Assessing & Monitoring Asthma & its Phenotypes

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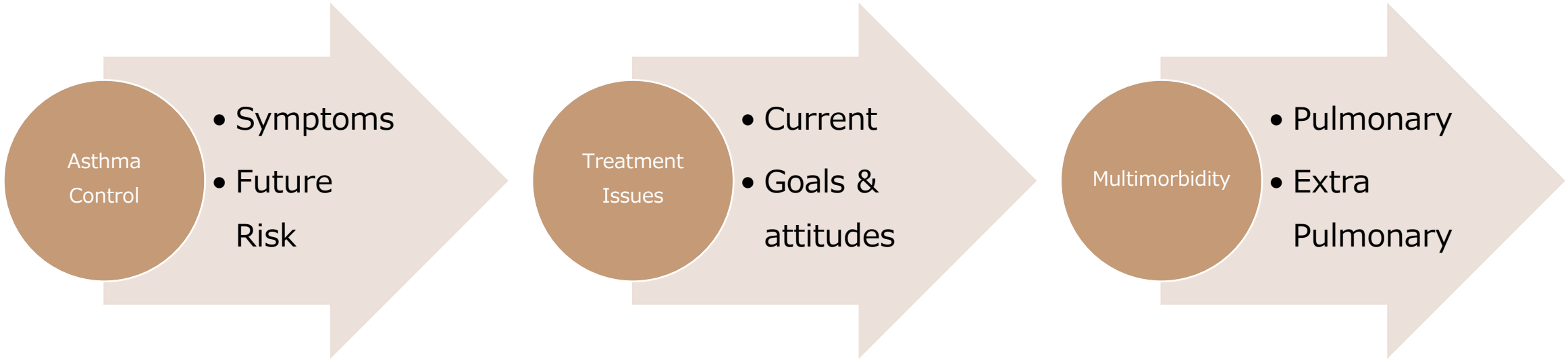
Assessment of Asthma

Discordant Asthma control Assessment by patient vs physician

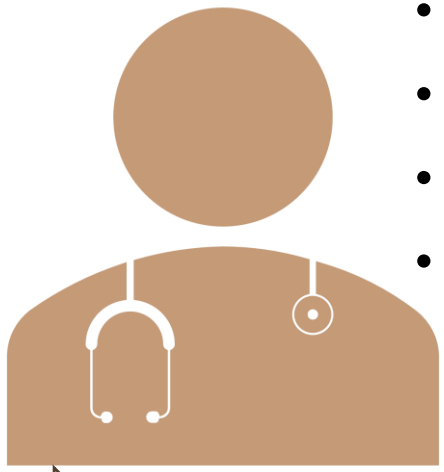


50% asthmatics continue to be Uncontrolled & at risk for future exacerbations

Assessments: Asthma Control

Symptom Control

- Symptom Control :
  1. Daytime
  2 Nocturnal
  3 Activity
  4 SABA* use (2 /week)

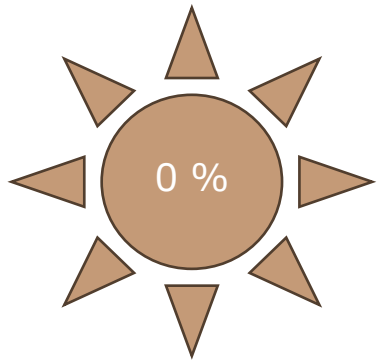


- About Past 4 weeks
- Every Visit
- Direct Questioning
- Tools :

  Simple : GINA / PACS

  Categorical : Research

  Numerical : ACT / ACQ
- Before Exercise SABA X



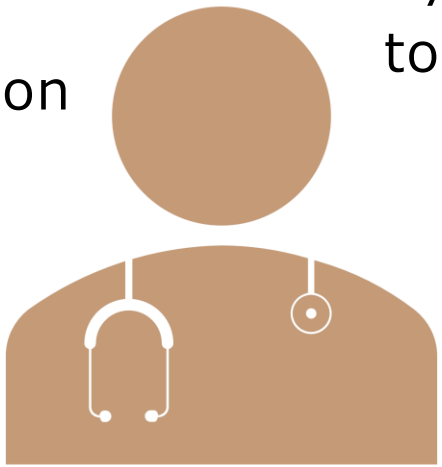
Well Controlled, Partially Controlled Uncontrolled

* Not for patients on AIR

Assessments: Asthma Control

Future Risk

- Risk for Poor Outcomes
  1. Exacerbations
  2. Persistent Airflow Obstruction
  3. Medication side effects

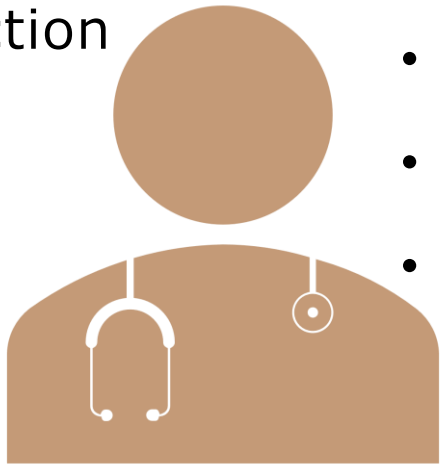


- Symptoms alone are not sufficient to assess asthma:
  - Poor perceivers
  - Non respiratory causes of Sx
  - Sx controlled by sham treatments
  - Anxiety / Depression

Assessments: Asthma Control

Future Risk : Exacerbations

- Risk for Poor Outcomes
  1. Exacerbations : future Risk
  2. Persistent Airflow Obstruction
  3. Medication side effects



- Past exacerbation in last 1 year
- Poor adherence
- Incorrect technique
- Chronic sinusitis
- Smoking

Low FEV_1 is a strong predictor of Exacerbations

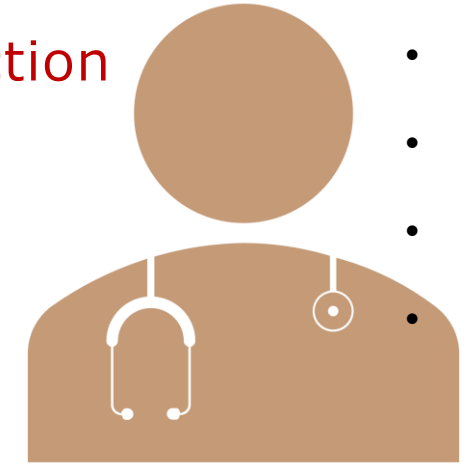
Risk for Exacerbations: *Others*

- Medication: High SABA & Low ICS use
- Others: Pregnancy, Food allergy and multimorbidity
- Exposures : Allergen / Pollution / Smoke
- Psychosocial : Poor support
- Type 2 Inflammation: ↑AEC & FeNO
- Severe Exacerbation : Intubated or ICU

Assessments: Asthma Control

Future Risk :PAO

- Risk for Poor Outcomes
  1. Exacerbations
  2. Persistent Airflow Obstruction
  3. Medication side effects



- Fast decline in lung functions
- Low birth weight / pre term
- Smoking / Noxious inhalational agents
- Chronic Mucus Hypersecretion
- Asthma exacerbation in patient not on ICS

Assessments: Asthma Control

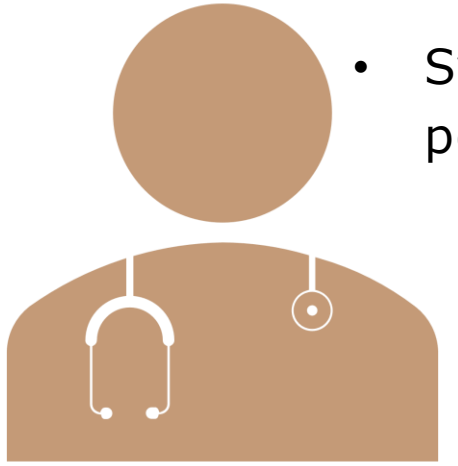
Future Risk : Medication Side-Effects

- Risk for Poor Outcomes
  1. Exacerbations
  2. Persistent Airflow Obstruction
  3. Medication side effects

P450i combined with asthma therapy increase toxicity :

Short term : CVS effects of LABA's

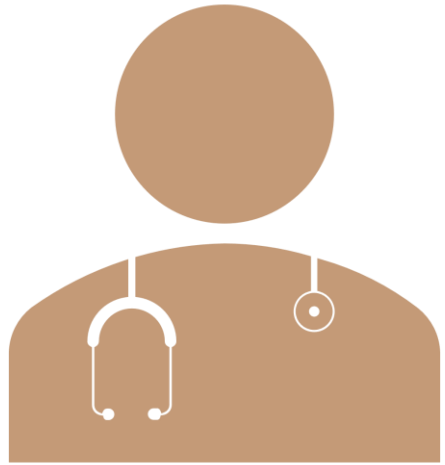
Long term : Adrenal Suppression



- Local : (incorrect technique)
  - Oral Thrush / Dysphonia
- Systemic : (higher doses / more potent ICS)
  - Easy bruising
  - Osteoporosis / fragility #
  - Cataracts / Glaucoma
  - Adrenal suppression

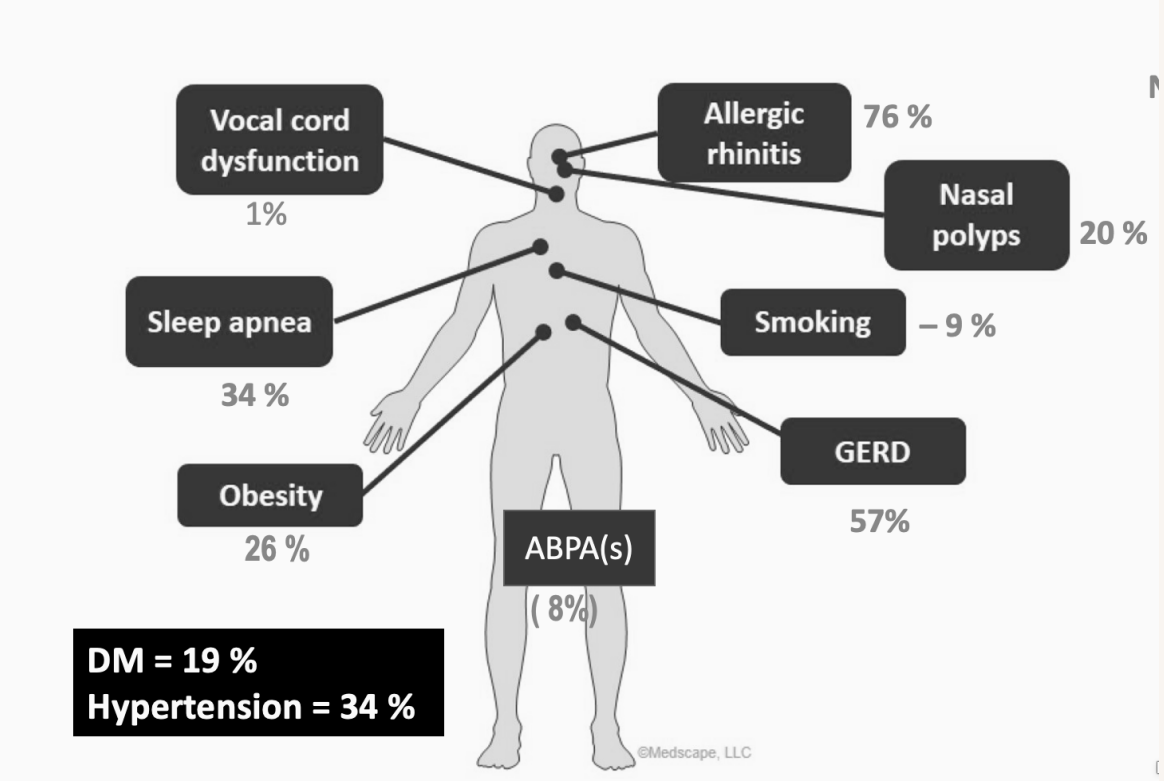
Assessments: Treatment Issues

- Current Treatment :
  - 1.GINA Step
  - 2 Adherence / Technique
  - 3 Asthma Action Plan
  - 4 Attitudes & Goals : Label/ Treatment



Well Controlled, Partially Controlled Uncontrolled

Assessments: Multimorbidity



- Pulmonary :
  - Rhinitis
  - Rhinosinusitis
- Extra-Pulmonary :
  - Obesity
  - GERD
  - OSA
  - Anxiety / Depression

➢ 99% SA patient's had at least 1 comorbidity

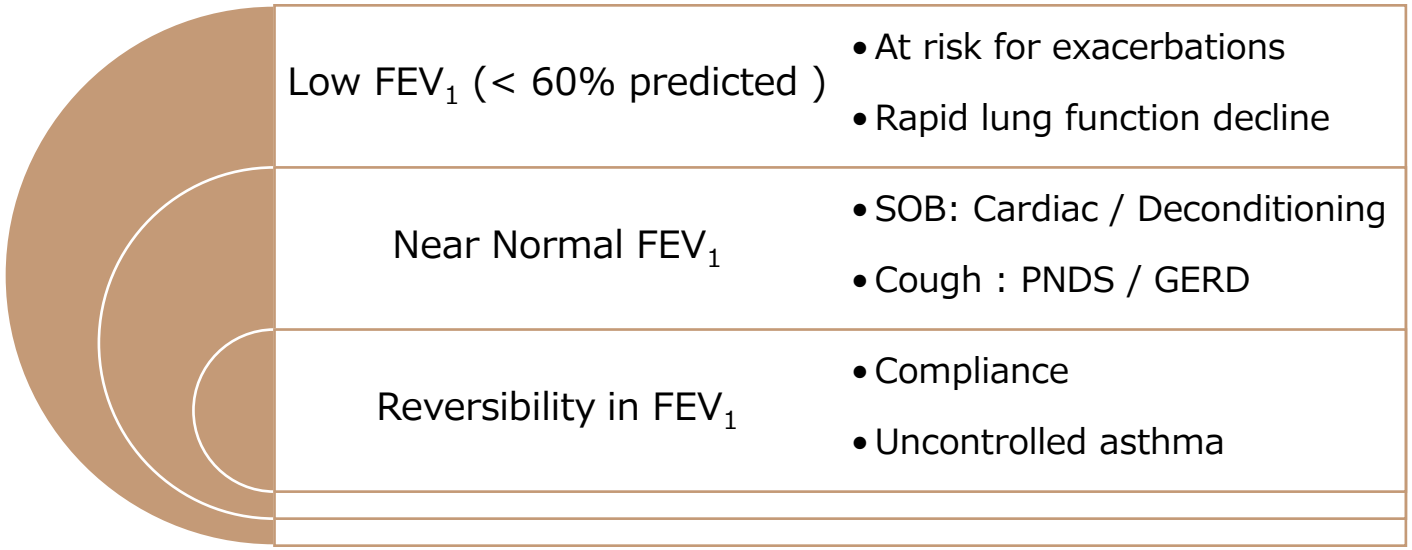
Talwar D, Lung India 2022;39:393-400.

Role of Lung Functions in Assessment

Lung functions do not strongly correlate with asthma control

- At Diagnosis or Start of treatment
- 3-6 months after ICS treatment
- 1-2 Yearly (more frequent in at risk for AE / decline at lung functions
- No need to hold medications prior to repeat PFT’s & do both pre & post

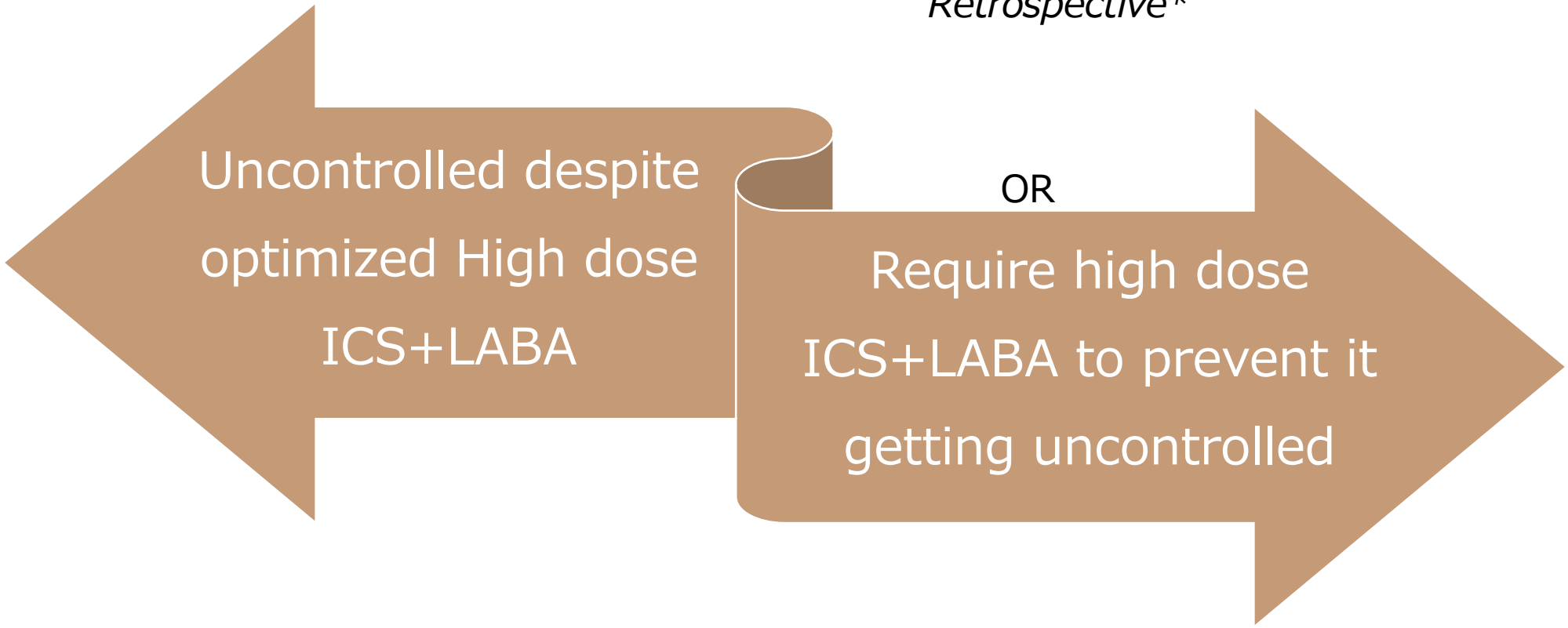
Interpretation of PFT on Treatment in Asthma



10% improvement or decline in FEV_1 is considered threshold MID for better or worsening asthma

Asthma Severity : *Severe Asthma**

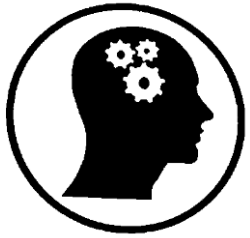
*Retrospective**



* Several months

Difficult Asthma # SA

5 Steps



Confirm Diagnosis of Asthma

✓ 1/4th

.✓ 1/3rd

Ongoing exposure to asthma triggers

Nonadherence to therapy

✓ 1/2

.✓ 1/3rd

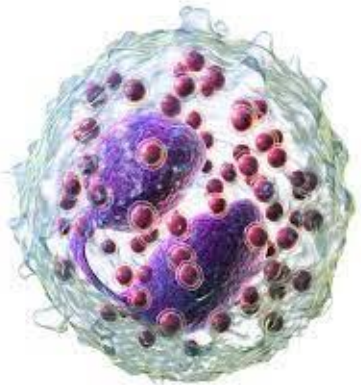
Comorbidities and psychosocial factors

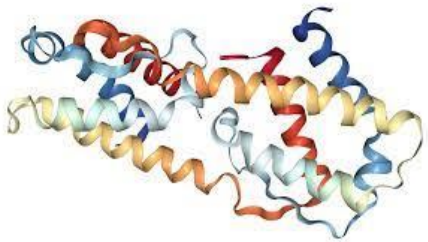
Incorrect inhaler technique

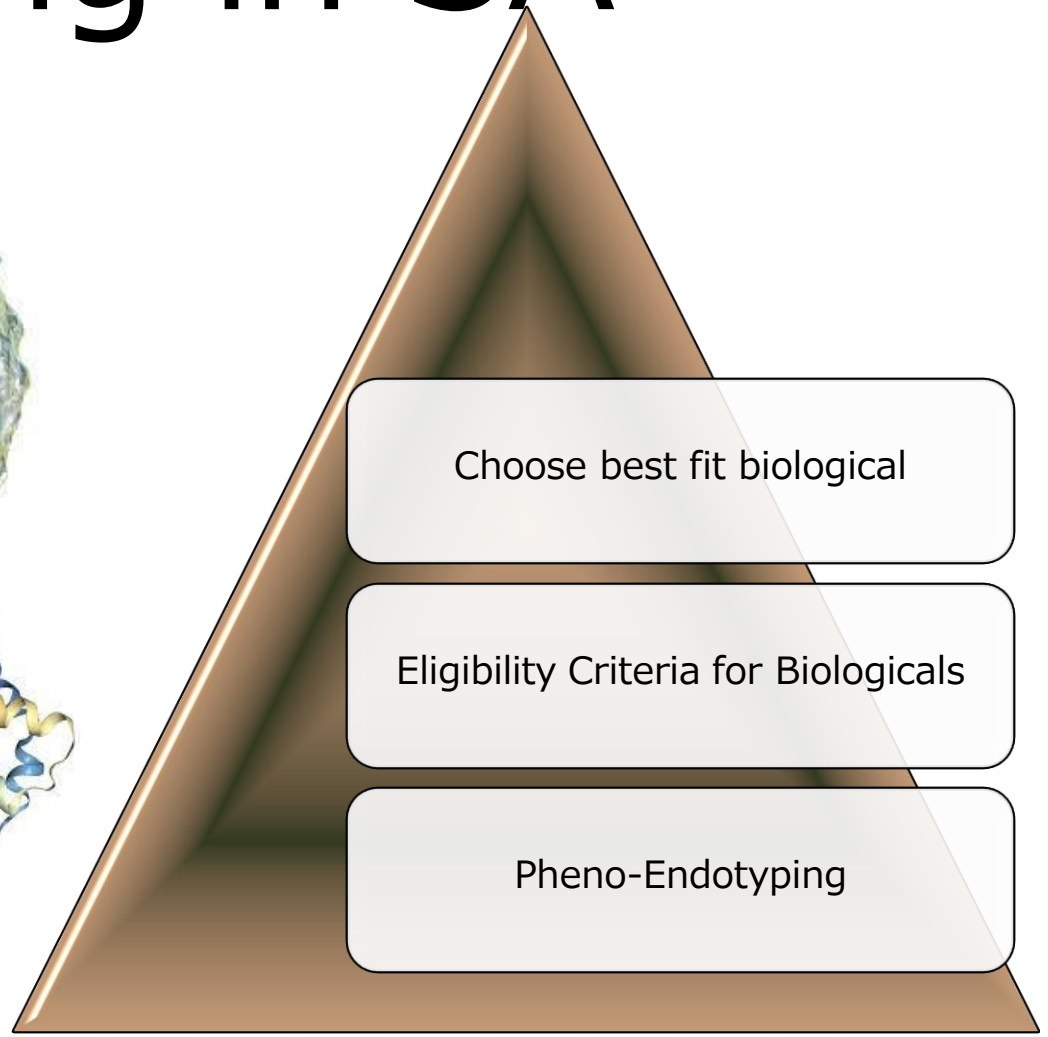
.✓ 1/3rd

Respiratory Medicine, vol. 106, no. 2, pp. 205–214, 2012.

Pheno-Endotyping in SA

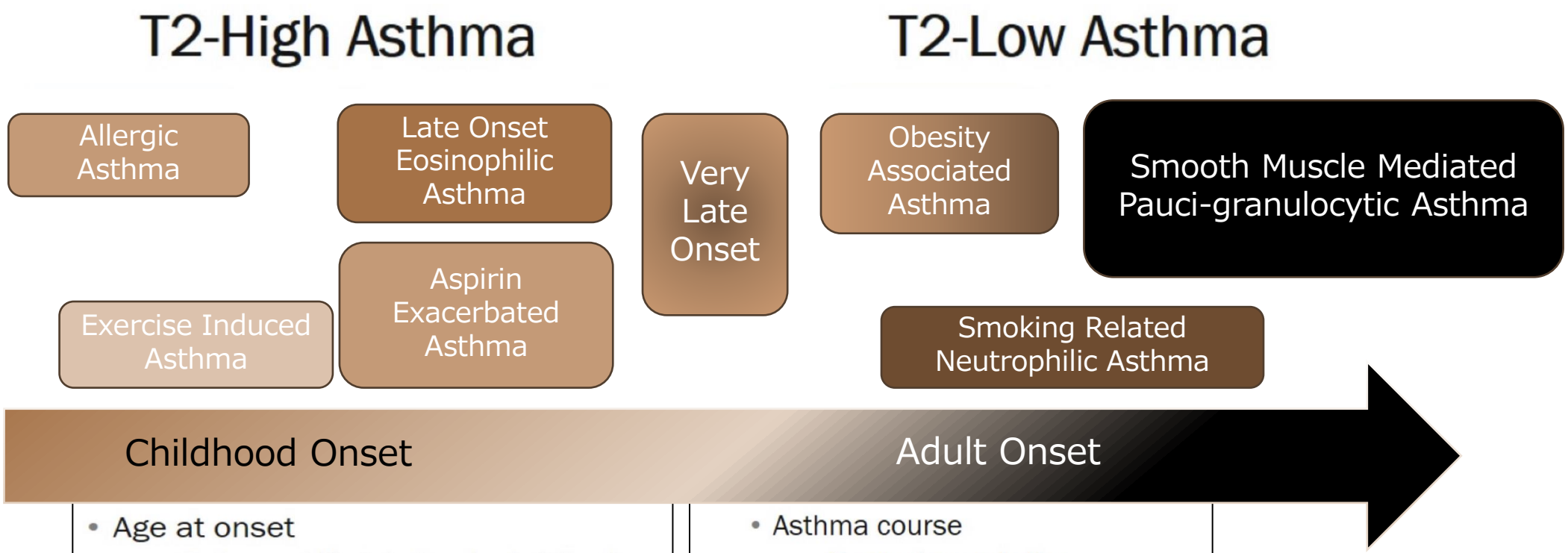






Observable Feature vs Pathobiological mechanism

Phenotypes Severe Asthma

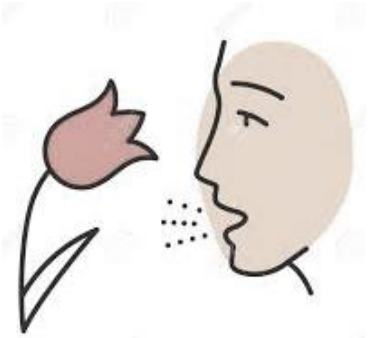


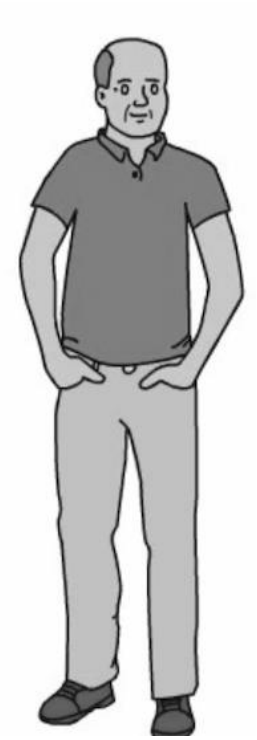
- Age at onset
  - Early onset likely to be atopic/allergic
  - Later onset more heterogeneous
- Patient exposures/triggers and host characteristics
  - Age
  - Smoking and other exposures
  - BMI
  - Infection triggers

- Asthma course
  - Frequent exacerbation
- Biomarkers
  - T2 inflammation
    - Sputum and blood eosinophils
    - FeNO
    - IgE/atopy
  - Absence of T2 inflammation
    - Blood and sputum neutrophils

Wenzel SE. *Nat Med*. 2012;18:716-725.

Type 2 Severe Asthma Phenotype



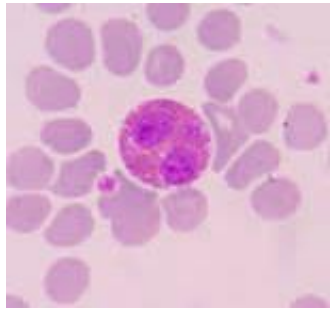


Type 2 Inflammation

- Age of onset of asthma: Childhood vs Adulthood vs late onset
- Allergic comorbidities : Atopic dermatitis, allergic rhinitis, Nasal polyposis, Chronic sinusitis, ABPA, EGA
- Oral steroids responsive

≥1 of following Criteria on high dose ICS (before OCS)*:

- Blood Eosinophils ≥ 150 /uL
- FeNO ≥ 20 ppb
- Sputum Eosinophils ≥ 2%



*At presentation or any time in last 1 year or during FU

Type 2 Severe Asthma

IgE Mediated Atopic SA

- Usually early age onset asthma
- Sx related to allergen exposure
- Allergic comorbidities (AR/AD)
- Skin prick test + for Aeroallergens
- Specific and total IgE raised

Eosinophilic SA

- Late onset asthma
- No clinically relevant atopy /allergy
- ± Nasal Polyposis
- ↑ Symptoms , ↑ Exacerbations
- Eosinophilia in Blood (± sputum)

Both are Responsive to Oral Steroids

Non Type 2 Severe Asthma Phenotype

Non Type 2 Inflammation

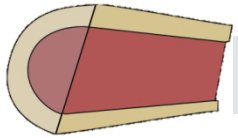
- Age of onset of asthma: Very late
- Non Allergic comorbidities : Obesity, Smoking
- Smooth muscle mediated
- Paucigranulocytic
- Not oral steroids responsive

Not Responsive to Oral Steroids

Biomarkers in SA

Serum Periostin

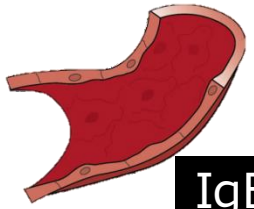
Bone marrow



Research Tool

Eosinophils

Circulation



IgE

Specific IgE

IgE ≥ 30 KU/L

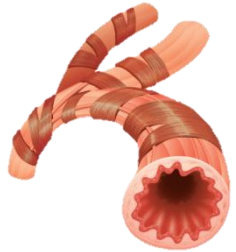
FeNO ≥20 ppb

FeNO

Breath

Eosinophils

Lung / airways



Blood eosinophils ≥300/μl,

Sputum eosinophils ≥ 2%

Hershey. J Allergy Clin Immunol 2003; 111:677–690; Menzies-Gow et al. J Allergy Clin Immunol 2003; 111:714–719; Scheerens et al. Clin Exp Allergy 2014; 44:38–46; Sidhu et al. Proc Natl Acad Sci USA 2010; 107:14170–14175; Suresh et al. Am J Respir Cell Mol Biol 2007; 37:97-104

Severe Asthma Pheno-Endotypes in India :

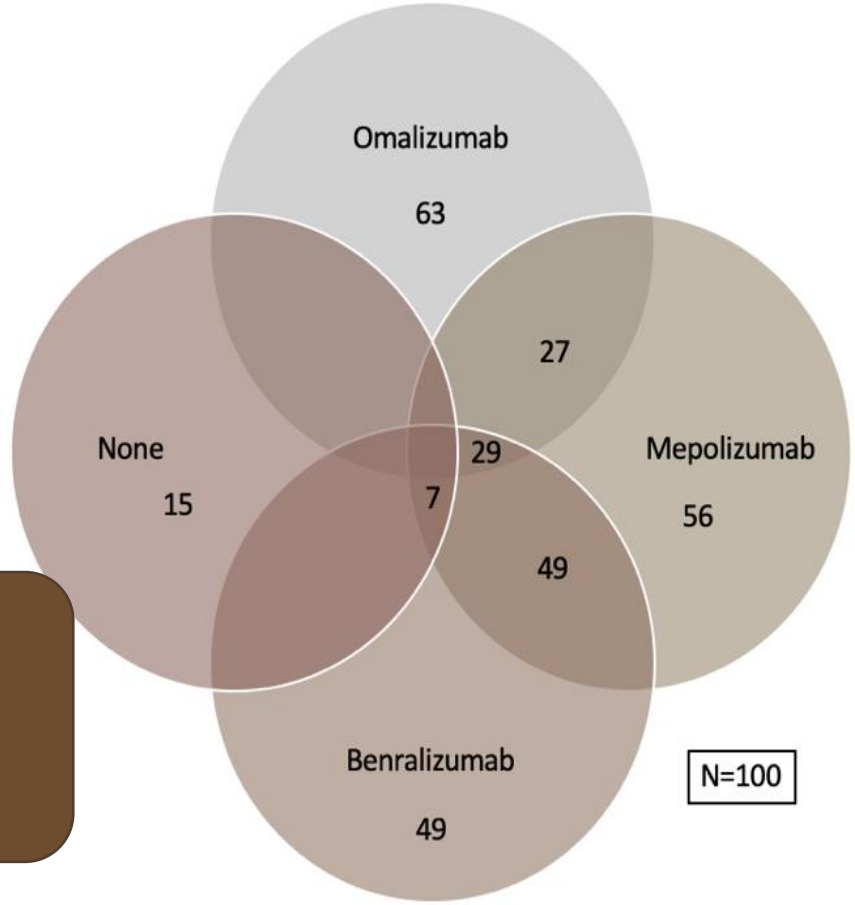
Original Article

A retrospective observational study on pheno-endotypes of severe asthma among adults attending asthma clinic in a tertiary care centre in India

Deepak Talwar[1], Dhruv Talwar[2], Nitin Jain[3], Deepak Prajapat[4], Sourabh Pahuja[4]

[1]Director and Chair, Metro Centre for Respiratory Diseases, Noida, Uttar Pradesh, India, [2]PGY III, JNMC Sawangi, Wardha, Maharashtra, India, [3]Senior Resident, Rajiv Gandhi Superspeciality Hospital, Tahirpur, New Delhi, India, [4]Consultant, Metro Centre for Respiratory Diseases, Noida, Uttar Pradesh, India

Severe Asthma (100)



~ 85 % Eligible for Biologicals

~ 50% SA eligible for both group of biologicals

Take Home :

- Asthma treatment aims at reductions of symptoms as well as future risk for poor outcomes(Exacerbations, FAO & Medication side effects)
- Assessments include multimorbidity's & expectations / attitudes
- Spirometry has pluripotent role in asthma diagnosis & management
- Severity assessment is retrospective : Severe vs Non Severe
- Phenotyping recommended in asthmatics on Step 4/5 treatments
- T2 high (allergic & eosinophilic) vs T2 low are main phenotypes for targeted therapeutics (Biologicals)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Thanks