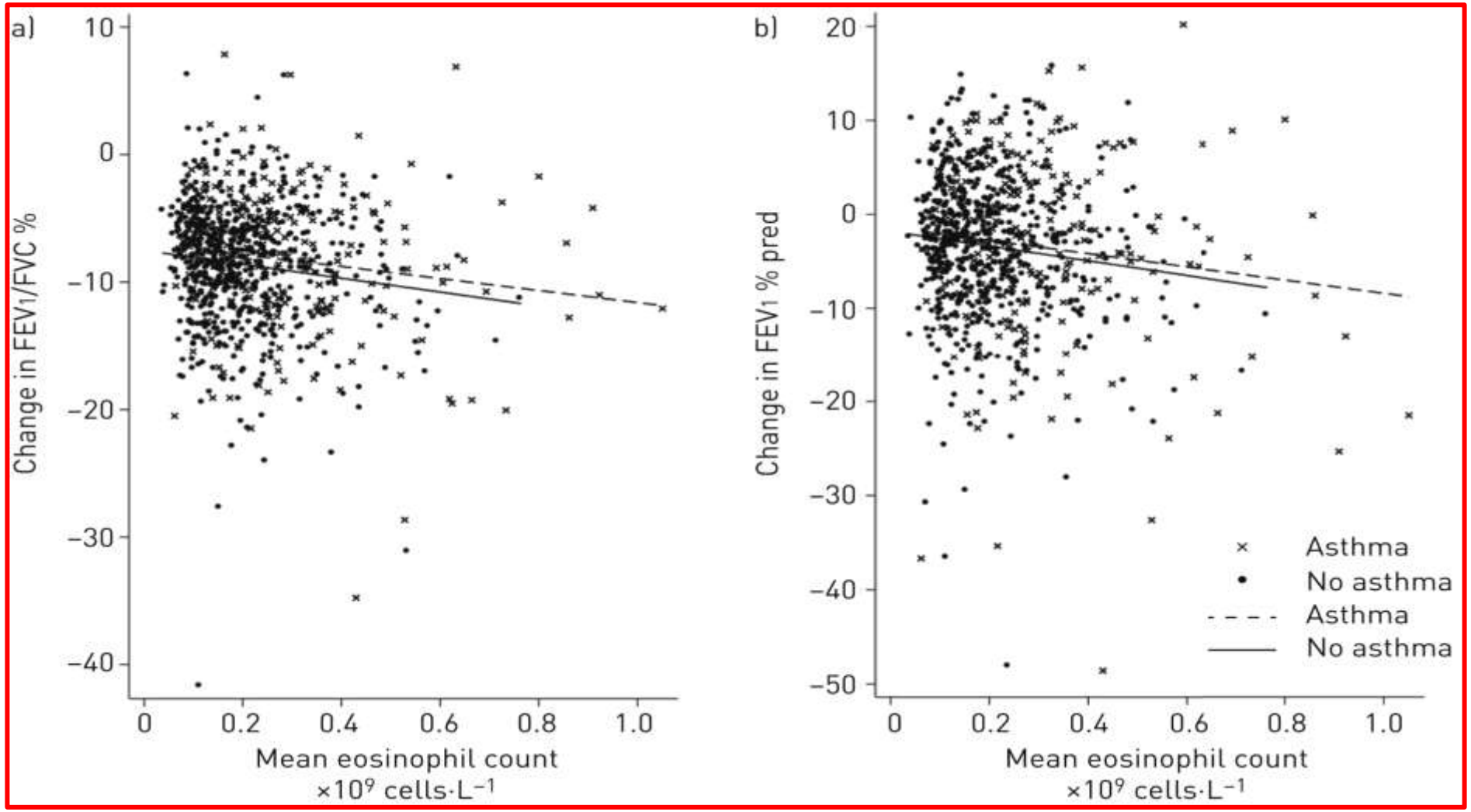
Θεραπεύσιμα χαρακτηριστικά





Gibson P et al Respirology 2018

Απώλεια LF & ηωσινόφιλα



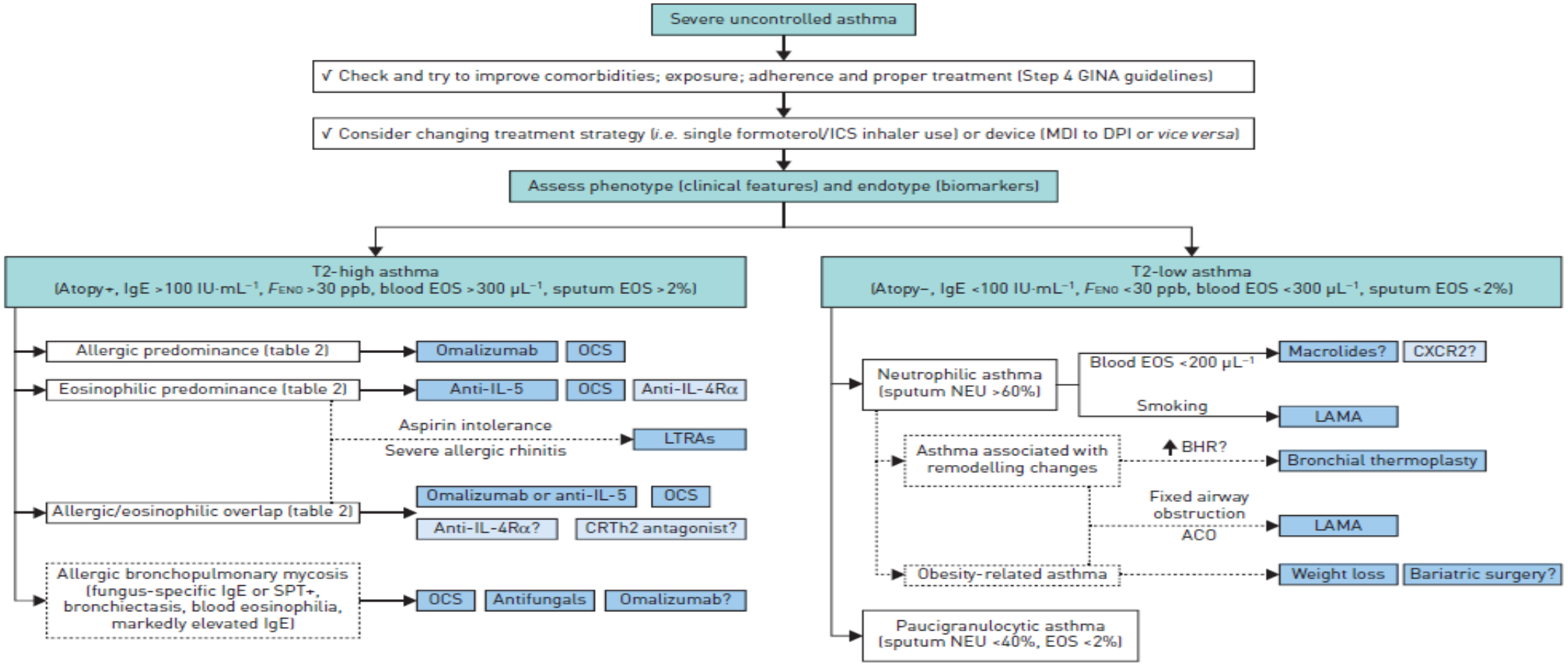
Robert J. Hancox et al. Eur Respir J 2018;51:1702536

Βασικές διαφορές?

ERJ open research

An algorithmic approach for the treatment of severe uncontrolled asthma

Eleftherios Zervas[1], Konstantinos Samitas[1], Andriana I. Papaioannou[2], Petros Bakakos[3], Stelios Loukides[2] and Mina Gaga[1]



ERJ open research

An algorithmic approach for the treatment of severe uncontrolled asthma

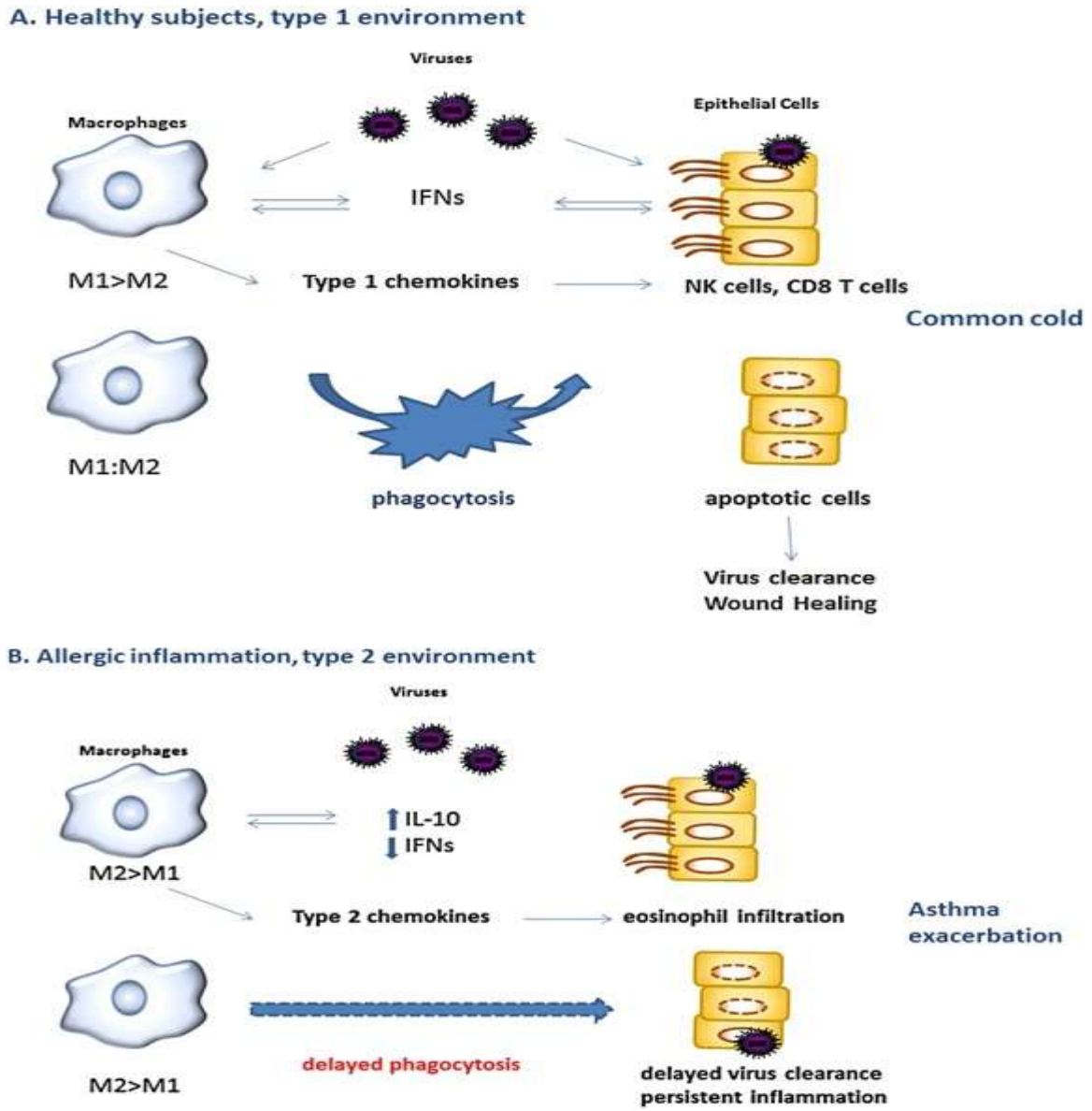
Eleftherios Zervas[1], Konstantinos Samitas[1], Andriana I. Papaioannou[2], Petros Bakakos[3], Stelios Loukides[2] and Mina Gaga[1]

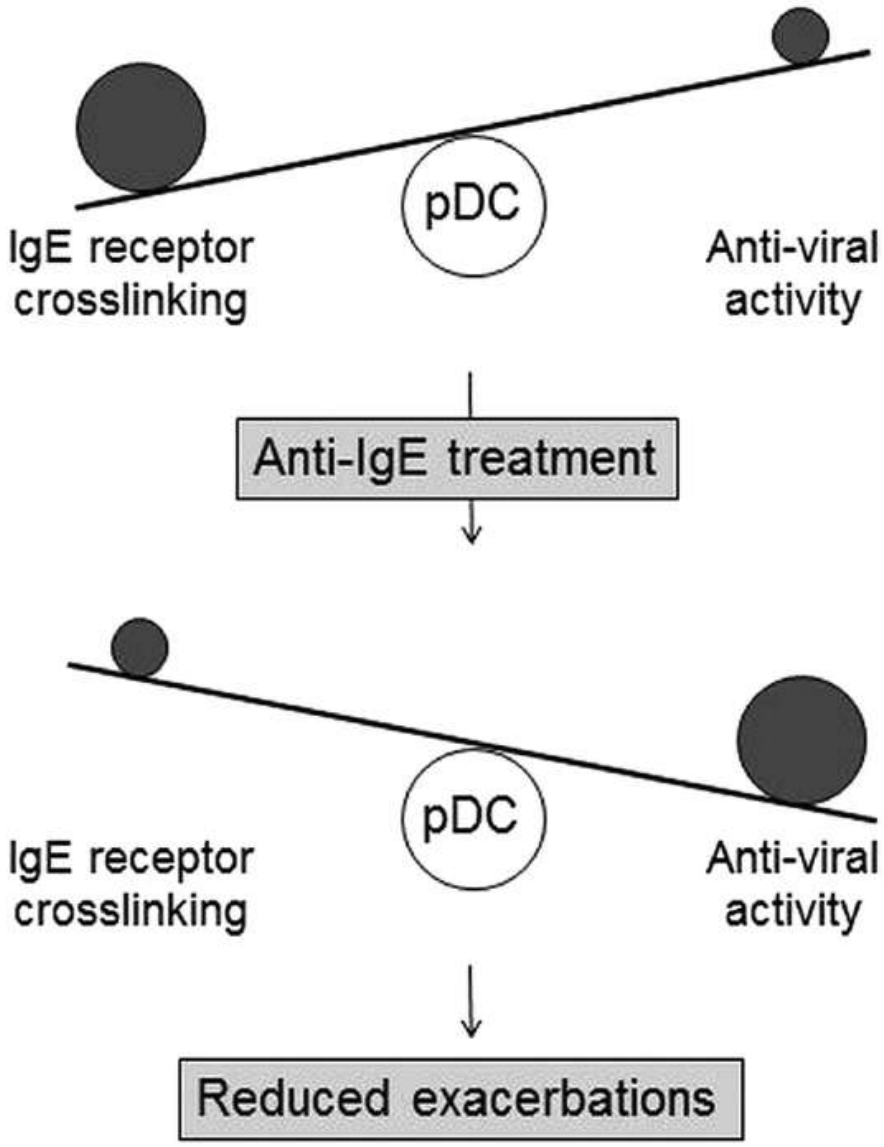
TABLE 2 Clinical features and biomarkers that can be used to differentiate between allergic and eosinophilic T2-high severe asthma

	A: allergic-predominant asthma	B: eosinophilic-predominant asthma
1	Early onset	Late onset
2	SPT/RAST+ with clinically significant allergies#	SPT/RAST– or + with no clinically significant allergies
3	IgE >100 IU·mL^{-1}	IgE <100 IU·mL^{-1}
4	Allergic rhinitis	Nasal polyps
5	High *F*ENO (30–50 ppb)	Very high *F*ENO (>50 ppb)
6	Blood eosinophils <300 cells·µL^{-1}	Blood eosinophils >300 cells·µL^{-1}#

SPT: skin prick test; RAST: radioallergosorbent test; *F*ENO: exhaled nitric oxide fraction. Check the number of relevant patient characteristics per column. If a patient has more features from column A or B it is more likely that he/she has allergic- or eosinophilic-predominant asthma, respectively. If the patient shares features from both columns, it is more likely that he/she suffers from eosinophilic/allergic overlap asthma. #: obligatory characteristics for allergic and/or eosinophilic asthma.

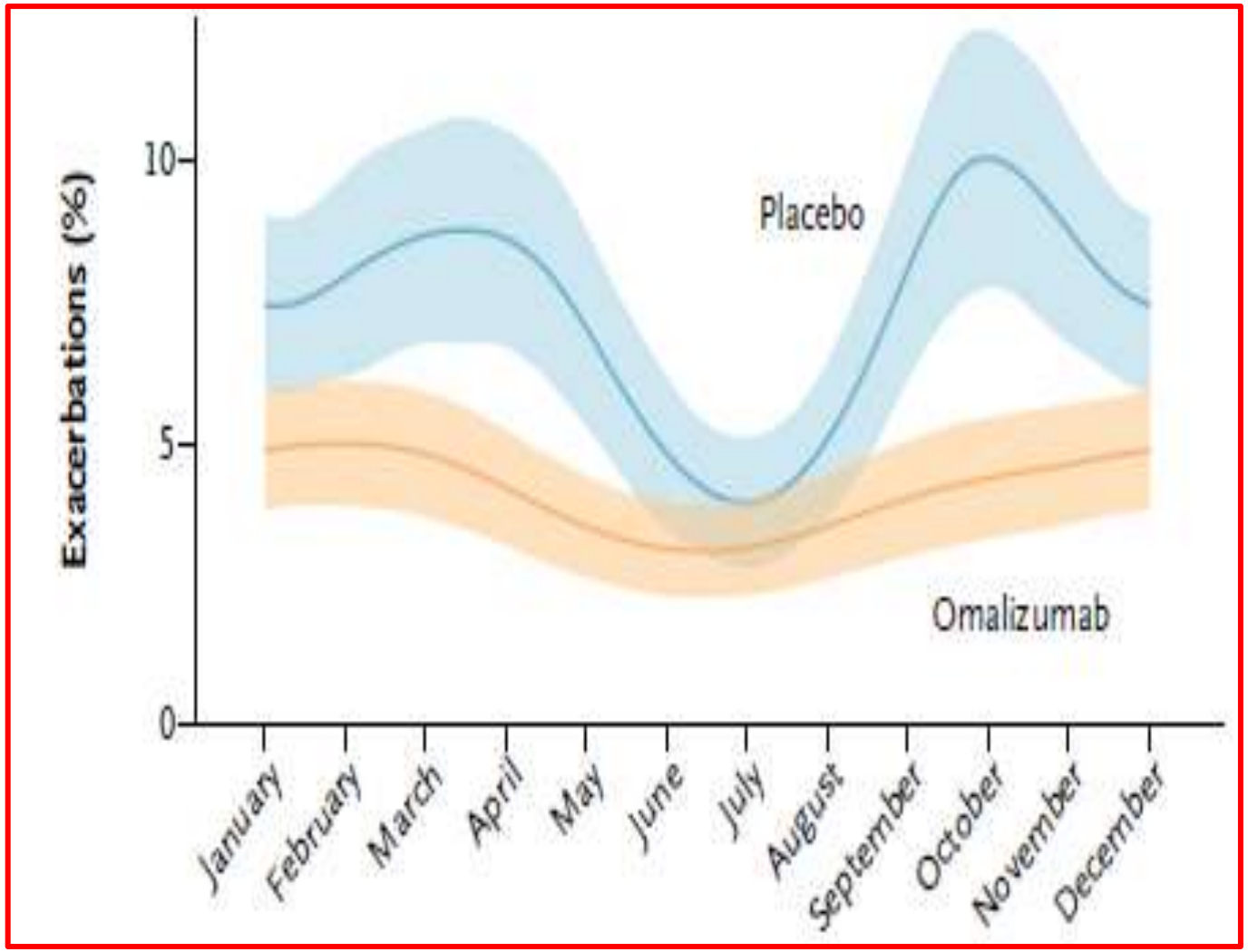
Υπόθεση

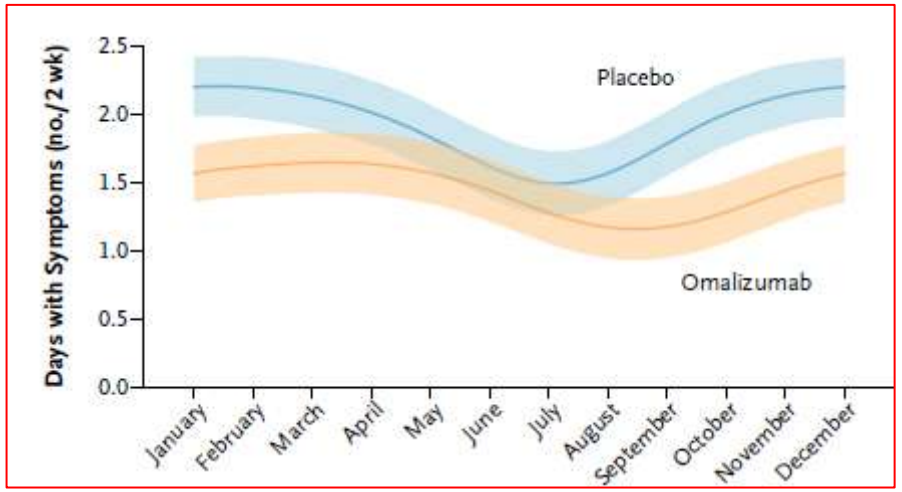


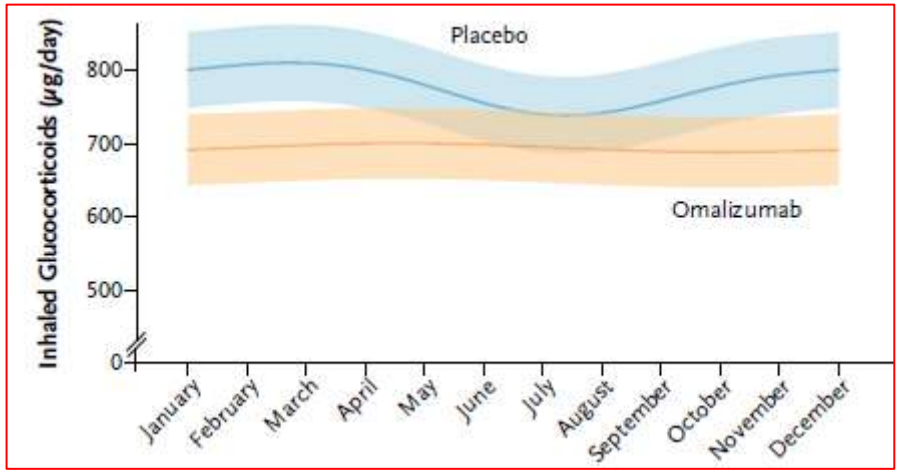


Johnston S Rev med Vir 2015 & Lommatzsch M et al Thorax 2014

Η ένδειξη

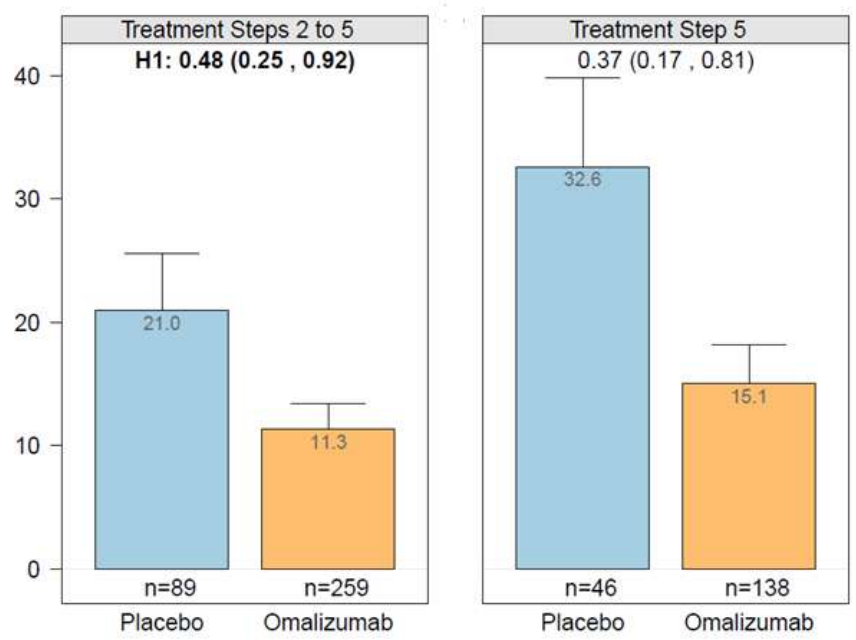


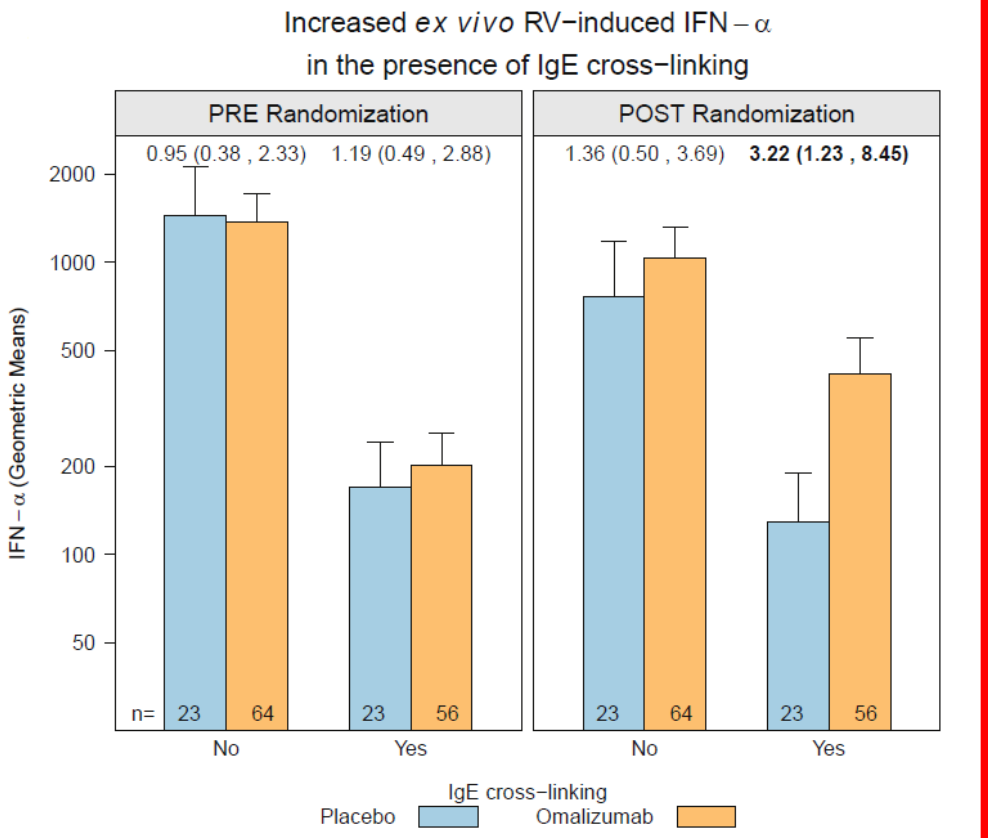


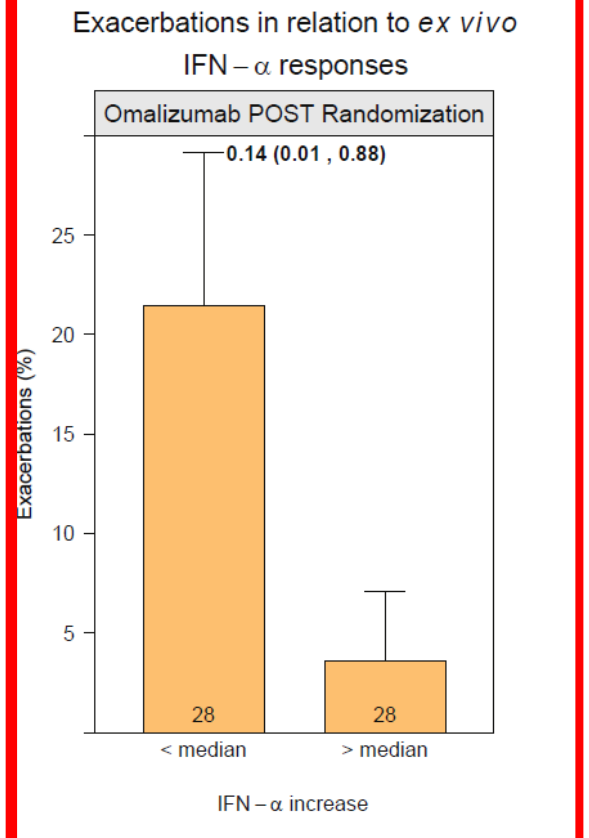


Busse WW et al. N Engl J Med 2011

Η εξήγηση

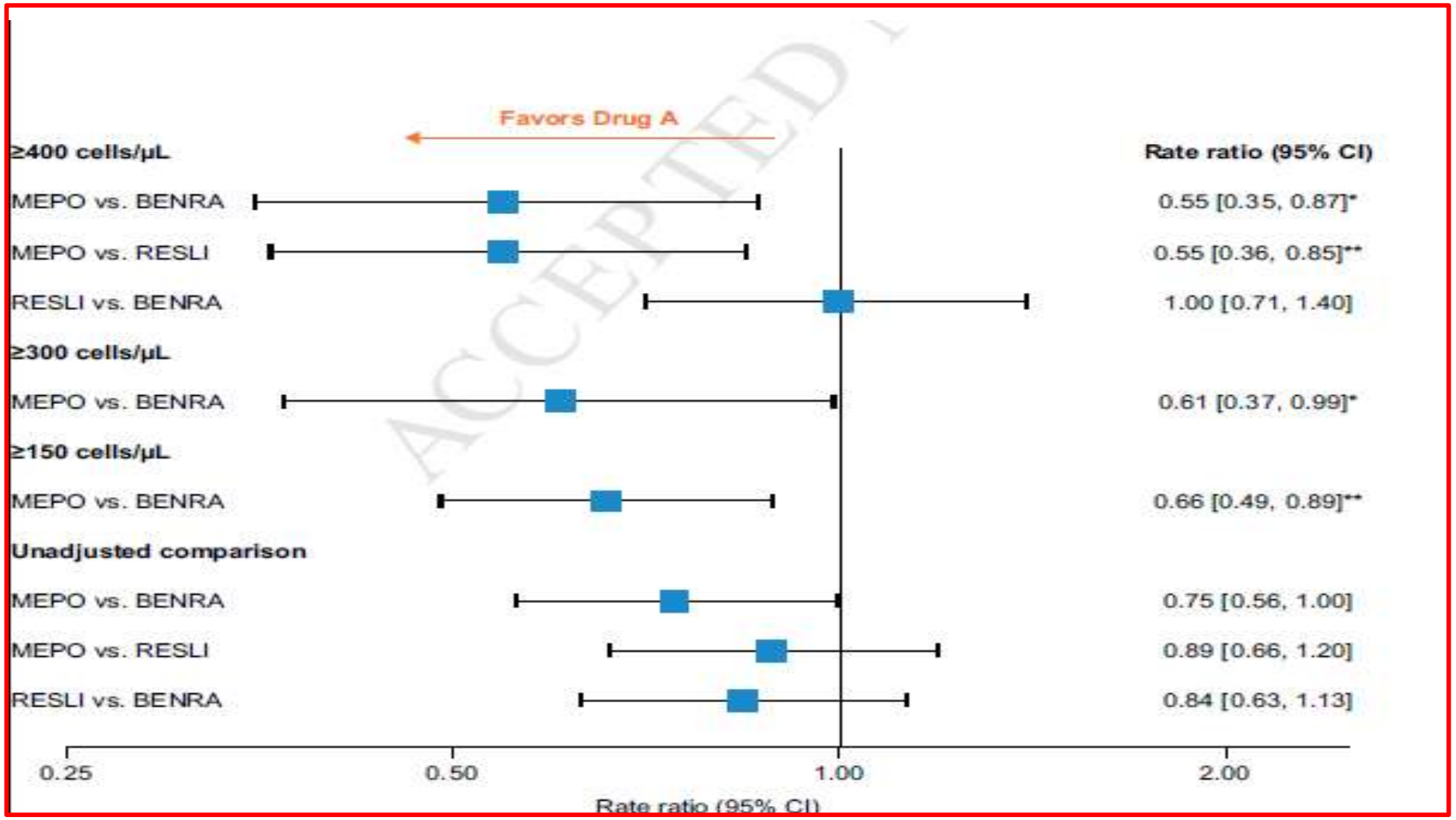






Teach S J et al JACI 2015

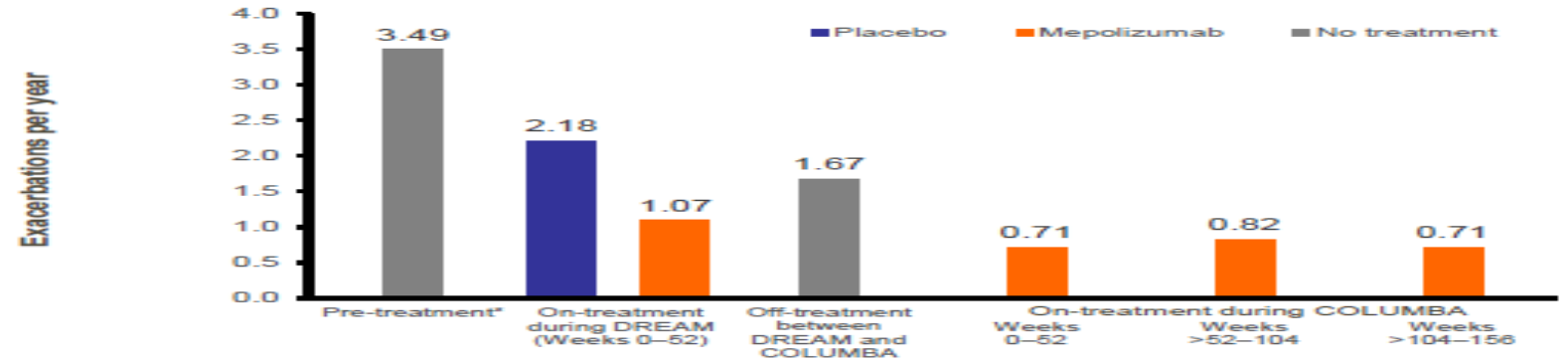
Διαστρωμάτωση & παροξύνσεις



Busse W, Chupp G, Nagase H, Albers FC, Doyle S, Shen Q, Bratton DJ, Gunsoy NB, Anti-IL5 treatments in severe asthma by blood eosinophil thresholds: indirect treatment comparison, *Journal of Allergy and Clinical Immunology* (2018), doi: 10.1016/j.jaci.2018.08.031

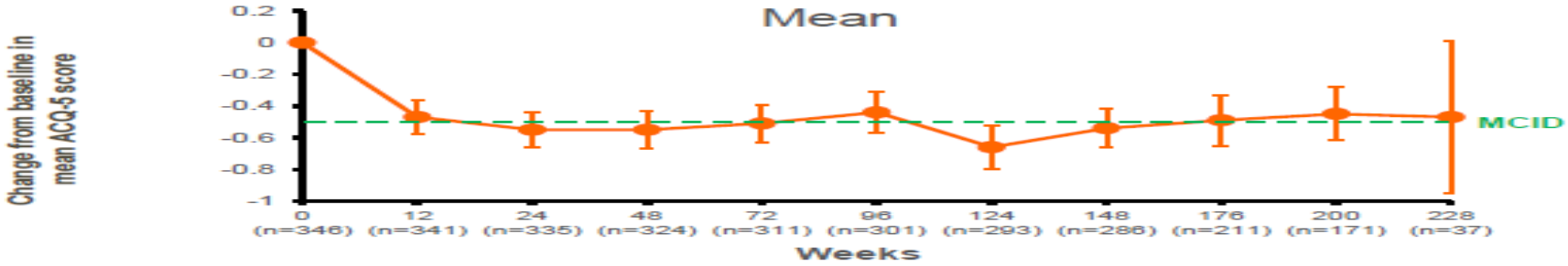
Ασφάλεια

Figure 1. Annualized rate of exacerbations across DREAM and COLUMBA (patients with ≥156 weeks of enrollment in COLUMBA)



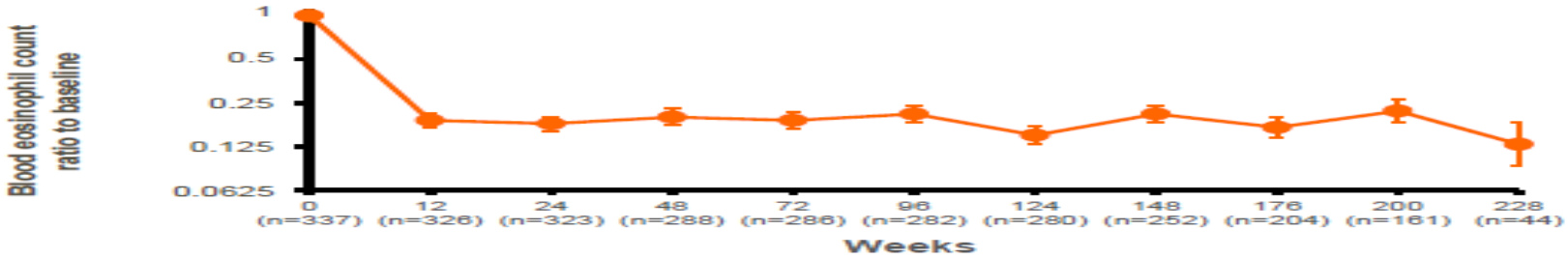
*Pre-treatment refers to the 12 months prior to enrollment in DREAM
Overall 286 patients with ≥156 weeks in COLUMBA are summarized above (DREAM: 62 Placebo, 224 Mepolizumab)

Figure 2. Mean change from baseline in ACQ-5 score (as-treated population)



Vertical bars show 95% confidence intervals
MCID, minimum clinically important difference (reduction of 0.5 points in ACQ-5 score)

Figure 3. Geometric mean peripheral blood eosinophil count ratio to baseline (as-treated population)



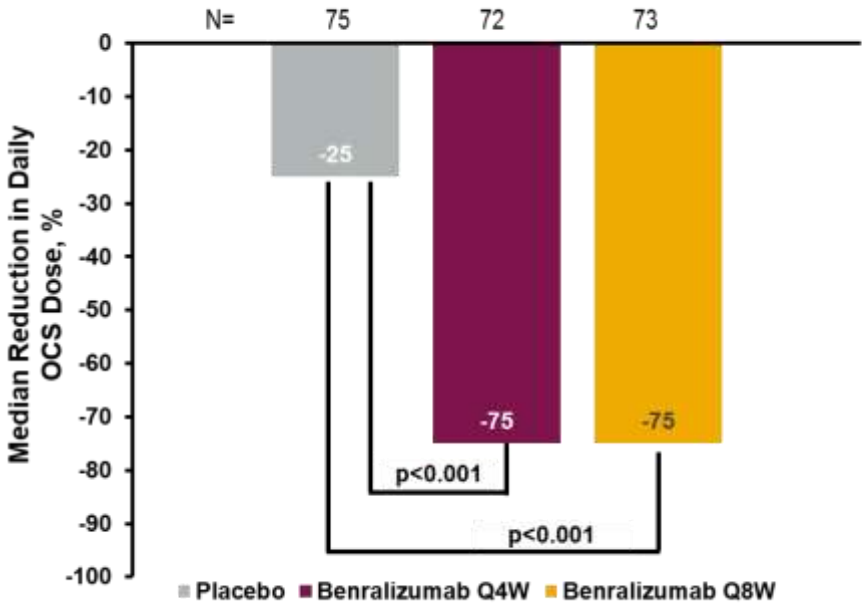
Vertical bars show 95% confidence intervals

Poster No: P892 Ortega et al. ATS 2018

Benralizumab στο σοβαρό άσθμα

Phase III ZONTA study[1] : Primary and Key Secondary Endpoints *Benralizumab Significantly Reduced Final OCS Doses at Week 28 While Maintaining Asthma Control vs. Placebo*

Primary Analysis



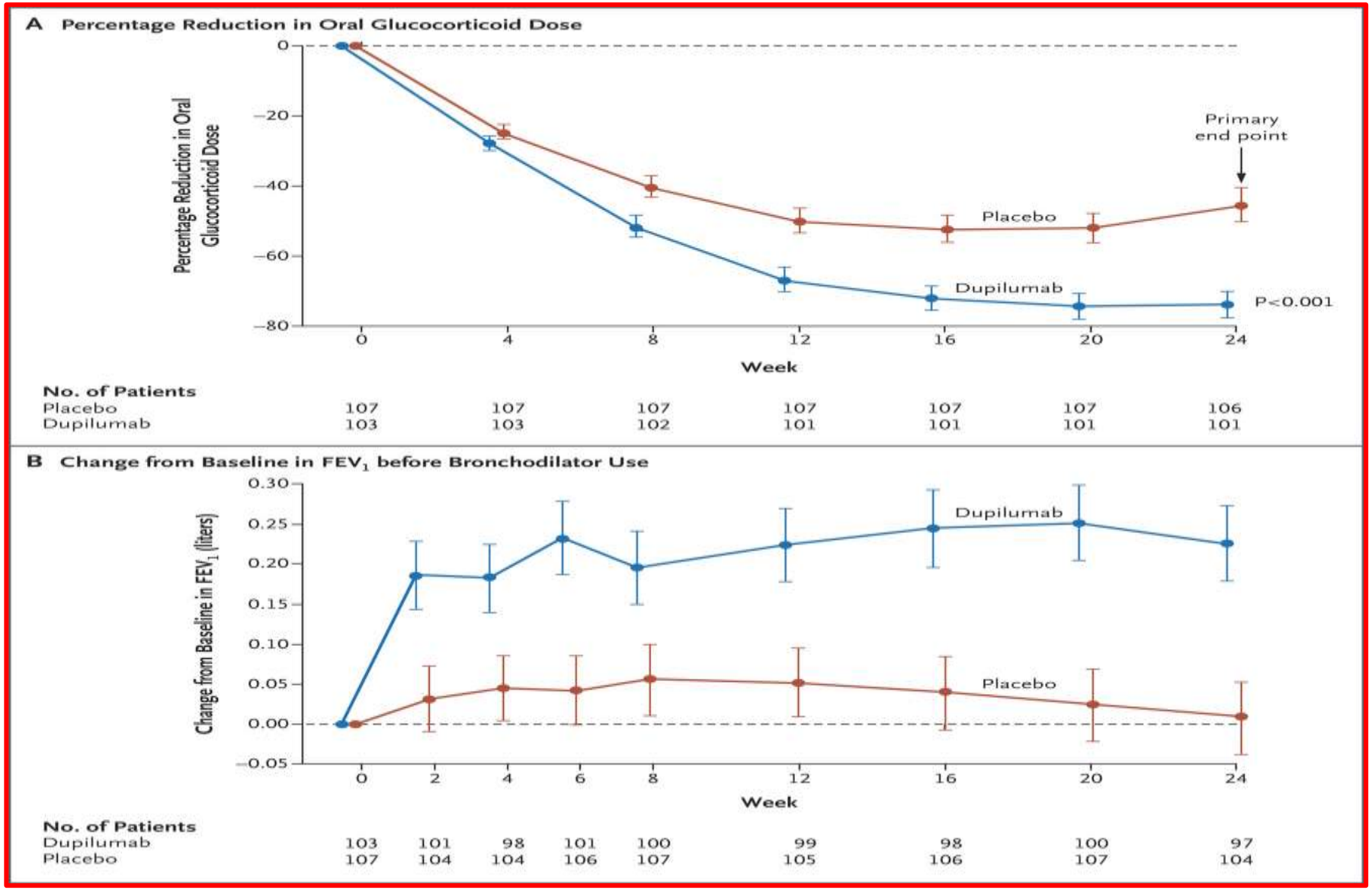
Categorical Analysis

Reduction in Final OCS Dose, n (%)	Placebo N=75	Benra 30 mg Q4W, N=72	Benra 30 mg Q8W, N=73
≥90%	9 (12)	24 (33)	27 (37)
≥75%	15 (20)	38 (53)	37 (51)
≥50%	28 (37)	48 (67)	48 (66)
>0%	40 (53)	55 (76)	58 (79)
No change or any increase in OCS dose	35 (47)	17 (24)	15 (21)
OR (95 %CI)	–	4.09 (2.22 – 7.57)	4.12 (2.22 – 7.63)
p-vakue	–	<0.001	<0.001

- **Reduction in final OCS daily dose was 4X greater with benra vs. placebo (median baseline OCS dose was 10 mg/d in all groups)**

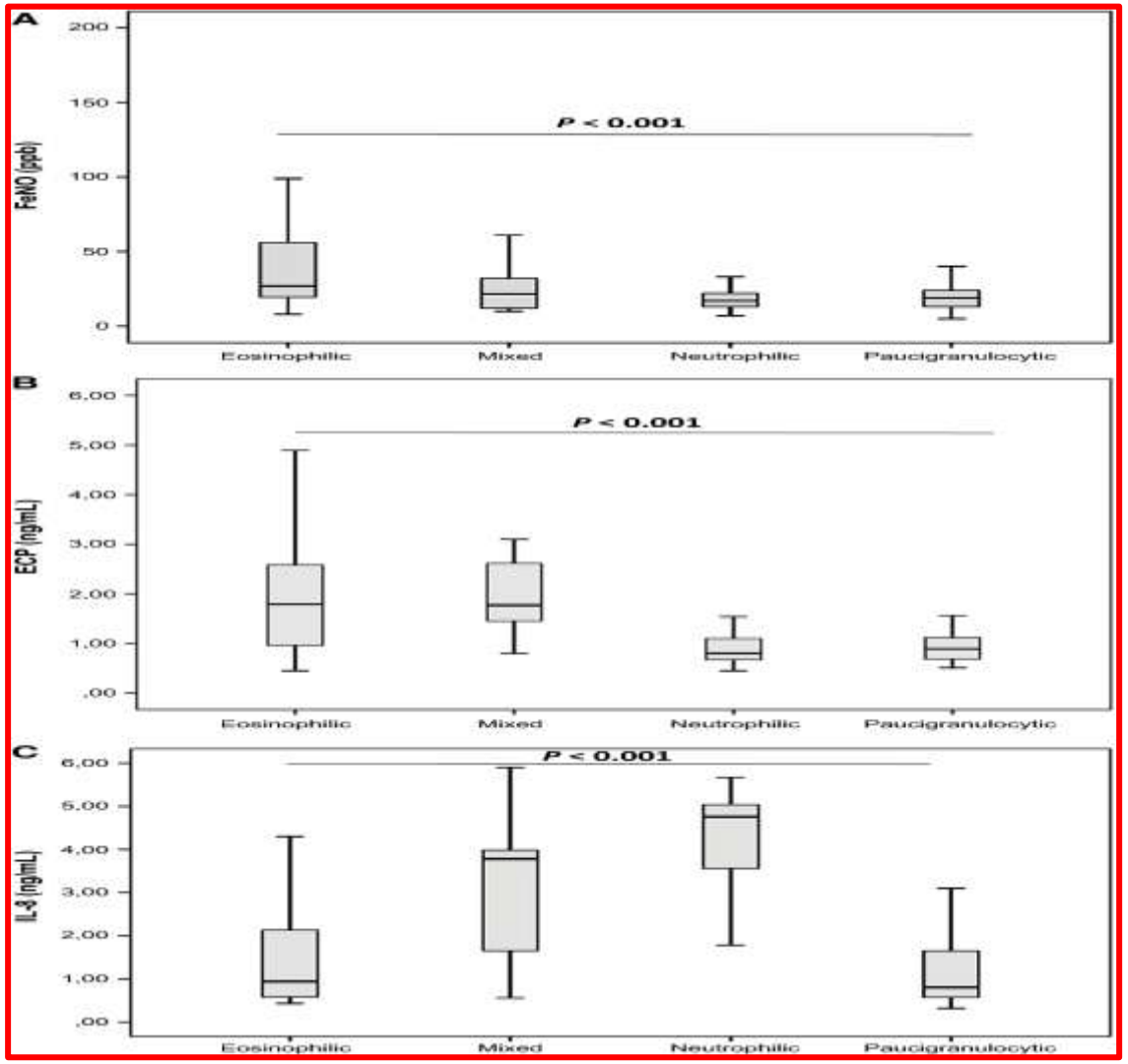
1. Nair P et al. N Engl J Med. 2017; 376:2448-2458

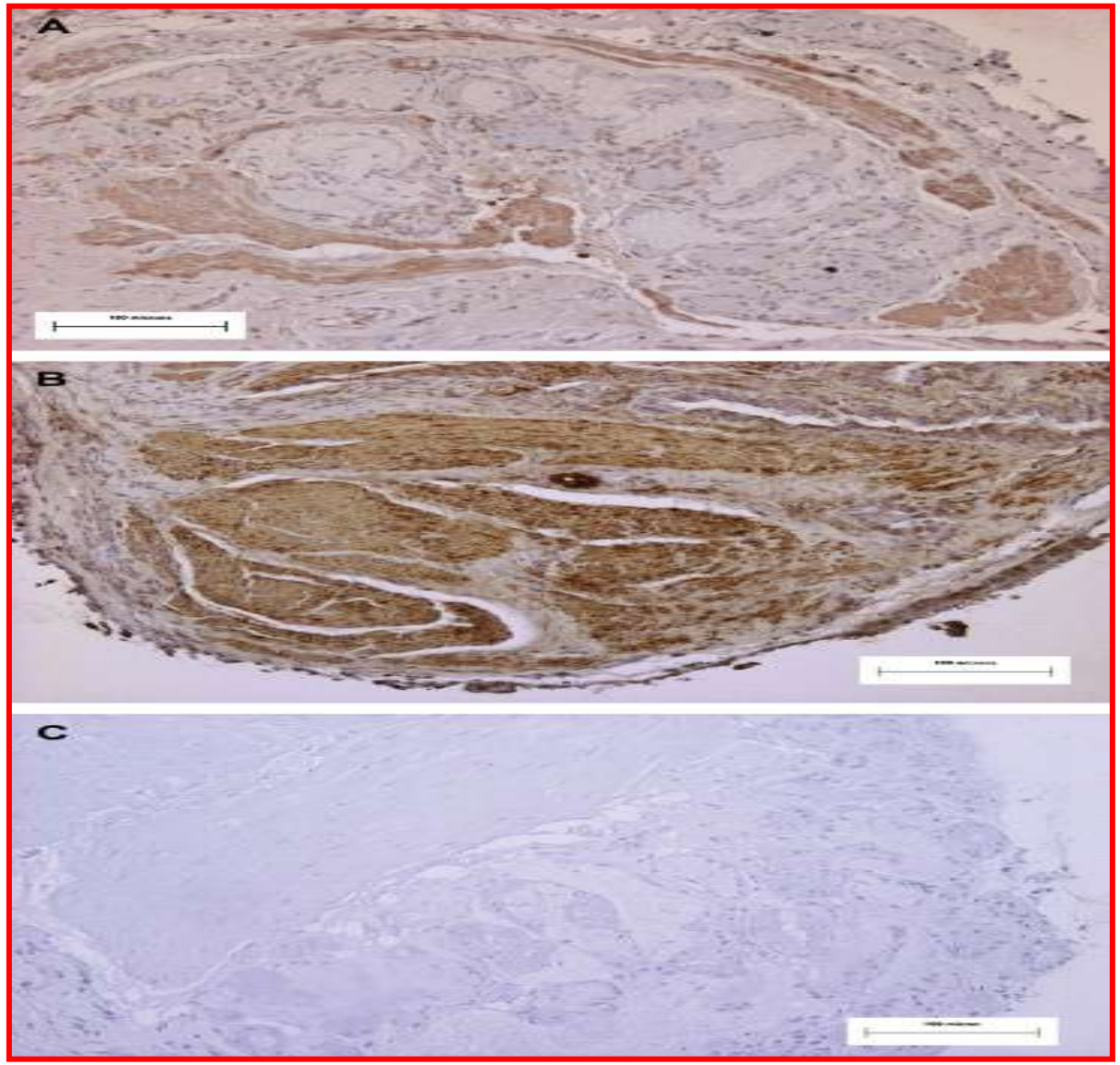
PFts : IL-4/IL-13



KF Rabe et al. N Engl J Med 2018. DOI: 10.1056/NEJMoa1804093

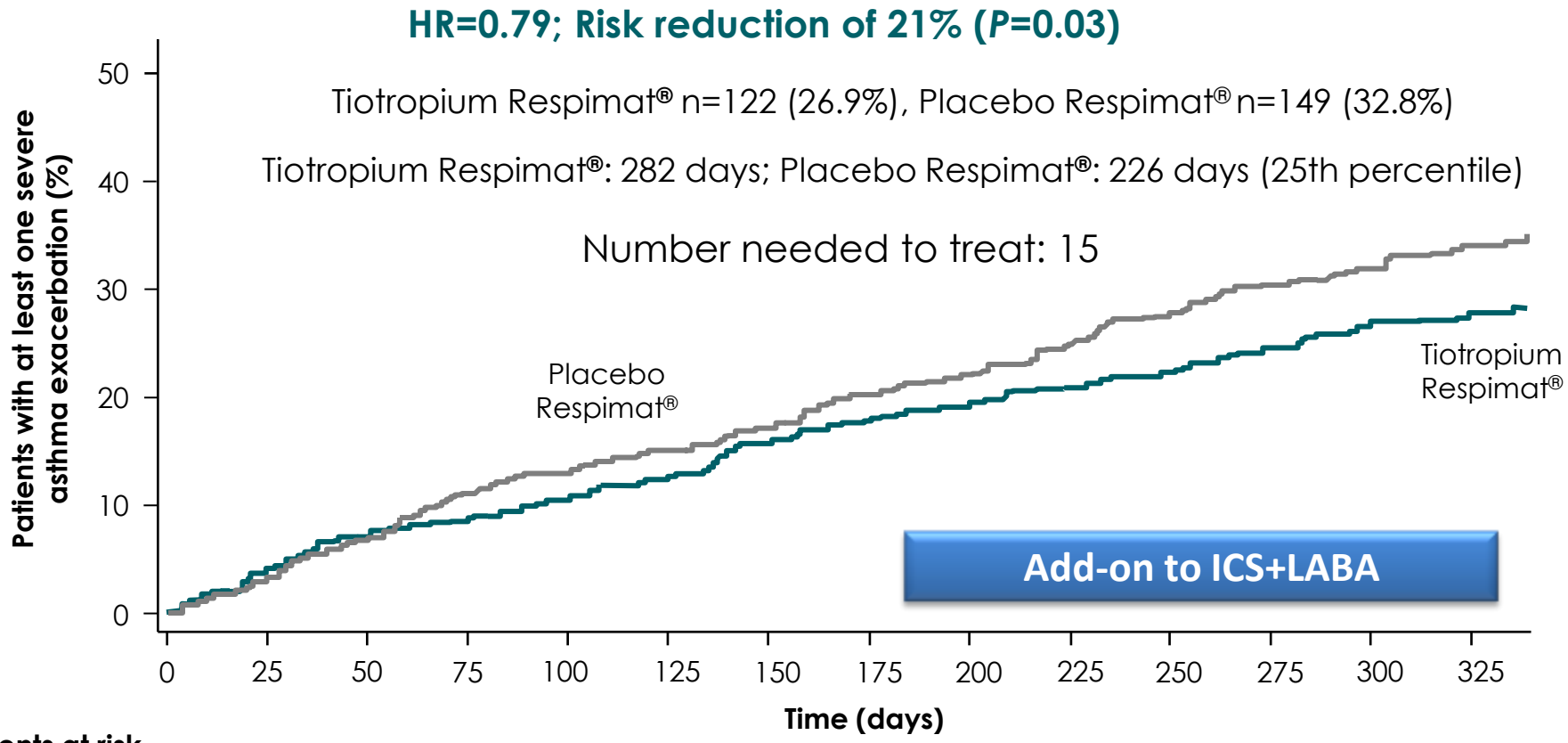
Η δύσκολη απόφαση





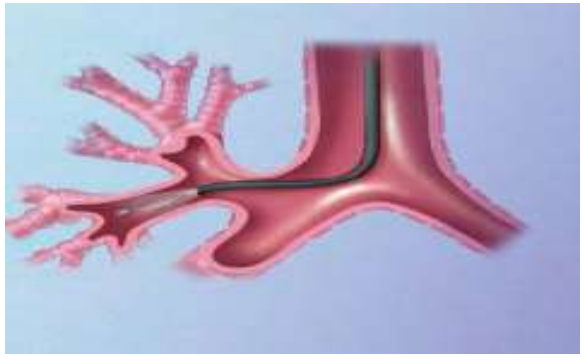
Ntontsi P et al Allergy 2017

Σημαντική μείωση στο χρόνο έως την πρώτη σοβαρή παρόξυνση άσθματος

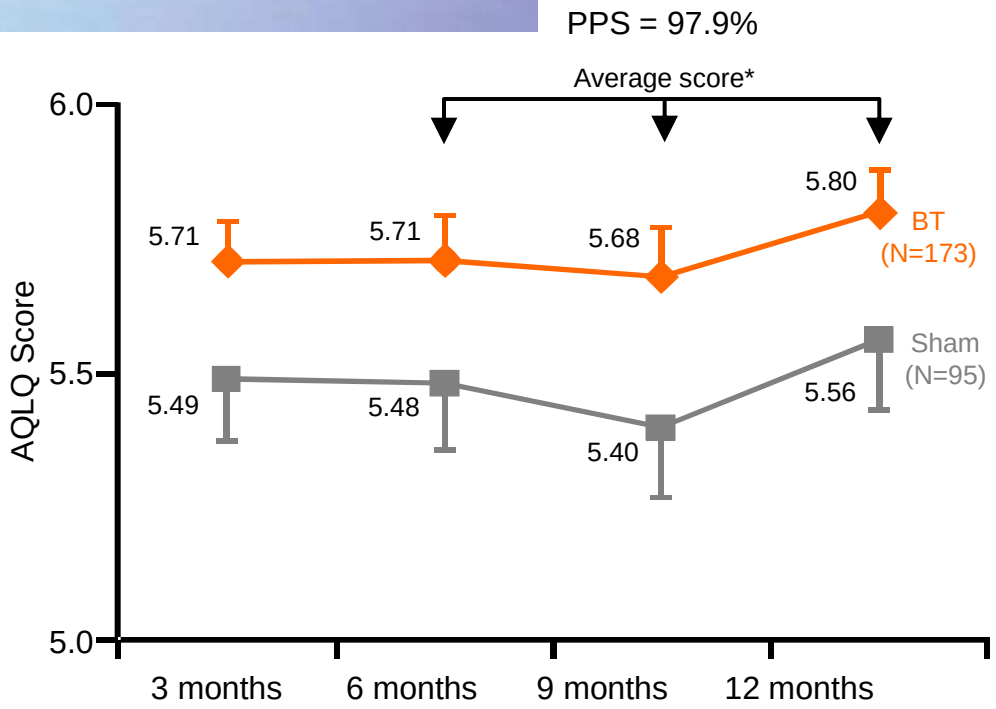


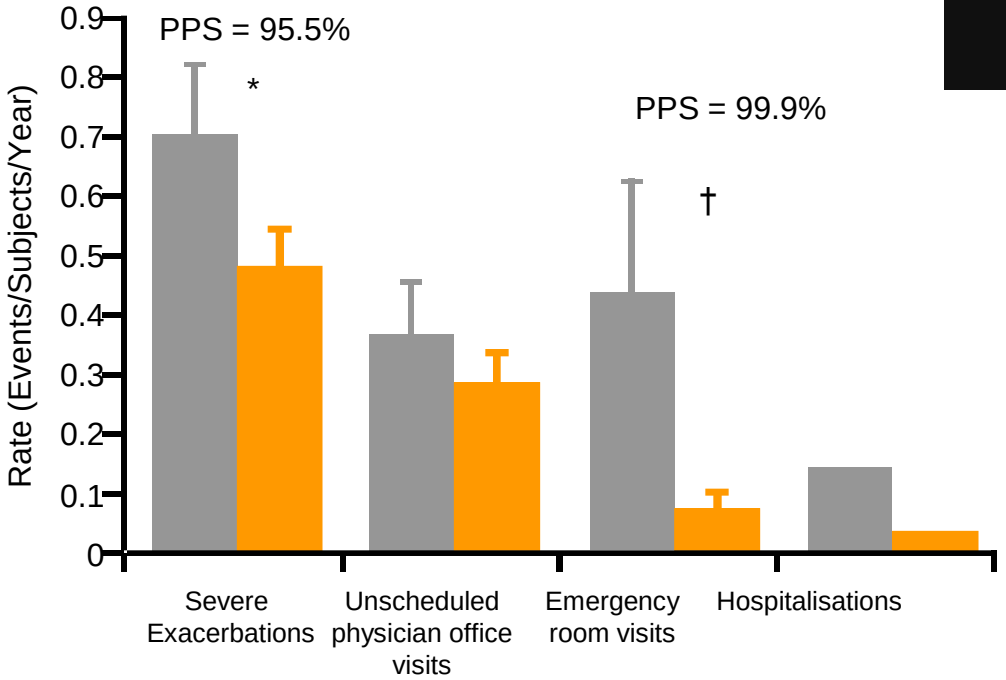
Patients at risk														
Placebo Respimat®	454	435	412	388	379	367	356	339	332	319	303	290	282	272
Tiotropium Respimat®	453	430	409	401	389	378	363	353	348	339	331	319	308	298

Kerstjens H, et al. *NEJM* 2012; 367: 1198-1207.



Βρογχική θερμοπλαστική

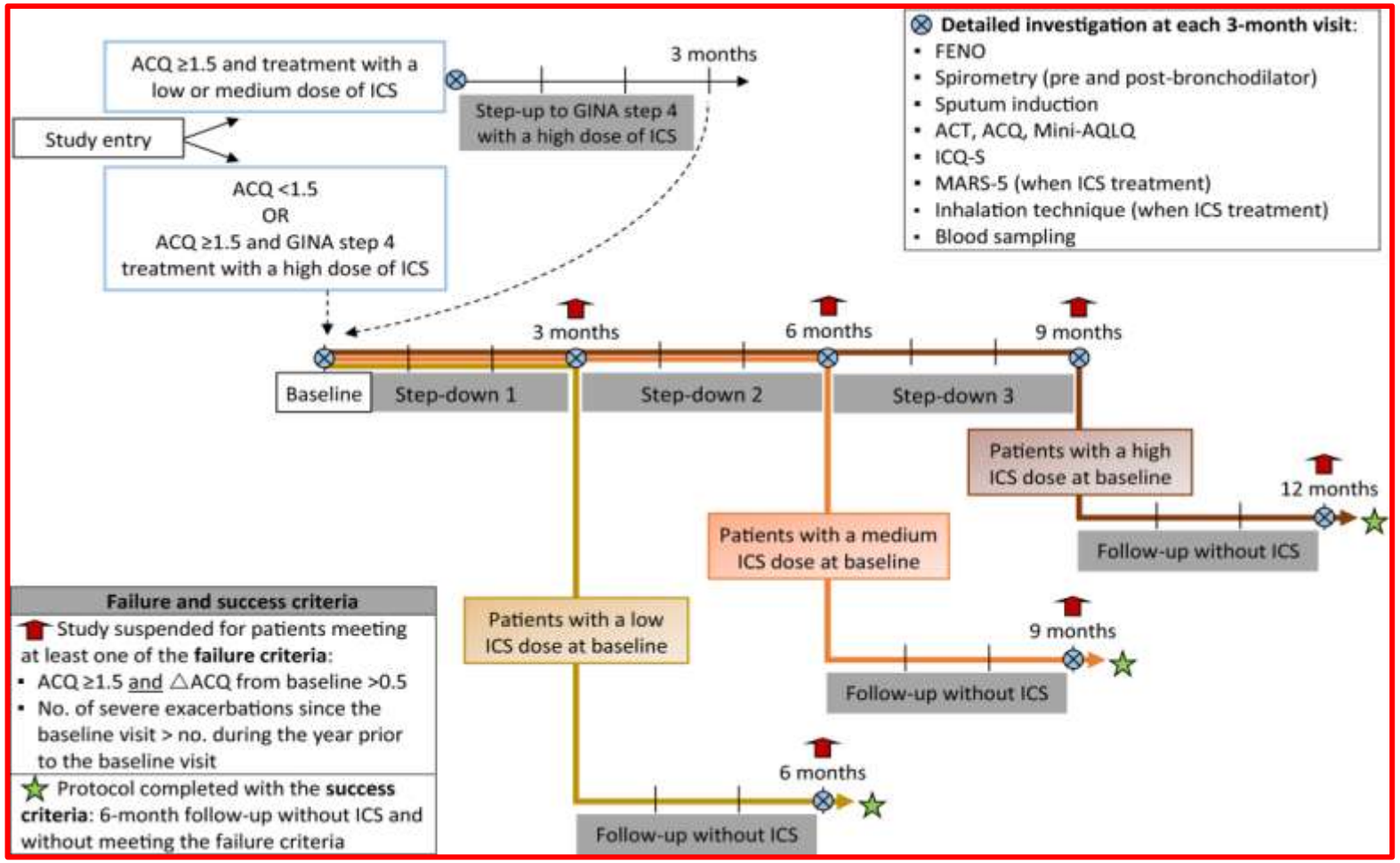


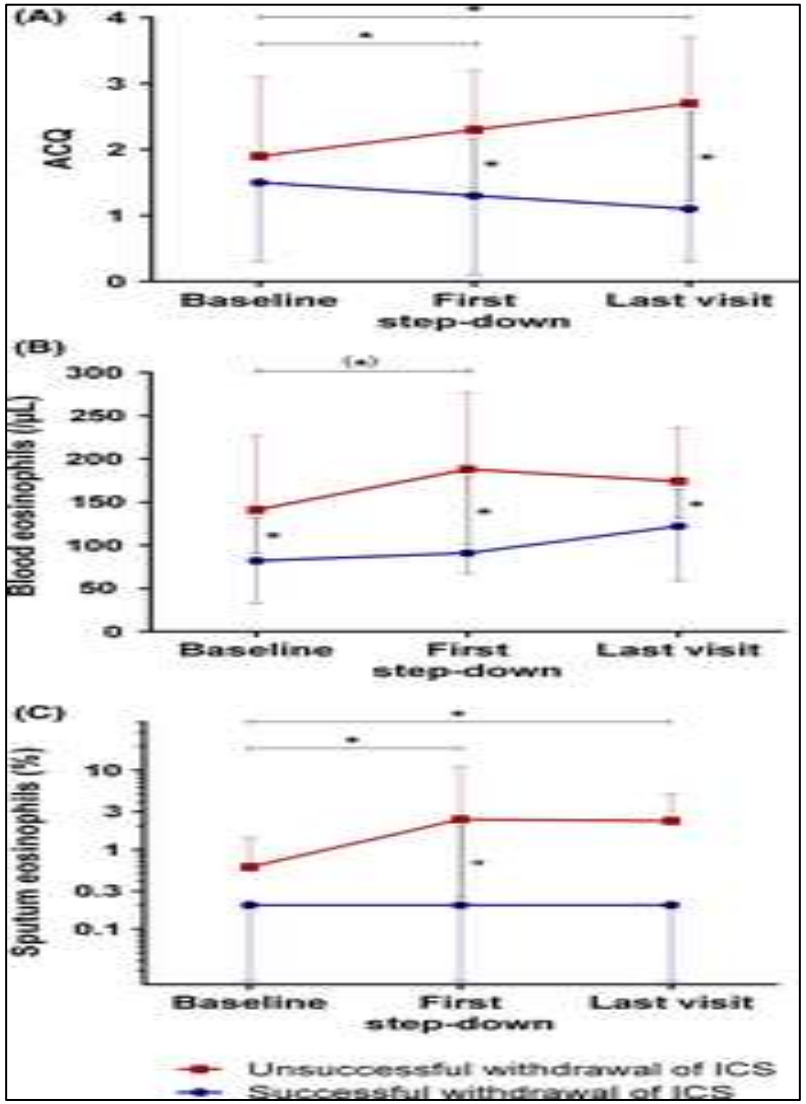


Sham
Bronchial thermoplasty

Castro M et al AJRCCM 2010

Καιρός για LABA/LAMA?





S Dimarche et al Step-down of inhaled corticosteroids in non-eosinophilic asthma: A prospective trial in real life, Volume: 48, Issue: 5, Pages: 525-535, First published: 31 January 2018, DOI: (10.1111/cea.13106)

Anti TLCP

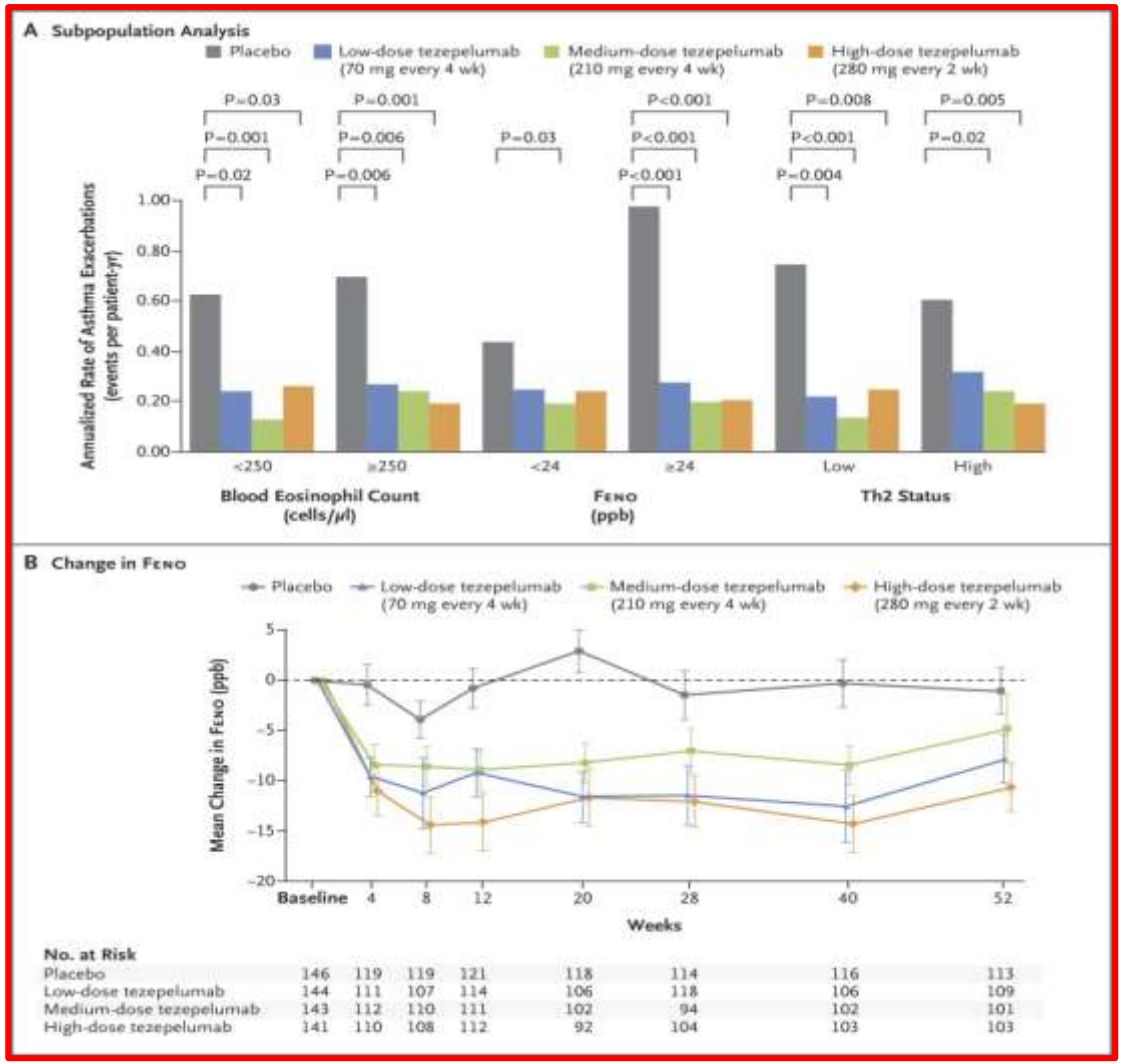


Table 2. Annualized Rate of Asthma Exacerbations and Change from Baseline in FEV_1, ACQ-6 Score, and AQLQ(S)+12 Score in the Intention-to-Treat Population.

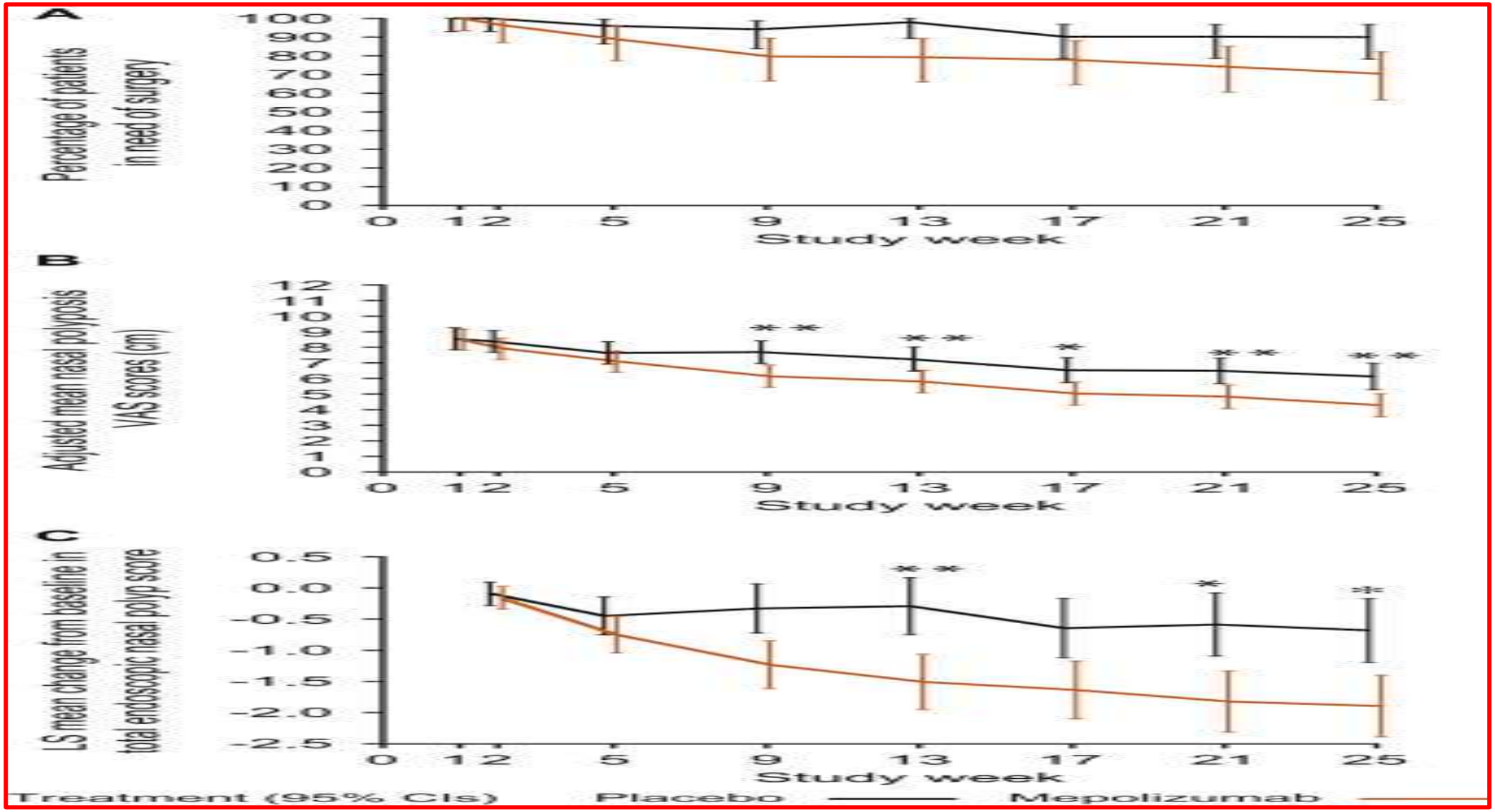
Variable	Placebo (N=148)	Low-Dose Tezepelumab (N=145)	Medium-Dose Tezepelumab (N=145)	High-Dose Tezepelumab (N=146)
Annualized rate of asthma exacerbations through wk 52 — events per patient-yr (90% CI)	0.67 (0.57 to 0.80)	0.26 (0.19 to 0.34)	0.19 (0.13 to 0.27)	0.22 (0.16 to 0.30)
Relative reduction vs. placebo — % (90% CI)	—	61 (39 to 75)	71 (53 to 82)	66 (47 to 79)
P value	—	<0.001	<0.001	<0.001
FEV_1 before bronchodilation				
No. of patients evaluated	141	137	128	125
Least-squares mean change from baseline at wk 52 — % of predicted value	−0.99	7.11	7.27	9.37
Difference vs. placebo (95% CI)	—	8.11 (2.39 to 13.82)	8.26 (2.50 to 14.03)	10.36 (4.60 to 16.13)
P value*	—	0.006	0.005	<0.001
Least-squares mean change from baseline at wk 52 — liters	−0.05	0.07	0.06	0.11
Difference vs. placebo (95% CI)	—	0.12 (0.02 to 0.21)	0.11 (0.02 to 0.20)	0.15 (0.06 to 0.25)
P value*	—	0.01	0.02	0.002
ACQ-6 score†				
No. of patients evaluated	53	53	44	49
Least-squares mean change from baseline at wk 52	−0.89	−1.13	−1.16	−1.22
Difference vs. placebo (95% CI)	—	−0.24 (−0.50 to 0.02)	−0.27 (−0.54 to 0.00)	−0.33 (−0.60 to −0.07)
P value*	—	0.07	0.046	0.01
AQLQ(S)+12 score‡				
No. of patients evaluated	47	52	41	49
Least-squares mean change from baseline at wk 52	0.95	1.07	1.13	1.33
Difference vs. placebo (95% CI)	—	0.12 (−0.15 to 0.39)	0.18 (−0.10 to 0.47)	0.38 (0.10 to 0.65)
P value*	—	0.39	0.21	0.008

* P values are nominal and were not adjusted for multiplicity.
† ACQ-6 scores range from 0 to 6, with lower scores indicating better disease control. The minimal clinically important difference is 0.5 points.
‡ AQLQ(S)+12 scores range from 1 to 7, with higher scores indicating better asthma-related quality of life. The minimal clinically important difference is 0.5 points.

Corren J et al. N Engl J Med 2017;377:936-946

The NEW ENGLAND JOURNAL of MEDICINE

Anti IL-5 σε πολύποδες



Bachert C et al JACI 2017

Anti IL-5-Churg Strauss

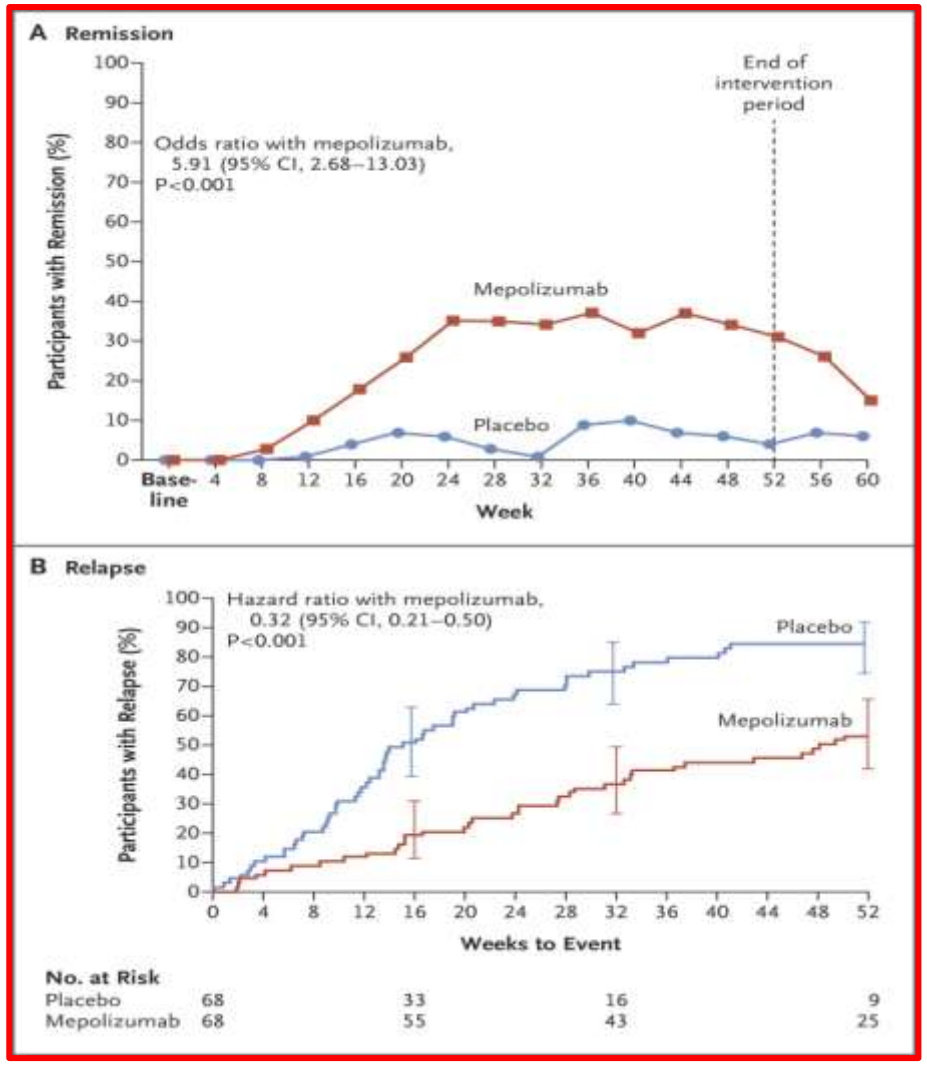


Table 2. Efficacy End Points in the Intention-to-Treat Population.*

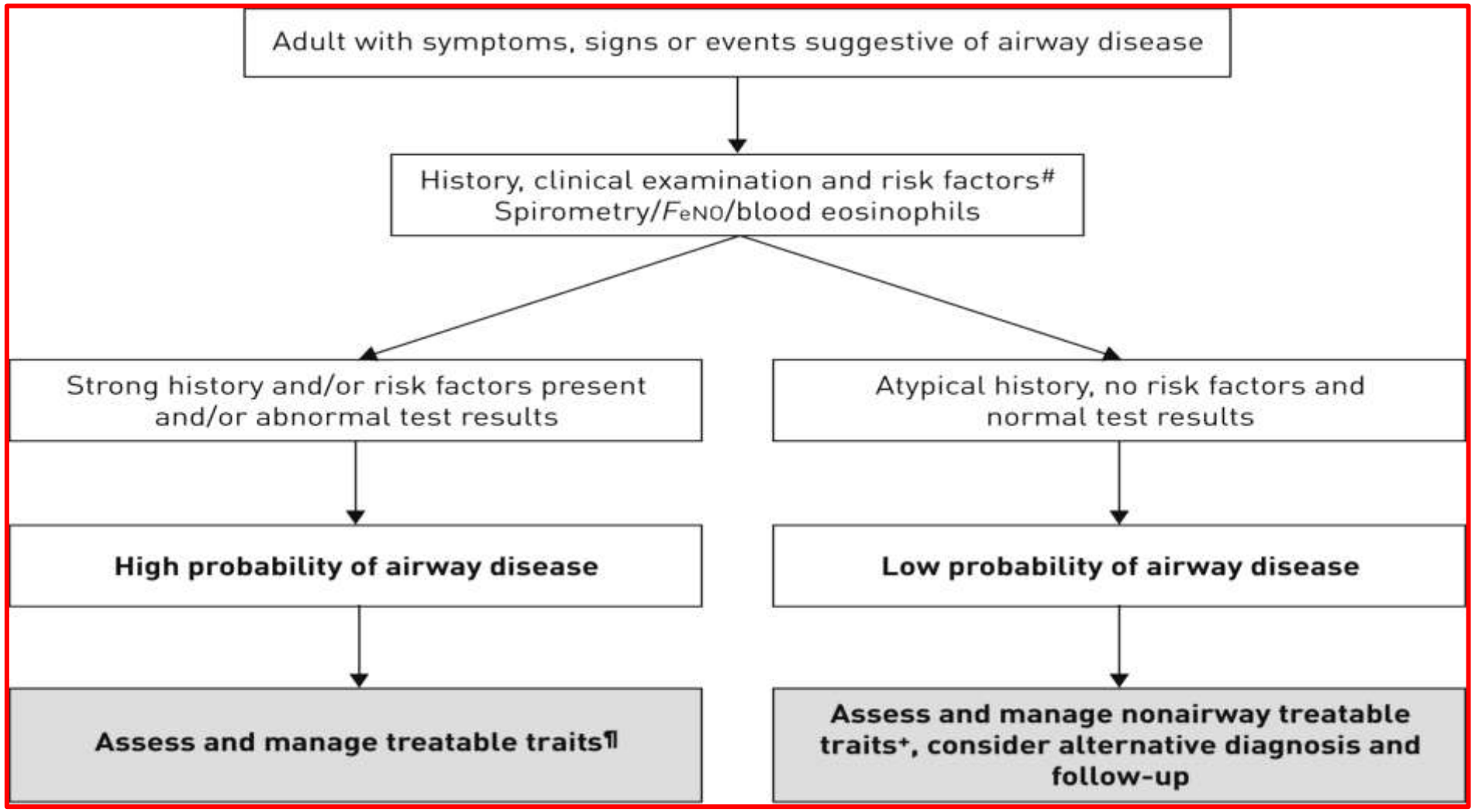
End Point	Mepolizumab (N=68)	Placebo (N=68)	Odds Ratio or Hazard Ratio (95% CI)	P Value
	no. of participants (%)			
Primary end points				
Accrued weeks of remission over 52-wk period			5.91 (2.68–13.03)	<0.001
0 wk	32 (47)	55 (81)		
>0 to <12 wk	8 (12)	8 (12)		
12 to <24 wk	9 (13)	3 (4)		
24 to <36 wk	10 (15)	0		
≥36 wk	9 (13)	2 (3)		
Remission at wk 36 and wk 48	22 (32)	2 (3)	16.74 (3.61–77.56)	<0.001
Other end points				
Remission within the first 24 wk that was sustained until wk 52	13 (19)	1 (1)	19.65 (2.30–167.93)	0.007
First EGPA relapse	38 (56)	56 (82)	0.32 (0.21–0.50)	<0.001

* Odds ratios are shown for the analyses of the two primary end points and for the secondary analysis of remission within the first 24 weeks that was sustained until week 52. For the analysis of accrued weeks in remission, the odds ratio is for 24 or more weeks of accrued remission. Remission was defined as a BVAS of 0 (on a scale from 0 to 63, with higher scores indicating greater disease activity) and a prednisolone or prednisone dose of 4.0 mg or less per day. For the time-to-event analysis of the first relapse of EPGA, the hazard ratio is shown. Participants with a first EGPA relapse were those who had a relapse before the completion of the planned trial period or who withdrew prematurely from the trial.

Wechsler ME et al. N Engl J Med 2017;376:1921-1932

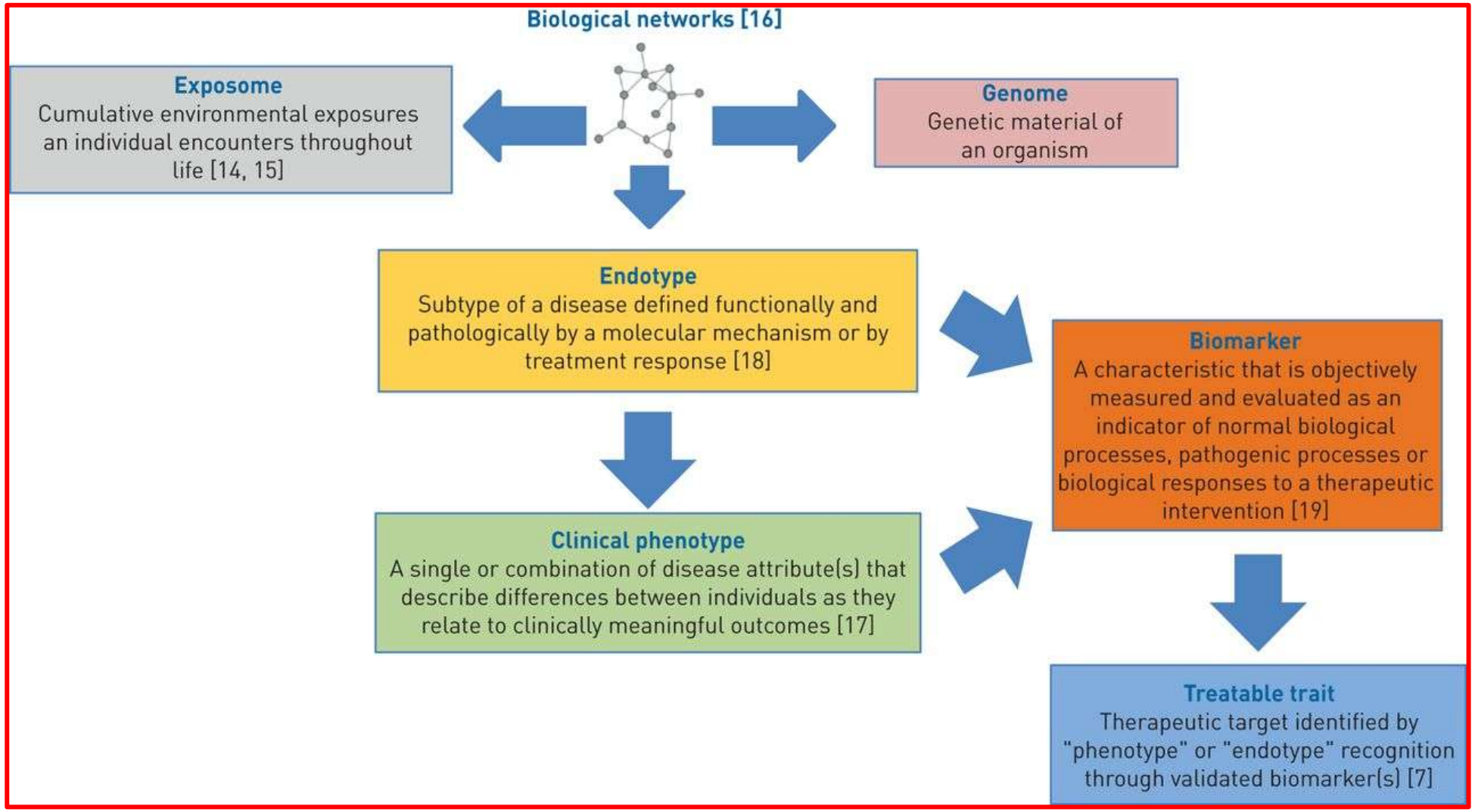
The NEW ENGLAND JOURNAL of MEDICINE

Διαγνωστική στρατηγική αποφρακτικών νοσημάτων: Το μέλλον

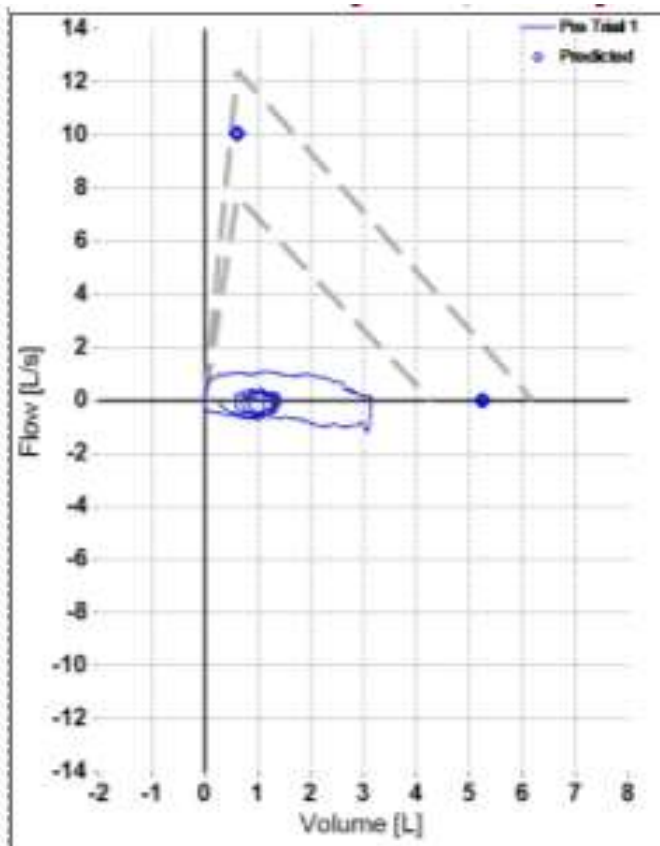


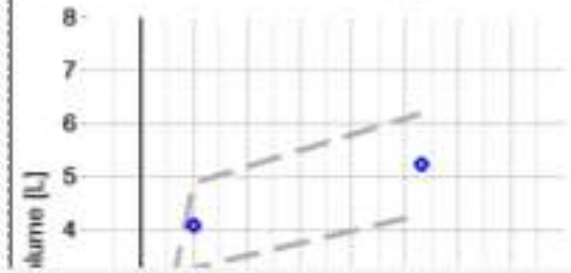
Alvar Agustí et al. Eur Respir J 2017;50:1701655

Η προσωποποιημένη θεραπεία στην επόμενη δεκαετία

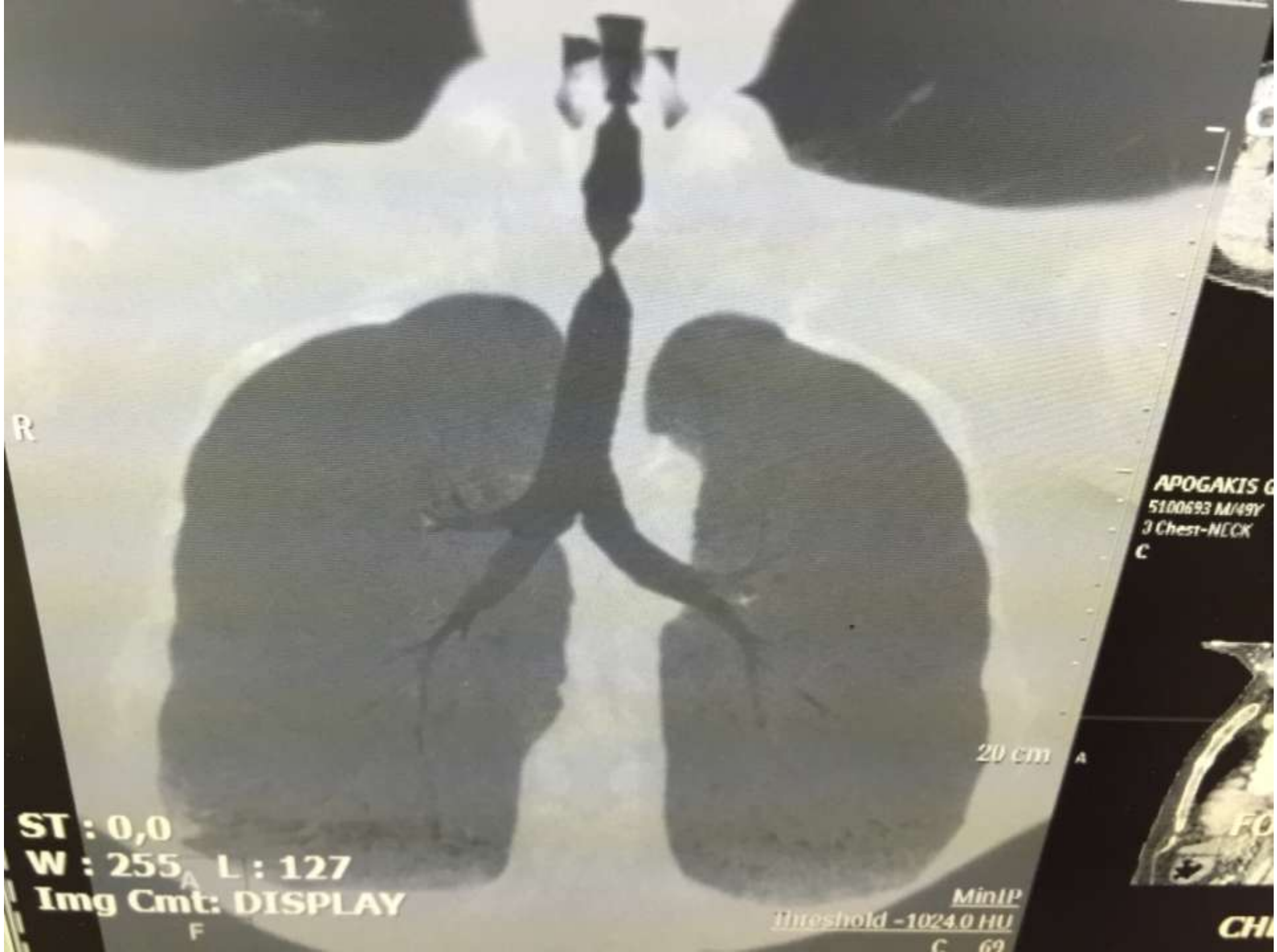


Alvar Agustí et al. Eur Respir J 2017;50:1701655





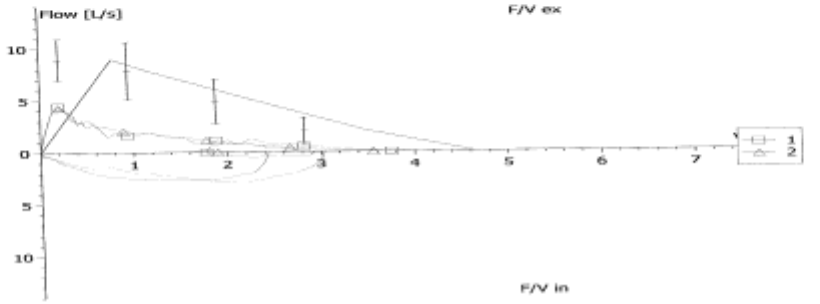
Parameter	Pred	LLN	Pre Best	Trial 1	%Pred
FVC [L]	5,23	4,28	3,16*	3,16*	60
FEV1 [L]	4,07	3,26	1,08*	1,08*	27
FEV1/FVC	0,779	0,682	0,343*	0,343*	44
FEF25-75% [L/s]	3,60	1,97	0,95*	0,95*	26
PEF [L/s]	10,07	7,69	1,10*	1,10*	11
FET [s]	-	-	5,3	5,3	-
PIF [L/s]	-	-	1,19	1,19	-
BEV [L]	-	-	0,11	0,11	-
Session Quality	Pre	F			
System Interpretation	Pre	No interpretation, not enough acceptable maneuvers			

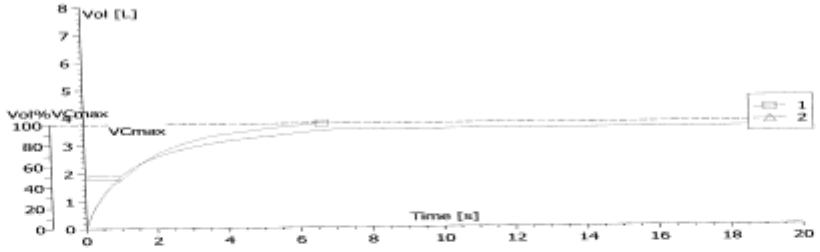
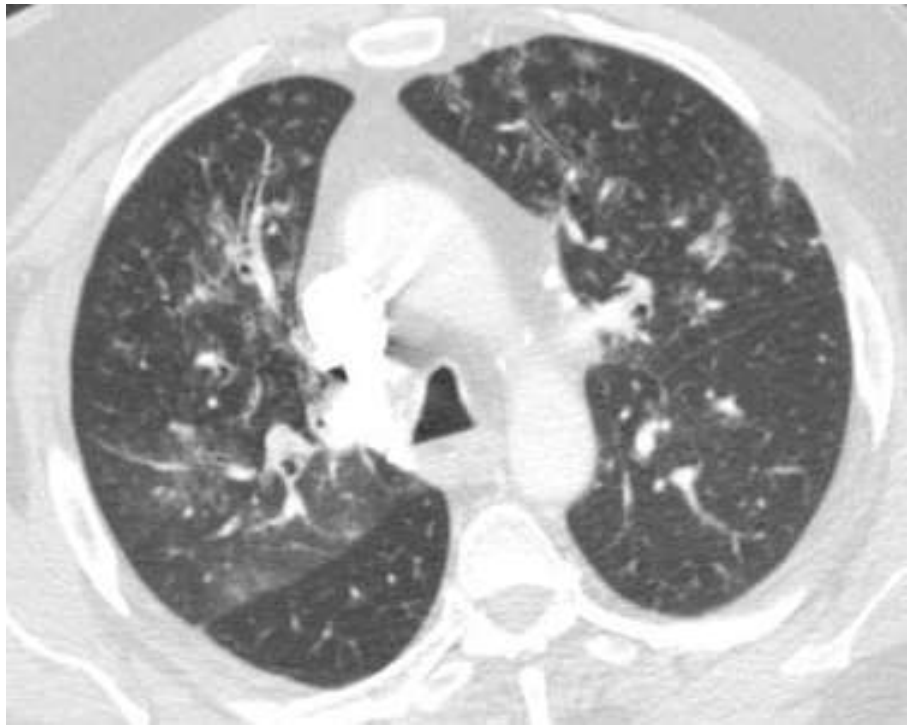
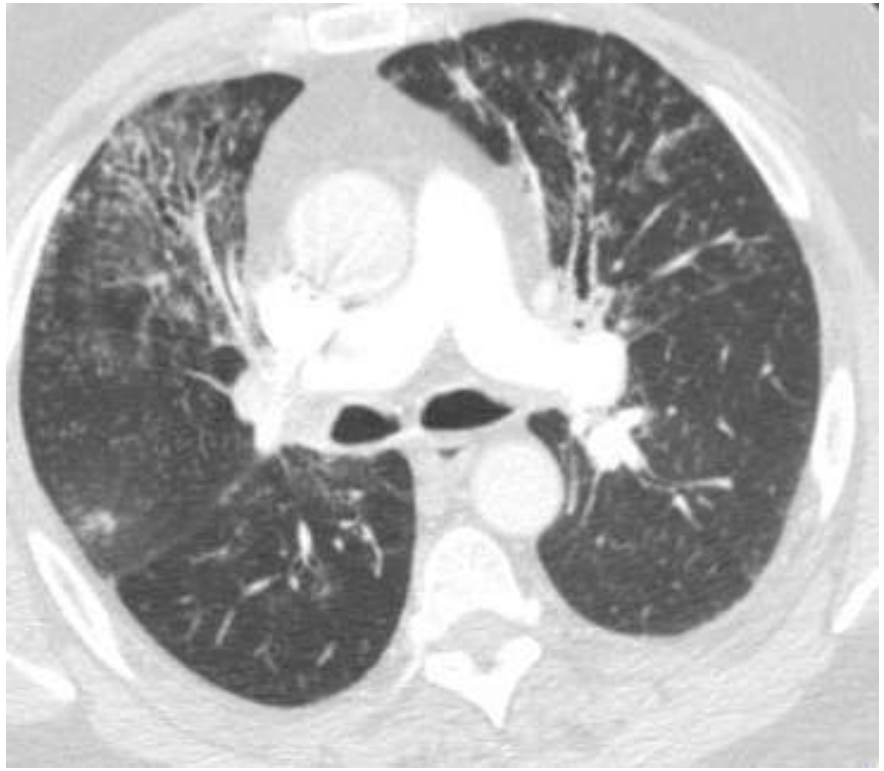
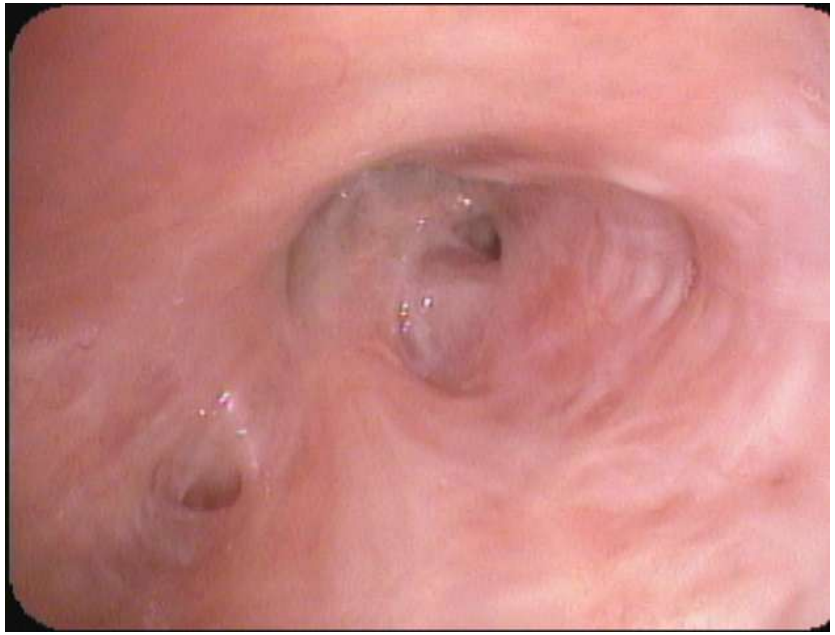
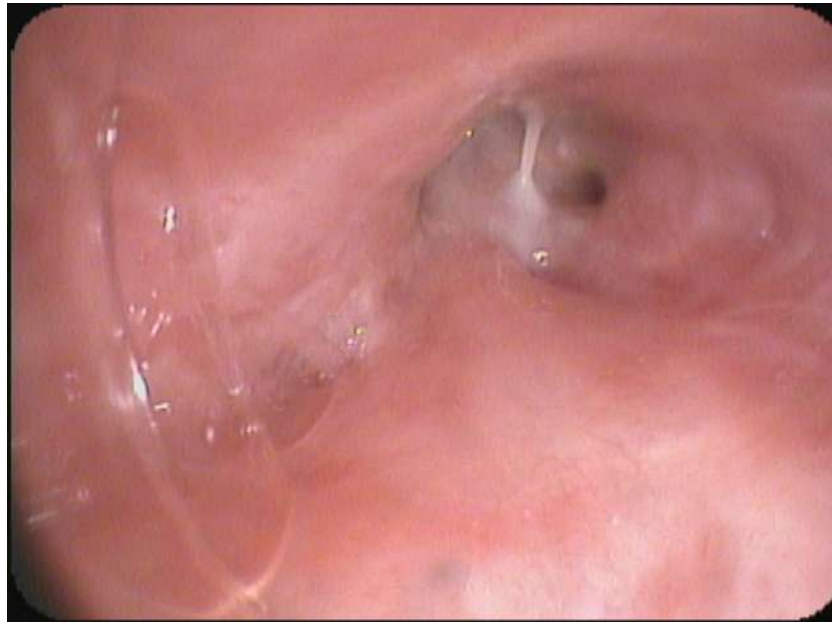
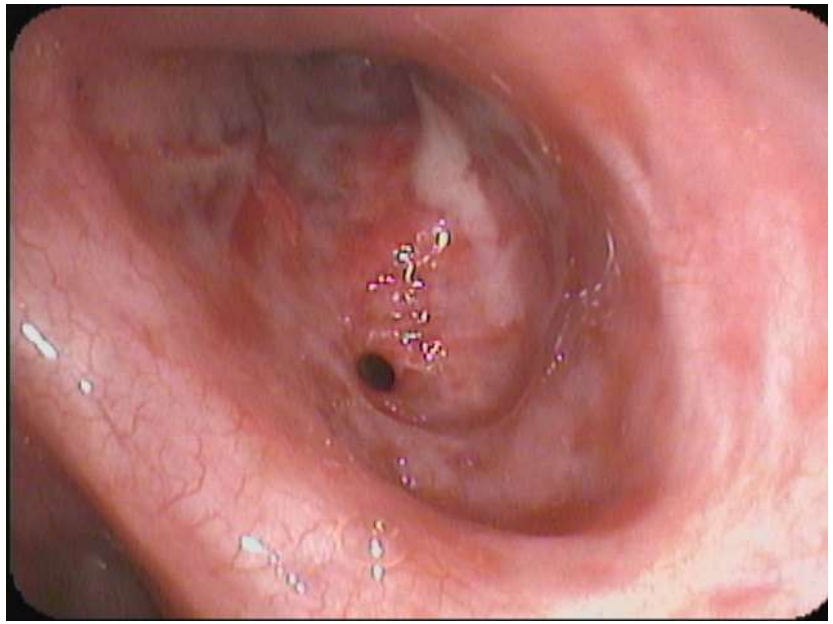

R
20 cm
ST : 0,0
W : 255 L : 127
Img Cmt: DISPLAY
MinIP
threshold -1024.0 HU
APOGAKIS
5100693 M/49Y
3 Chest-NECK

Flow volume

ΠΑΝΕΠΙΣΤΗΜΙΑΚΟ ΓΕΝΙΚΟ ΝΟΣΟΚΟΜΕΙΟ "ΑΤΤΙΚΟΝ"
Β' ΠΝΕΥΜΟΝΟΛΟΓΙΚΗ ΚΛΙΝΙΚΗ ΙΑΤΡΙΚΗΣ ΣΧΟΛΗΣ ΠΑΝ/ΜΙΟΥ ΑΘΗΝΩΝ
ΕΡΓΑΣΤΗΡΙΟ ΕΛΕΓΧΟΥ ΑΝΑΠΝΕΥΣΤΙΚΗΣ ΛΕΙΤΟΥΡΓΙΑΣ
ΔΙΕΥΘΥΝΤΗΣ:ΚΑΘΗΓΗΤΗΣ ΠΑΠΙΡΗΣ ΣΠΥΡΙΔΩΝ

Last Name:	Vitsaras	Identification:	YTEWYT;WET
First Name:	G		
Date of Birth:	01/01/1961	Age:	51 Years
Sex:	male	Weight:	120,0 kg
		Height:	179,0 cm





		P	A1	%(A1/P	A2	D%(A2/A1)
FVC	[L]	4.64	3.75	80.8	3.56	-5.2
FEV 1	[L]	3.73	1.77	47.6	1.90	6.8
FEV 1 % FVC	[%]		47.28		53.32	12.8
PEF	[L/s]	8.95	4.41	49.3	4.27	-3.1
MEF 75	[L/s]	7.82	1.60	20.4	2.04	27.5
MEF 50	[L/s]	4.85	1.13	23.2	1.11	-1.5
MEF 25	[L/s]	2.01	0.52	25.9	0.39	-25.0
MMEF 75/25	[L/s]	3.98	0.98	24.6	0.91	-6.7
FEF 75/85	[L/s]	0.95	0.42	44.3	0.27	-35.2
Date			21/12/12		21/12/12	
Time			10:24:13πμ		10:47:03