Nyinsjuknande i astma; åldersaspekter, riskfaktorer och prognos genom livet

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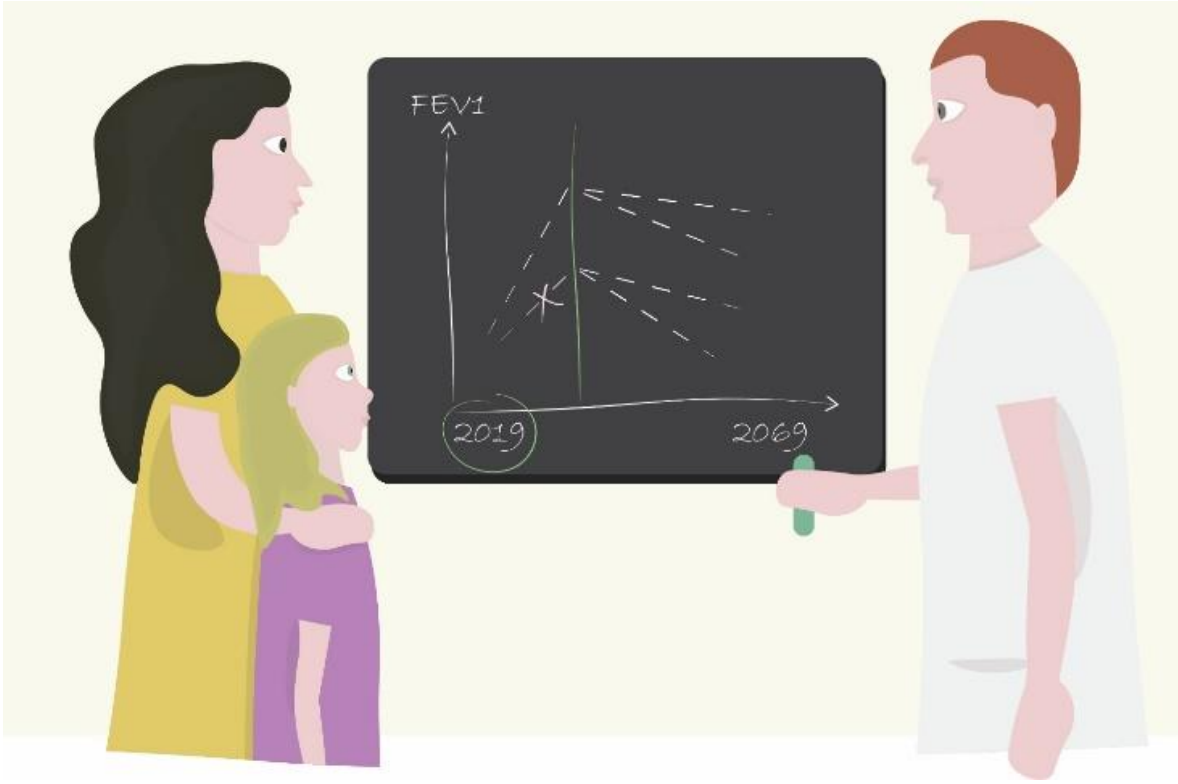
COI:
Advisory board för ALK, AstraZeneca.
Föreläsningar för ALK, AstraZeneca, Chiesi och Sanofi.

Utmaningen

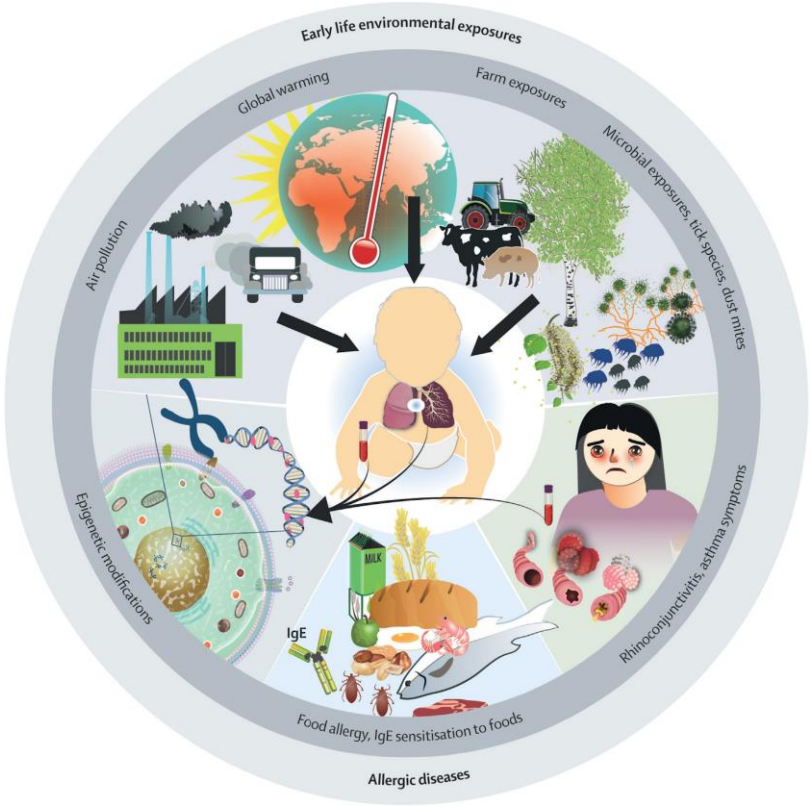
- 10% av barn har astma
- Idag ingen botande behandling
- Lunghälsa genom livet?
  - barnastma: 5-30 ggr ökad risk för svår astma / KOL
  - 50% av KOL-förekomst kopplad till barndomen (Lange, *NEJM* 2015)



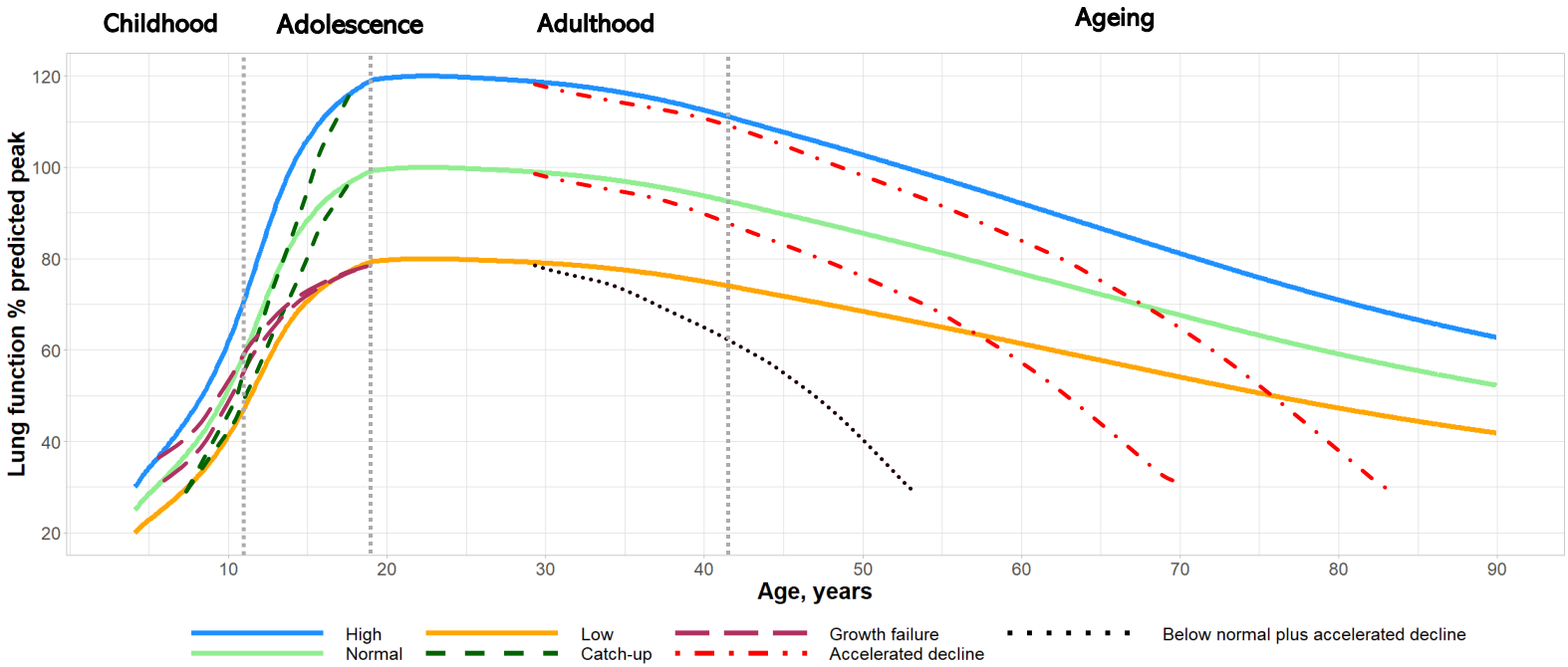
Linking COPD epidemiology with pediatric asthma care; implications for the patient and the physician
(Melén, Guerra, Hallberg, Jarvis, Stanojevic, *Pediatr All Immunol* 2019)

Lunghälsa genom hela livet

CADSET
Chronic Airway DiSeases
Early sTratification



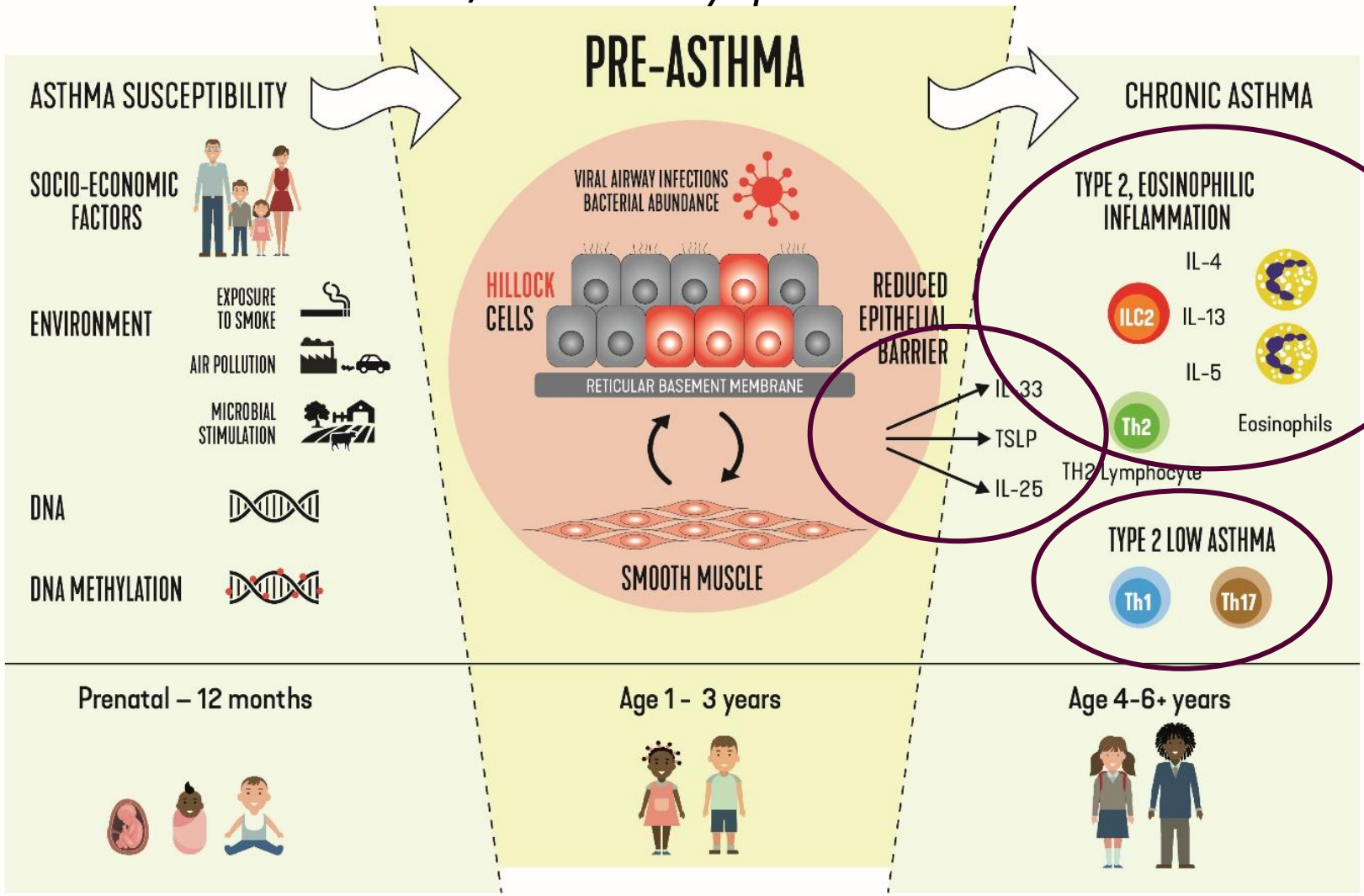
Melén, Koppelman et al. *Lancet Child & Adolescent Health* 2022



Melén, Faner and the ERS CADSET project, *The Lancet 2024*

Hur uppstår sjukdomen astma hos barn?

1. Non-T2 mekanimser!
-> ICS/OCS minskar symptom men förhindrar inte astma.....



2. Epitel eller immunförsvar?


ORIGINAL ARTICLE

Bacterial Mucosal Immunotherapy with MV130 Prevents Recurrent Wheezing in Children

A Randomized, Double-Blind, Placebo-controlled Clinical Trial

3. T2-inflammation kan vi behandla!

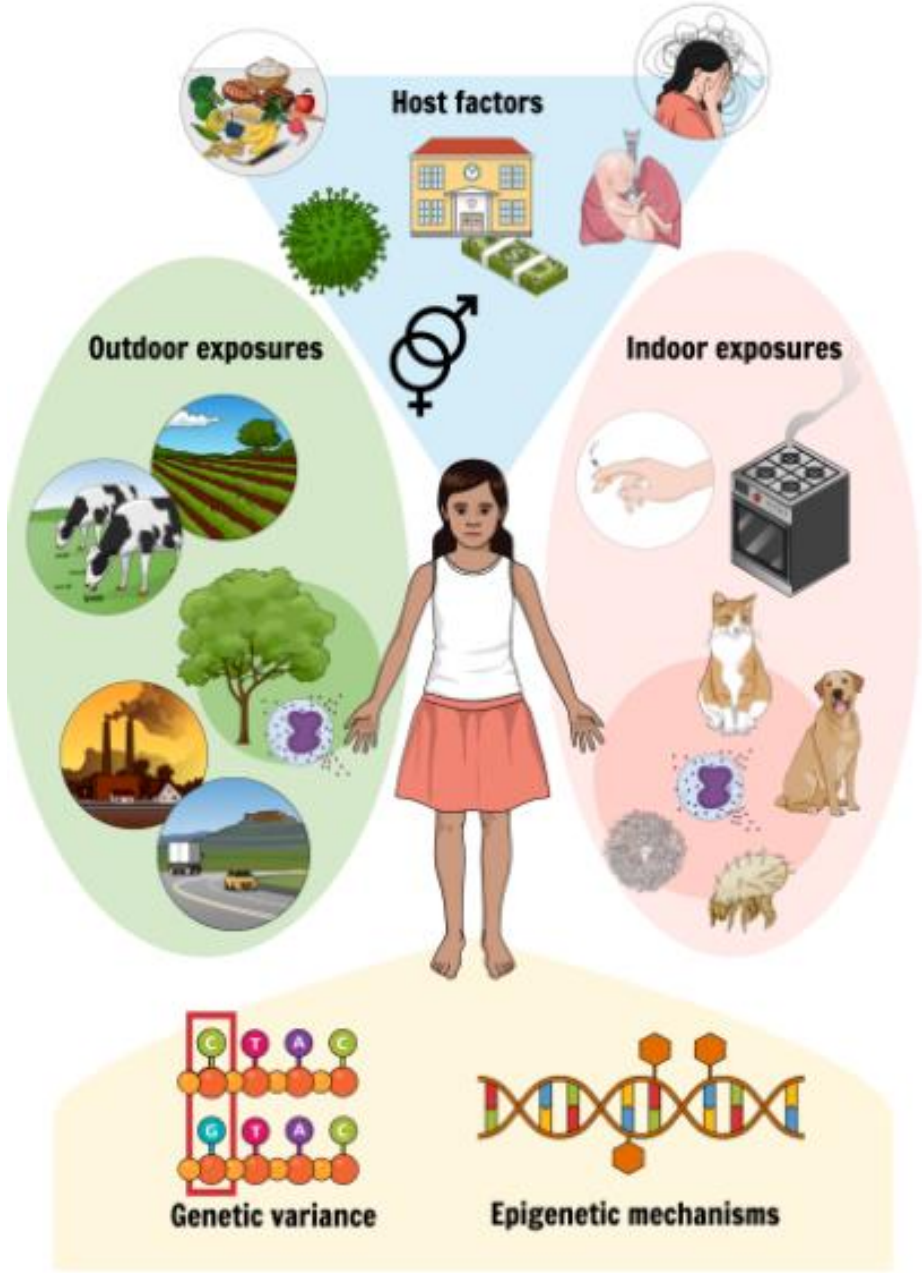
4. Non-T2 / T2-low: oklara mekanismer, oklar optimal behandling.

Melén et al. *Am J Resp Crit Car Med* 2024

Riskfaktorer

Table 1. Risk and Protective Factors for Early Childhood Asthma Organized by Maternal/*In Utero* and Infant/Child Factors and Exposures, Summary Estimates, and References

	Risk Factor	Protective Factor	Summary Statistics and Reference
Maternal and *in utero* factors			
Maternal asthma	X		Family history of asthma: incidence rate through the fourth year of life (IRR, 1.94; 95% CI, 1.76–2.16), after which the rates converged (98)
Maternal smoking and secondhand smoke exposure	X		Any maternal smoking: aOR = 1.19; 95% CI, 0.98–1.43 (99)
GWG and maternal obesity	X		Maternal obesity or overweight during pregnancy: aOR, 1.41 and 1.13; 95% CI, 1.26–1.59 compared with normal GWG, very high GWG (aOR, 1.24; 95% CI, 1.04–1.47), moderate high GWG (aOR, 1.12; 95% CI, 1.04–1.21), and very low GWG (aOR, 1.26; 95% CI, 1.08–1.47) (100)
Maternal stress	X		Pooled OR, 1.56; 95% CI, 1.36–1.80 (101)
Maternal antibiotics	X		RR, 1.28; 95% CI, 1.22–1.34 (102)
Folic acid supplementation	X		OR, 1.07; 95% CI, 1.04–1.11 (103)
Birth by cesarean section	X		RR, 1.20; 95% CI, 1.15–1.25 (104)
Vitamin D supplementation during pregnancy		X	Meta-analysis of RCTs of vitamin D supplementation (OR, 0.72; 95% CI, 0.56–0.92). Omega-3 fatty acids did not reach statistical significance (OR, 0.70; 95% CI, 0.45–1.08) (105)
Omega-3 PUFA supplementation during pregnancy		X	Omega-3 fatty acids did not reach statistical significance (OR, 0.70; 95% CI, 0.45–1.08) (105)
Infant and child factors			
Male sex	X		Before puberty onset: aHR, 0.67; 95% CI, 0.61–0.74 for girls (51.3% boys vs. 48.8% girls). After puberty onset, sex difference did not reach statistical significance (aHR, 0.84; 95% CI, 0.64–1.10 (106)
Family history of asthma	X		Family history of asthma (pooled OR, 2.20; $P < 0.001$ (107)
Black ancestry	X		Pooled frequency of clinician-diagnosed asthma in children: highest in black (15%; 95% CI, 3.5–26.5%), then white (10.6%; 95% CI, 4.6–16.7%) and South Asian (7.6%; 95% CI, 3.7–11.4%) (108). U.S. birth cohorts: increased incidence of asthma in Black (HR, 1.47; 95% CI, 1.26–1.73) and Hispanic children (HR, 1.29; 95% CI, 1.09–1.53) compared with White children, with earlier onset of asthma (98, 109)
Preterm birth	X		Risk for asthma in relation to preterm birth (<37 wk of gestation): OR, 1.40; 95% CI, 1.18–1.67 (110)
Lower socioeconomic status	X		Risk for asthma at age 14 yr: OR, 2.30; 95% CI, 1.23–4.31 (111)
Secondhand smoke exposure	X		Overall exposure: OR, 1.24; 95% CI, 1.20–1.28; $I^2 = 86.7\%$; environmental tobacco smoke: OR, 1.24; 95% CI, 1.19–1.30; $I^2 = 88.2\%$; postnatal paternal smoking: OR, 1.23; 95% CI, 1.14–1.33; $I^2 = 82.8\%$; postnatal maternal smoking: OR, 1.17; 95% CI, 1.04–1.29; $I^2 = 91.6\%$ (112)
Low physical activity	X		Risk of new-onset asthma in children with low PA (OR, 1.32; 95% CI, 0.95–1.84 [random effects] and OR, 1.35; 95% CI, 1.13–1.62 [fixed effects]) (113)



Hernandez-Pacheco, Kere, Melén *Pediatr All Immunol* 2022

Mekanismer och kliniska fynd

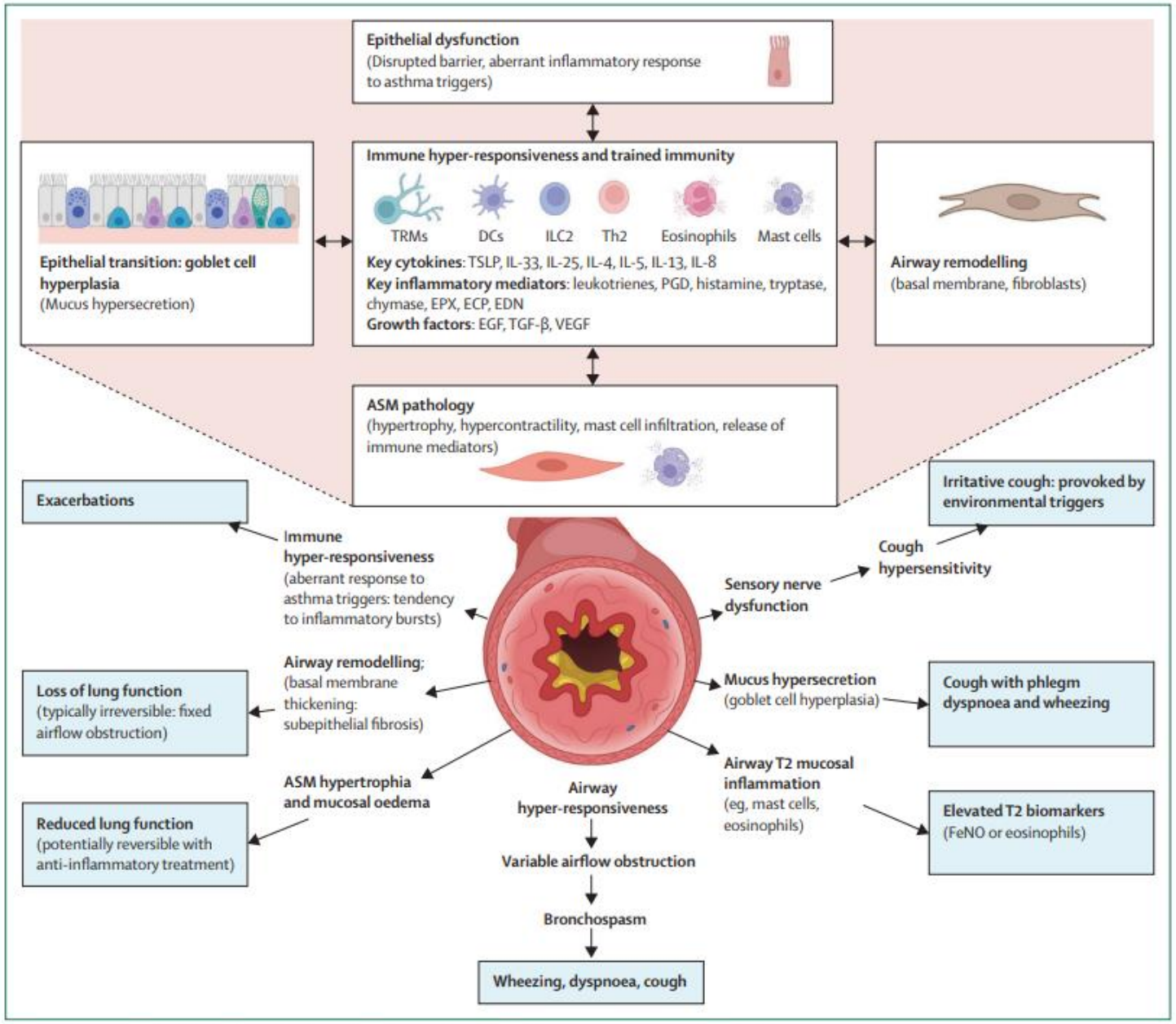


Figure 1: **Key pathophysiological mechanisms of asthma and resulting disease components and clinical features**

Porsbjerg, Melén et al, *Lancet* 2023

Från barn till vuxen ålder

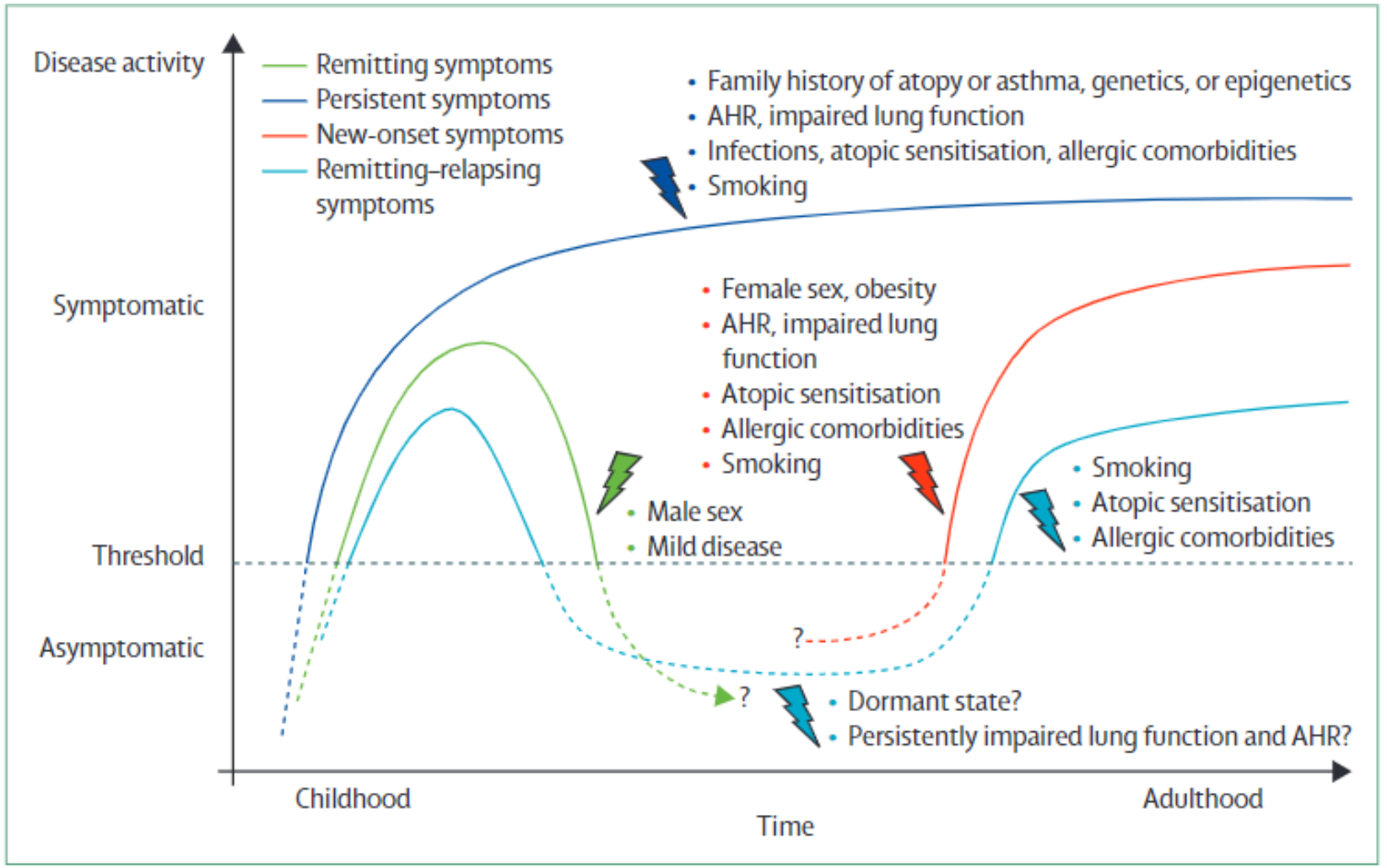
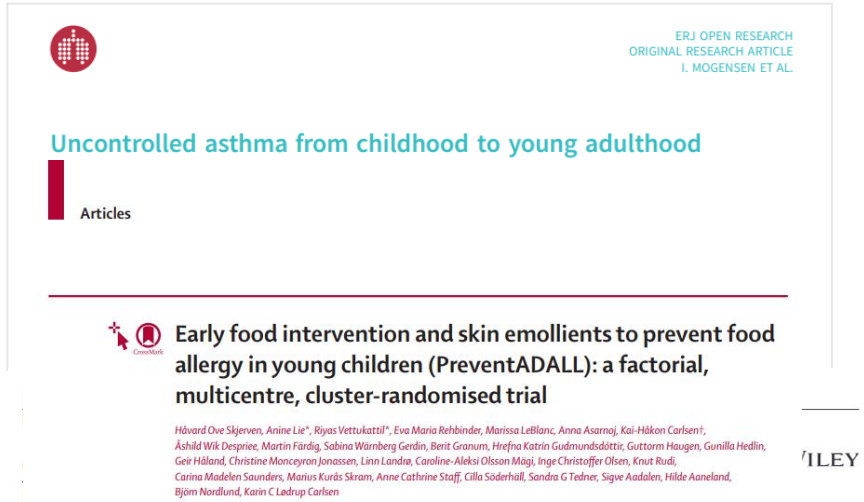


Figure 2: **Determinants of disease course across asthma transition and ages**

Fuchs et al, *Lancet RM* 2017

Hur kan vi optimera behandlingen?

- Svårighetsgrad av astma →
- Atopi, poly-sensibilisering →
- Eosinofili →
- Allergisk samsjuklighet →
- Annan samsjuklighet (tex fetma) →
- Lung- / luftvägsinfektioner →
- Nedsatt lungfunktion →
- Bronkiell hyperreaktivitet →



Natural course of pollen-induced allergic rhinitis from childhood to adulthood: A 20-year follow up

Magnus Lindqvist[1] | Katja Biering Leth-Møller[2] | Allan Linneberg[2,3] | Inger Kull[4] | Anna Bergström[5,6] | Antonios Georgellis[5,6] | Magnus P. Borres[7] | Agneta Ekebom[8] | Marianne van Hage[1] | Erik Melén[4] | Marit Westman[1,9]

Lunghälsa! (vaccinationer, profylax etc)

Seminar

Asthma

Celeste Porsbjerg, Erik Melén, Lauri Lehtimäki, Dominick Shaw

Asthma is one of the most common chronic non-communicable diseases worldwide and is characterised by variable airflow obstruction, causing dyspnoea and wheezing. Highly effective therapies are available; asthma morbidity and mortality have vastly improved in the past 15 years, and most patients can attain good asthma control. However, undertreatment is still common, and improving patient and health-care provider understanding of when and how to adjust treatment is crucial. Asthma management consists of a cycle of assessment of asthma control and risk factors and adjustment of medications accordingly. With the introduction of biological therapies, management of severe asthma has entered the precision medicine era—a shift that is driving clinical ambitions towards disease remission. Patients with severe asthma often have co-existing conditions contributing to their symptoms, mandating a multidimensional management approach. In this Seminar, we provide a clinically focused overview of asthma; epidemiology, pathophysiology, diagnosis, and management in children and adults.

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S0140-6736(22)02125-0

Department of Respiratory and Infectious Diseases, Bispebjerg Hospital, Copenhagen, Denmark (Prof C Porsbjerg MD PhD); **Institute of Clinical Medicine, University of Copenhagen, Copenhagen, Denmark** (Prof C Porsbjerg); **Department**

EUROPEAN RESPIRATORY JOURNAL
SERIES
D. THOMAS ET AL.

Asthma remission: what is it and how can it be achieved?

Dennis Thomas [1], Vanessa M. McDonald [1,2], Ian D. Pavord [3] and Peter G. Gibson [1,2]

Number 7 in the series "Innovations in asthma and its treatment"
Edited by P. O'Byrne and I. Pavord

Remission är en medicinsk term för ett tillstånd utan symptom på sjukdom.

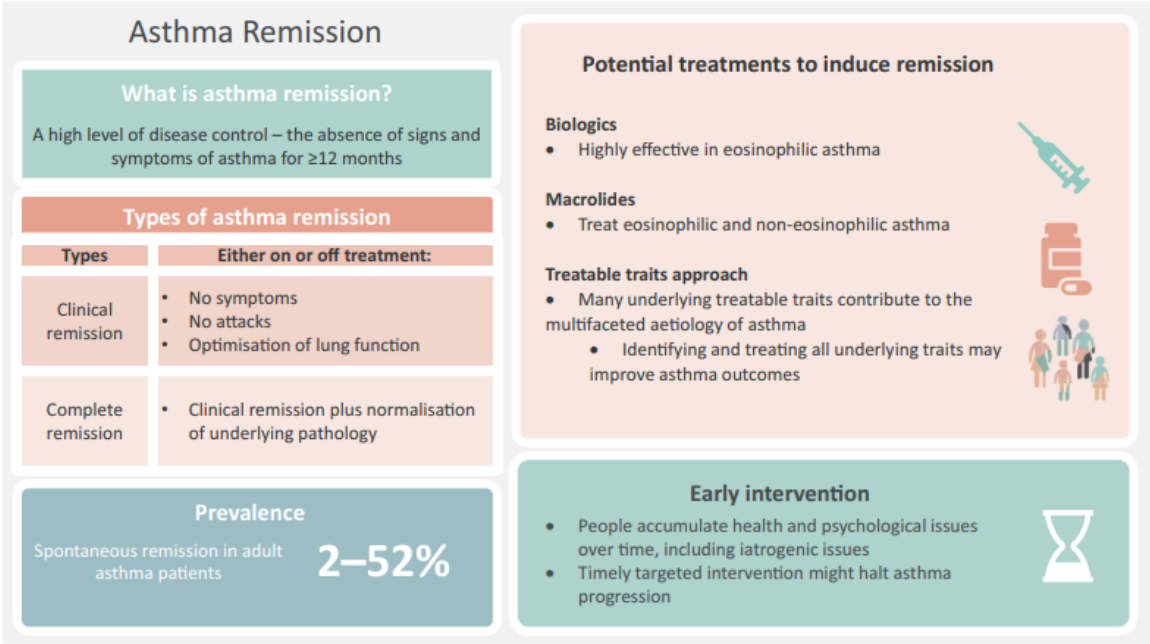

TABLE 1 Types and measures of asthma remission

Type	Criteria	Assessments
Clinical remission	No symptoms	Sustained absence of significant asthma symptoms established using a validated instrument (*e.g.* ACQ score ⩽1 or ACT score ⩾20); the use of relievers is not permitted during the remission period
	No exacerbations	The use of systemic corticosteroids for exacerbation treatment is not permitted during the remission period; hospitalisation or emergency department visit or unscheduled doctor visit for asthma exacerbation management are also not permitted during the remission period
	Optimisation of lung function	Example: post-bronchodilator FEV_1 ⩾80% predicted
Complete remission	Clinical remission plus normalisation of underlying pathology	No evidence of current inflammation established using either blood eosinophil count (<300 cells·μL^{-1}), sputum eosinophil count (<3%) or F_{ENO} (<40 ppb) [97, 98]; other measures of underlying pathology may include a negative bronchial hyperresponsiveness test (*e.g.* histamine or methacholine provocation tests) or degree of subepithelial fibrosis (subepithelial thickness)

Both clinical and complete remission can be achieved either on treatment or off treatment. ACQ: Asthma Control Questionnaire; ACT: Asthma Control Test; FEV_1: forced expiratory volume in 1 s; F_{ENO}: exhaled nitric oxide fraction. With acknowledgement of [8].

Hur vanligt är remission i studier?
– ca *10–30%*

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Childhood factors associated with complete and clinical asthma remission at 25 and 49 years

Orestes A. Carpaij | Maartje A.E. Nieuwenhuis | Gerard H. Koppelman | Maarten van den Berge | Dirkje S. Postma | Judith M. Vonk See Less

European Respiratory Journal 2017; 49(6): 1601974; DOI: https://doi.org/10.1183/13993003.01974-2016

*In conclusion, our study shows that over 39 years of follow-up, it is indeed possible to have persistent asthma remission after having childhood asthma, even though this was evident in **only 11%** of the subjects under investigation.*

*When complete remission is present at age 25, **75%** of this group have persistent remission to age 49.*

Thorax 2014

Chronic obstructive pulmonary disease

Editor's choice
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ORIGINAL ARTICLE

The association between childhood asthma and adult chronic obstructive pulmonary disease

Andrew Tai,[1] Haily Tran,[2] Mary Roberts,[3] Nadeene Clarke,[2] John Wilson,[4] Colin F Robertson[2,5]

Table 2 Outcome at the age of 50 by recruitment groups

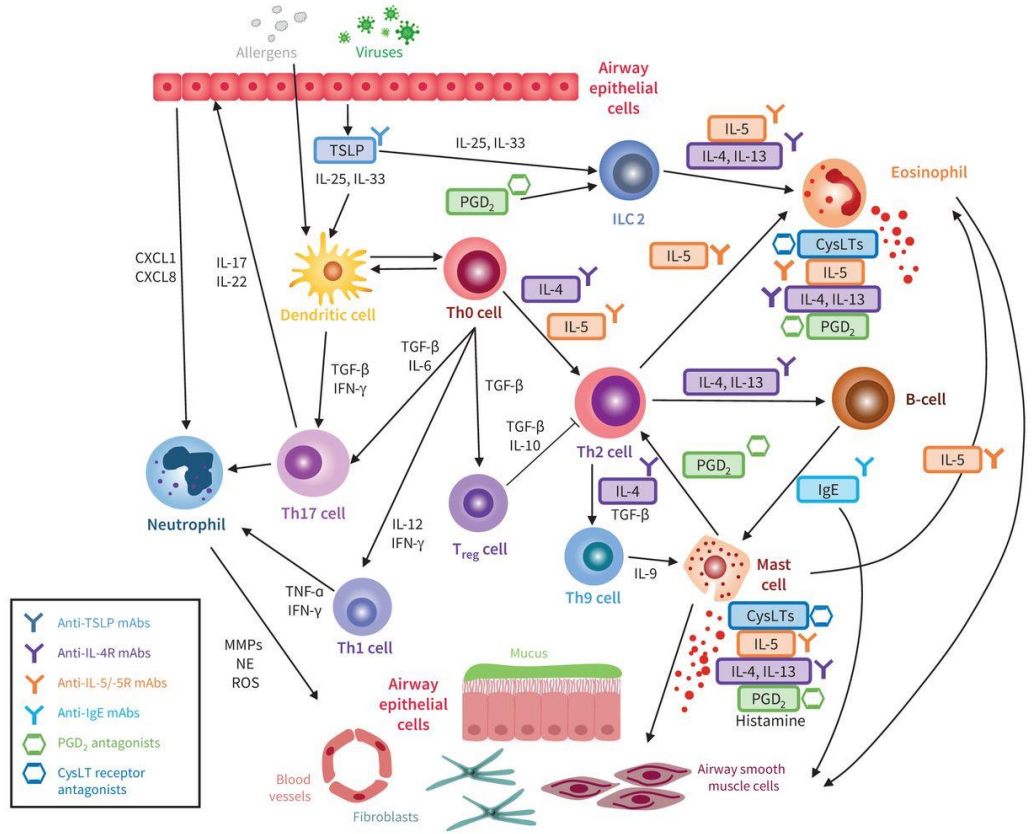
	Asthma remission (n=57)	Current asthma (n=65)	COPD (n=27)
MWB	11/23 (48%)	11/23 (48%)	1/23 (4%)
WB	24/43 (56%)	16/43 (37%)	3/43 (7%)
A	17/49 (35%)	24/49 (49%)	8/49 (16%)
SA	5/34 (15%)	14/34 (41%)	15/34 (44%)

1/48 of the control group had COPD at the age of 50.

MWB = Mild wheezy bronchitis, WB = Wheezy bronchitis
A = Asthma, SA = Severe asthma

Kan biologiska Im hjälpa?

- 20-50% remission av svår astma
- Individanpassad behandling (precision medicine)
- Till patienter med hög sjukdomsaktivitet (dvs pågående inflammation)



EUROPEAN RESPIRATORY REVIEW
REVIEW
W.W. BUSSE ET AL.

Holy Grail: the journey towards disease modification in asthma

William W. Busse[1], Erik Melén[2] and Andrew N. Menzies-Gow[3]

[1]Dept of Medicine, Division of Allergy, Pulmonary and Critical Care Medicine, University of Wisconsin School of Medicine and Public Health, Madison, WI, USA. [2]Dept of Clinical Science and Education Södersjukhuset, Karolinska Institutet and Sachs' Children's Hospital, Stockholm, Sweden. [3]Dept of Respiratory Medicine, Royal Brompton Hospital, London, UK.

The NEW ENGLAND JOURNAL of MEDICINE

REVIEW ARTICLE

Darren B. Taichman, M.D., Ph.D., *Editor*

Biologic Therapies for Severe Asthma

Guy G. Brusselle, M.D., Ph.D., and Gerard H. Koppelman, M.D., Ph.D.

EDITORIALS

Check for updates

Remission in the World of Severe Asthma

Pavord, I. *AJRCCM* 2024

› Am J Respir Crit Care Med. 2025 Jan 21. doi: 10.1164/rccm.202412-2431VP. Online ahead of print.

Stop the Asthma Treatment Elevator, We Need to Get Off!

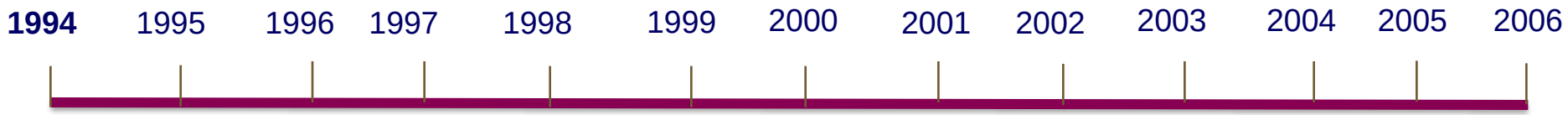
Andy Bush [1], Ian D Pavord [2]

Affiliations + expand

PMID: 39836435 DOI: 10.1164/rccm.202412-2431VP

*So the key question in treating the asthma patient is, what is the **level of disease activity**? Is there active, ongoing **type-2 airway inflammation** which needs to be treated early and energetically to prevent short- and medium-term attacks and severe asthma respectively, or has the **disease burnt out**, in which case treatment targeting disease activity should **be reduced**?*

BAMSE-studien 1994-



Baseline questionnaire
4 089 100%
PM, NO_2 , indoor environment

5 488
(75%)

1-year questionnaire
3 925 96%

2-year questionnaire
3 843 94%

4-year follow-up

Questionnaire	3 729	91%
Dust	3 610	97%
PEF	2 966	80%
Blood, DNA	2 614	70%
Urine	1 033	25%

8-year follow-up

Questionnaire	3 417	84%
Spirometry	2 613	64%
Food freq quest	2 630	64%
Blood, DNA	2 461	60%

12-year follow-up
Questionnaire

Parent	3 356	82%
Children	2 795	68%
Parent or child	3 369	82%

16-year follow-up

Questionnaire	3 247	79%
Spirometry	2 312	57%
Impulse Oscil.	2 300	57%
FeNO	2 300	57%
Blood, DNA, RNA	2 547	63%
Patch test	2 285	56%

24-year follow-up

Questionnaire	3064	75%
Examination	2270	56%
Spirometry	2039	50%
N_2 washout	1660	41%
FeNO	1926	47%
Blood pressure	2268	55%
Blood	2234	55%
Nasal sample	661	16%
Urine	2235	55%
Saliva	1596	39%

COVID-19

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Plasticity of Individual Lung Function States from Childhood to Adulthood

Gang Wang , Jenny Hallberg ; Rosa Faner , Hans-Jacob Koefoed , Simon Kebede Merid , Susanna Klevebro , Sophia Björkander , Olena Gruzieva , Göran Pershagen , Marianne van Hage , Stefano Guerra , Matteo Bottai , Antonios Georgelis , Ulrike Gehring , Anna Bergström , Judith M. Vonk , Inger Kull , Gerard H Koppelman ; Alvar Agusti , and Erik Melén ... Show less

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https://doi.org/10.1164/rccm.202203-0444OC PubMed: 36409973

Received: March 03, 2022 Accepted: November 21, 2022

Abstract | PDF

Astma och Allergiförbundet

SPRÅK | LYSSNA | SÖK

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Hopp för barn med svår astma

Det är viktigt att ha en bra lungfunktion som barn, eftersom det minskar risken för lungsjukdomar senare i livet. Men det går att komma upp i en normal funktion även om man som barn haft en sänkt nivå. Det visar en ny studie från det stora Bamse-projektet.

Forskning har visat att om vår lungfunktion av någon anledning inte utvecklas normalt när vi är barn till följd av till exempel infektioner, luftföroreningar, allergi eller svår astma, kan det bli svårt att ta igen det och få en normal lungfunktion som vuxen. Detta ökar i sin tur risken för att drabbas av lungsjukdom senare i livet.

Forskarna bakom den nya studien ville undersöka vilka möjligheter det ändå finns att påverka den här utvecklingen. Mätningar av lungfunktionen gjordes på drygt 3 000 deltagare från den stora befolkningsstudien Bamse*.

Möjligt komma ifatt senare

Resultatet visar att även om lungfunktionen vanligtvis följer sin tillväxtkurva, kan barn med sänkt lungfunktion ändå komma upp i en normal lungfunktion på sikt.

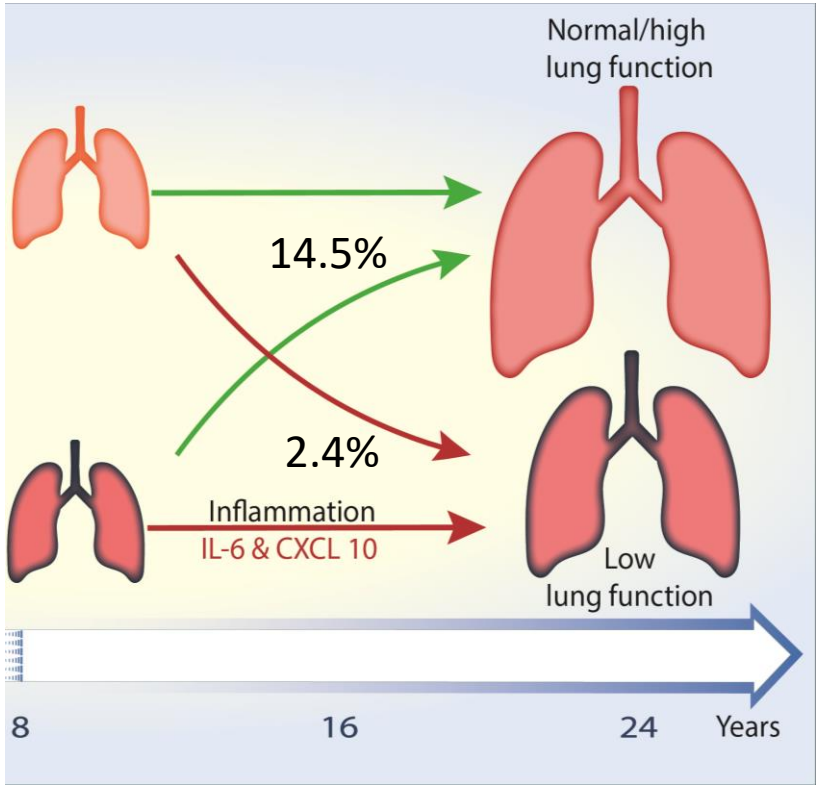
Från barn till vuxen och lungtillväxt

Check for updates

ORIGINAL ARTICLE *AJRCCM* 2023

Plasticity of Individual Lung Function States from Childhood to Adulthood

Gang Wang[1,2,3,4], Jenny Hallberg[2,5], Rosa Faner[6,7], Hans-Jacob Koefoed[8], Simon Kebede Merid[2], Susanna Klevebro[2,5], Sophia Björkander[2], Olena Gruzieva[3,9], Göran Pershagen[3,9], Marianne van Hage[10], Stefano Guerra[11,12], Matteo Bottai[13], Antonios Georgelis[9], Ulrike Gehring[14], Anna Bergström[3,9], Judith M. Vonk[8,15], Inger Kull[2,5], Gerard H. Koppelman[8,16], Alvar Agusti[6,7,17,18*], and Erik Melén[2,5*]

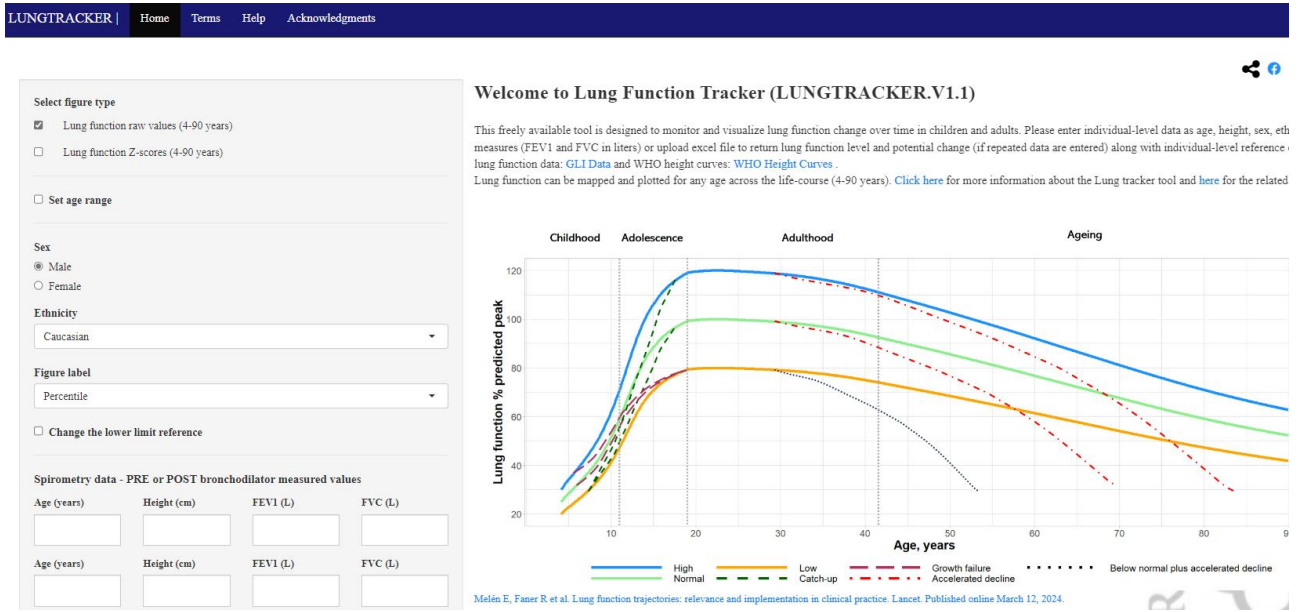


Review

Lancet 2024

Lung-function trajectories: relevance and implementation in clinical practice

Erik Melén*, Rosa Faner*, James P Allinson, Dinh Bui, Andrew Bush, Adnan Custovic, Judith Garcia-Aymerich, Stefano Guerra, Robab Breyer-Kohansal, Jenny Hallberg, Lies Lahousse, Fernando D Martinez, Simon Kebede Merid, Pippa Powell, Hilary Pinnock, Sanja Stanojevic, Lowie E G W Vanfleteren, Gang Wang, Shyamali C Dharmage†, Jadwiga Wedzicha†, Alvar Agusti†, CADSET Investigators‡



Lansering av "Lung Function Tracker" för att kartlägga utveckling och förändring av lungfunktionen

ERJ OPEN RESEARCH
ORIGINAL RESEARCH ARTICLE
H.J.L. KOEFOED ET AL.

Childhood lung function is associated with adolescent-onset and persistent asthma

Hans Jacob L. Koefoed[1,2,3], Anhar Ullah[4], Jenny Hallberg[3,5], Simon Kebede Merid[3], Maura M. Kere[3], Lesley Lowe[6,7], Angela Simpson[6,7], Clare S. Murray[6,7], Ulrike Gehring[8], Roel Vermeulen[8], Inger Kull[3], Anna Bergström[9,10], Judith M. Vonk[2,11], Adnan Custovic[4], Erik Melén[3,5] and Gerard H. Koppelman[1,2]

Shareable abstract (@ERSpublications)
Subjects who develop asthma during adolescence have a lower FEV_1 and FEV_1/FVC at age 8 years. A lower lung function in childhood may either be a risk factor or an early manifestation of "subclinical" adolescent-onset asthma. https://bit.ly/3zkQKB1

Cite this article as: Koefoed HJL, Ullah A, Hallberg J, *et al*. Childhood lung function is associated with adolescent-onset and persistent asthma. *ERJ Open Res* 2024; 10: 00469-2024 [DOI: 10.1183/23120541.00469-2024].

Received: 5 June 2023 | Revised: 8 December 2023 | Accepted: 17 December 2023
DOI: 10.1111/all.16024

ORIGINAL ARTICLE
Asthma and Lower Airway Disease

Allergy WILEY

Infant lung function and early skin barrier impairment in the development of asthma at age 3 years

Martin Färdig[1,2] | Angela Hoyer[1,2] | Catarina Almqvist[2,3] | Karen Eline S. Bains[4,5] | Karin C. Lødrup Carlsen[4,5] | Hrefna Katrín Gudmundsdóttir[4,5] | Berit Granum[6] | Guttorm Nils Haugen[4,7] | Gunilla Hedlin[1,2] | Christine Monceyron Jonassen[8,9] | Jon R. Konradsen[1,2] | Anine Lie[4,5] | Eva Maria Rehbinder[4,10] | Håvard O. Skjerven[4,5] | Anne Cathrine Staff[4,7] | Riyas Vettukattil[4,5] | Cilla Söderhäll[1,2] | Björn Nordlund[1,2]

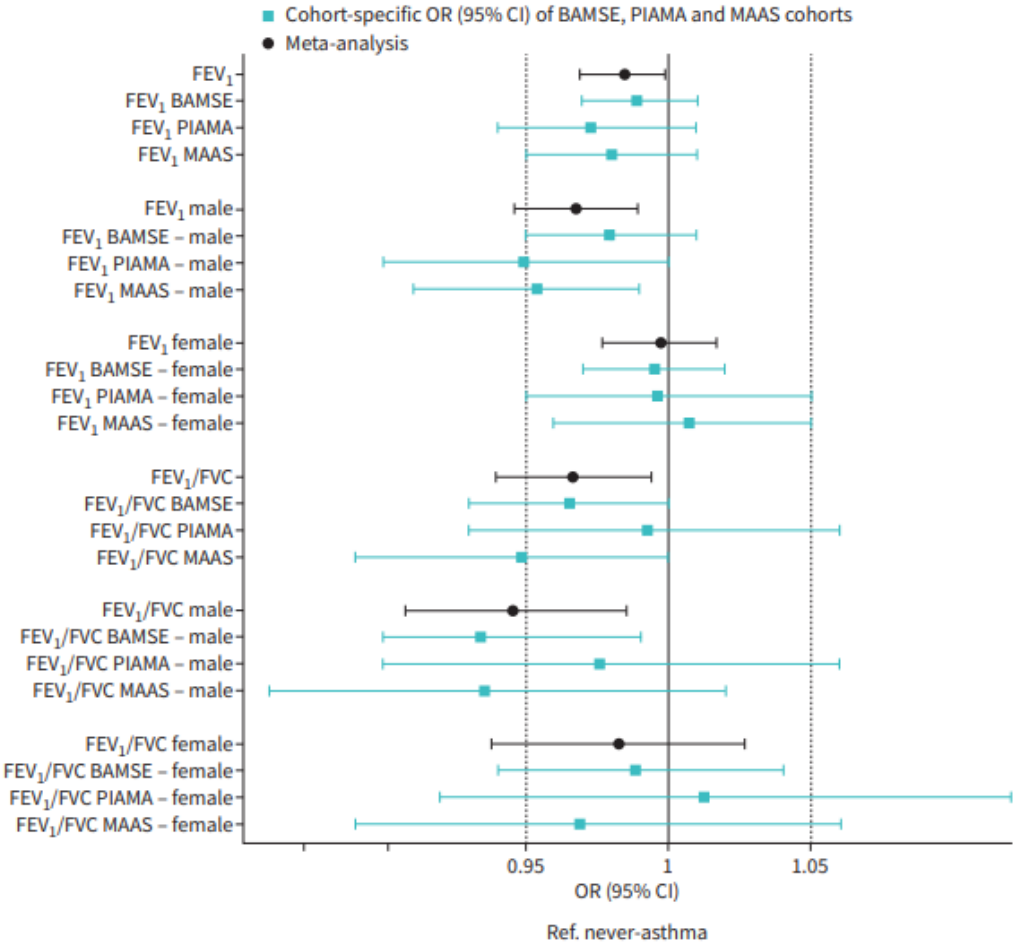


FIGURE 1 Meta-analysis and cohort-specific OR (95% CI) of BAMSE, PIAMA and MAAS cohorts on the association between lung function at age 8 years and adolescent-onset asthma *versus* never-asthma (adjusted for BMI at age 8 years, SES and allergic sensitisation to common inhalant allergens at age 8 years). FEV_1 is investigated using % predicted (Global Lung Function Initiative) while FEV_1/FVC is investigated as a percentage and adjusted for age, sex and height. BMI: body mass index; SES: socioeconomic status; FEV_1: forced expiratory volume in 1 s; FVC: forced vital capacity.

Lung function in young adulthood in relation to moderate-to-late preterm birth

Björn Lundberg[1,2], Simon Kebede Merid[1], Petra Um-Bergström[1,2], Gang Wang[1,3], Anna Bergström[4,5], Sandra Ekström[1,4,5], Inger Kull[1,2], Erik Melén[1,2] and Jenny Hallberg[1,2]

TABLE 4 Characteristics of identified latent lung function classes in individuals born moderate-to-late preterm

	Class 1: "Preterm reference"	Class 2: "Asthma-like"	Class 3: "Dysanapsis-like"
n (%)	50 (45.5)	40 (36.4)	20 (18.2)
Probability for F_{ENO} >25 ppb (95% CI)	0.06 (0.02–0.22)	0.18 (0.09–0.35)	0.07 (0.01–0.36)
FEV_1, z-score	−0.24±0.49	−1.23±0.54	1.05±0.54
FEV_1/FVC, z-score	0.04±0.63	−1.28±0.60	−0.52±0.51
FVC, z-score	−0.30±0.45	−0.41±0.75	1.29±0.49
LCI	5.88±0.33	6.08±0.39	5.84±0.25
Post-bronchodilator FEV_1 increase, %	1.38±2.54	6.72±2.40	2.92±2.35

Analysis based on input from spirometry, F_{ENO} and MBW data at 24-year follow-up. Data presented as mean±SD unless otherwise indicated. Z-scores were computed according to 2012 Global Lung Initiative reference values. F_{ENO}: fractional exhaled nitric oxide; FEV_1: forced expiratory volume in 1 s; FVC: forced vital capacity; LCI: lung clearance index.

Shareable abstract (@ERSpublications)

Peak lung function is impaired in males born moderate-to-late preterm, while preterm females catch up between ages 16 and 24 years in this regard (FEV_1). Several phenotypes of lung function impairment exist in individuals born moderate-to-late preterm. https://bit.ly/3R8xBc3

Cite this article as: Lundberg B, Merid SK, Um-Bergström P, *et al*. Lung function in young adulthood in relation to moderate-to-late preterm birth. *ERJ Open Res* 2024; 10: 00701-2023 [DOI: 10.1183/23120541.00701-2023].

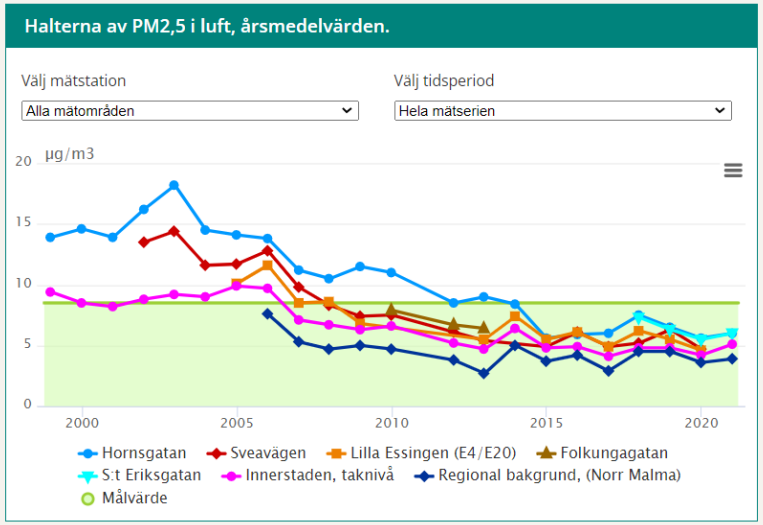
Bättre luft – mindre astma, större lungor!

ERJ 2023

EUROPEAN RESPIRATORY JOURNAL
ORIGINAL RESEARCH ARTICLE
Z. YU ET AL.

Associations of improved air quality with lung function growth from childhood to adulthood: the BAMSE study

Zhebin Yu[1], Simon Kebede Merid[2], Tom Bellander[1,3], Anna Bergström[1,3], Kristina Eneroth[4], Antonios Georgelis[1,3], Jenny Hallberg[2,5], Inger Kull[2,5], Petter Ljungman[1,6], Susanna Klevebro[2,5], Massimo Stafoggia[1,7], Gang Wang[1,2], Göran Pershagen[1,3], Olena Gruzieva[1,3] and Erik Melén[2,5]



- Bättre luftkvalitet i Stockholm sedan år 2000
- BAMSE-studien visar
  - **Bättre luft – större lungor**
  - **Bättre luft – mindre astma**

Annals ATS 2024

Annals of the American Thoracic Society

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Improved Air Quality and Asthma Incidence from School-Age to Young Adulthood: A Population-based Prospective Cohort Study

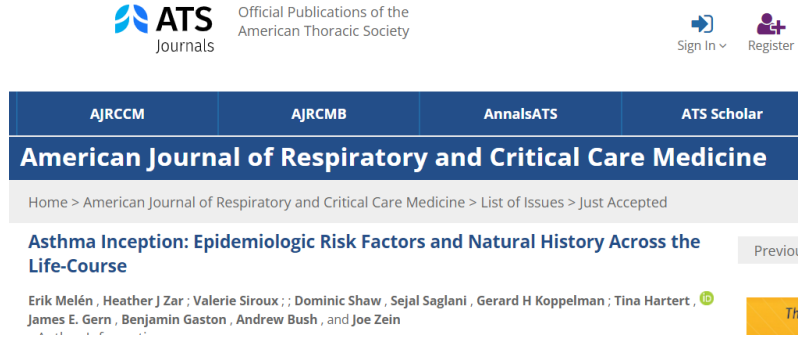
Zhebin Yu , Simon Kebede Merid , Tom Bellander ; Anna Bergström , Kristina Eneroth , Anne-Sophie Merritt , Maria Ödling , Inger Kull , Petter Ljungman , Susanna Klevebro , Massimo Stafoggia , Christer Janson , Gang Wang , Göran Pershagen , Erik Melén , and Olena Gruzieva ... Show less

Sammanfattning

- Astma representerar heterogen sjukdomsgrupp och kan debutera under hela livet
- Sjukdomen är vanligen kronisk men symptom är inte kroniska över tid
- Astma i barndomen viktig riskfaktor för senare kronisk sjukdom – primärprevention viktig
- Flera kliniska markörer (treatable traits) för kvarstående astma välkända
- Botande behandling finns inte idag, men….
- Undersök, karaktärisera, utvärdera → personalized medicine → **remission**

Lung Function Tracker
https://gli-calculator.ersnet.org/lung_tracker/

AJRCCM 2024



Lancet 2024

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