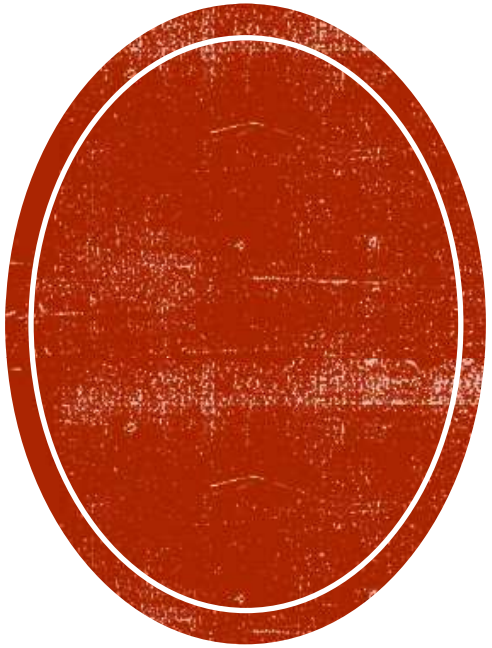
BRONCHIAL ASTHMA



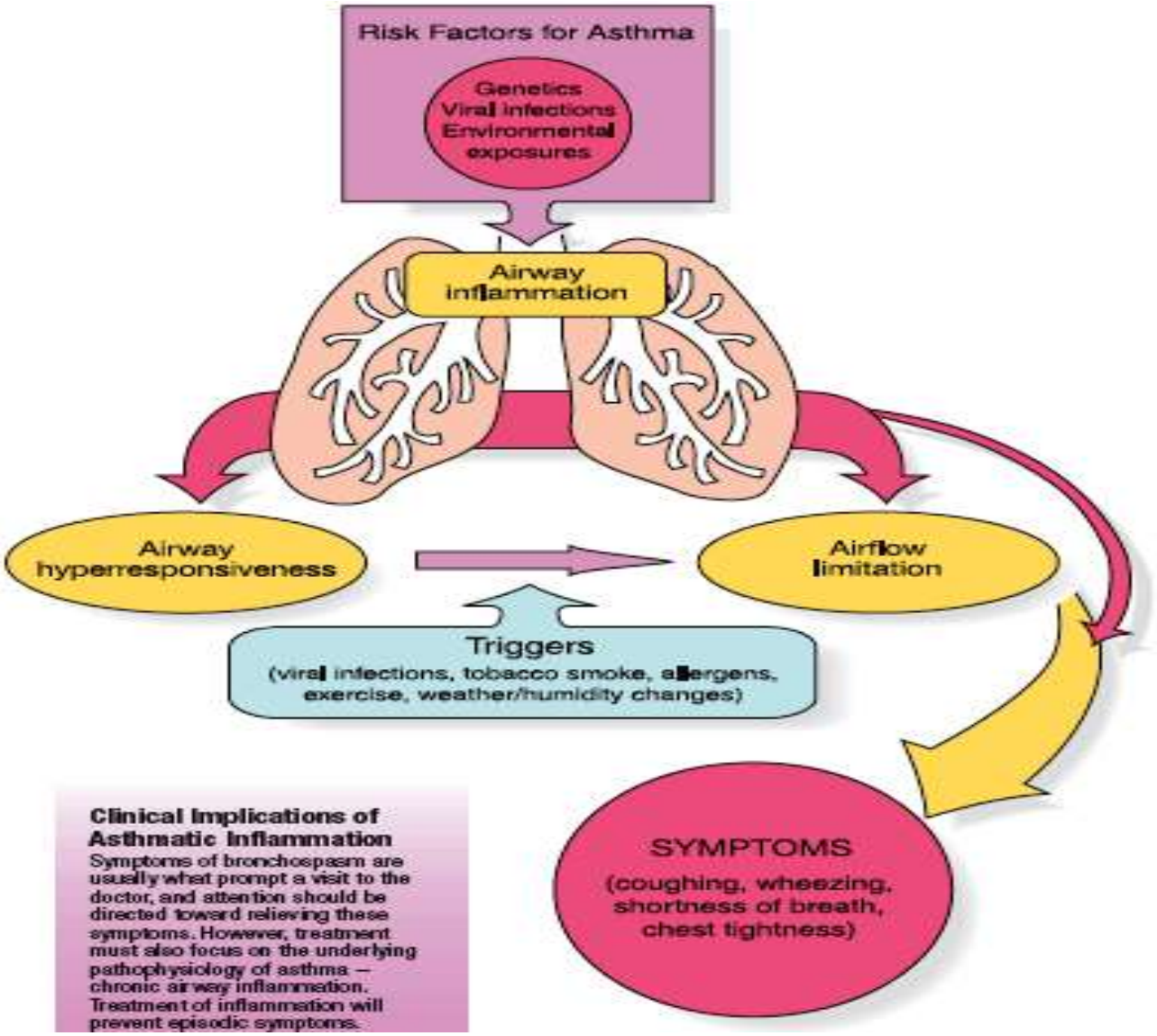
BRONCHIAL ASTHMA

Chronic inflammatory condition

Episodic, hyper-responsiveness

Reversible airway obstruction

PATHOPHYSIOLOGY



PATHOPHYSIOLOGY

Airway Inflammation

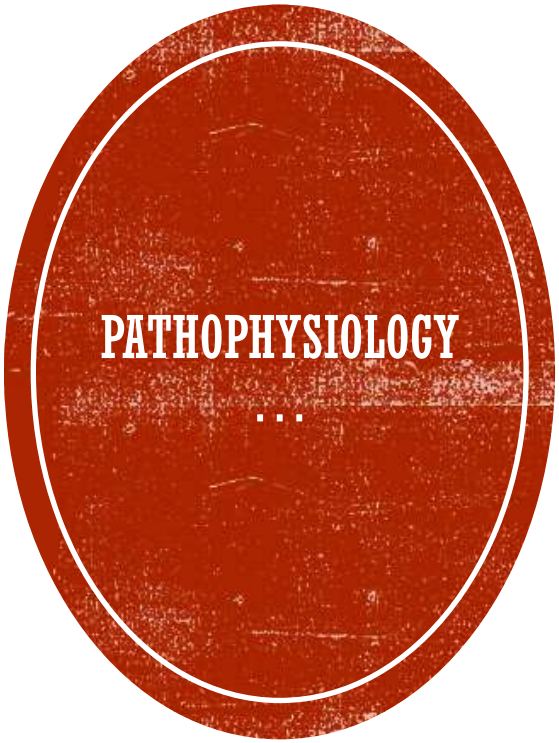
IL-4, IL-5,
IL-10, IL-12, IL-13
IFNγ,TGF-β

Bronchospasm | **Edema** | **Increased Secretion**

Airway Obstruction

In Chronic: **Remodelling of airways**

- Smooth Muscle hypertrophy & hyperplasia
- Inflammatory cell infiltration
- Edema
- Goblet cell & mucous gland hyperplasia
- Mucus hypersecretion
- Protein deposition including collagen
- Epithelial desquamation



- Extrinsic (IgE mediated)
- Intrinsic (Non IgE mediated)
- Mixed
- Exercise induced
- Drug induced (Aspirin)

- **Interplay between genetic & environmental factors*

Occurs within 15-30 min

BRONCHOCONSTRICTION

Due to release of Histamine, Leukotriene, Bradykinin

- Inhibited by β_2 agonists

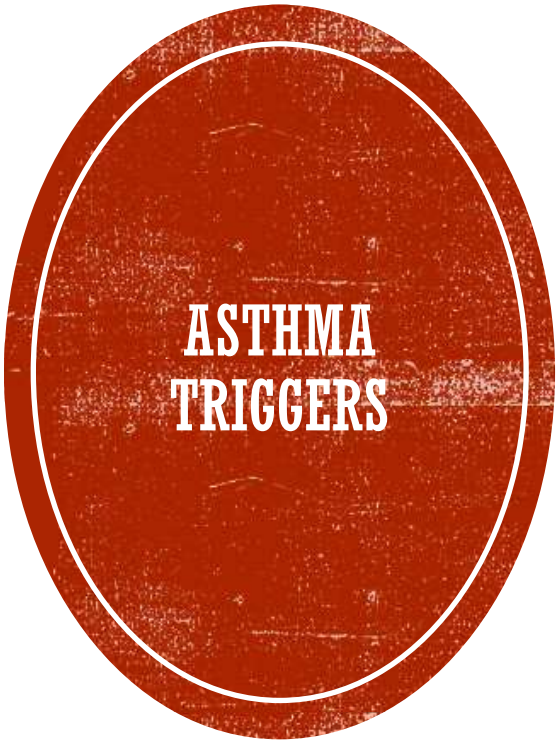
Occurs after 4-12 hour

Due to

- Airway inflammation
- Increased secretion

Inhibited by STEROIDS

But NOT by β_2 agonists



Allergen

- House dust mites
- Mold
- Pollen
- Drug

Environmental

- Smoke, dust, strong odor/ fumes, cold air

Infection

- Viral

Exercise

Emotional

- Common childhood chronic disease
- ***Under diagnosed & Under treated condition***
- Variable symptoms
- Chronic course

CLINICAL FEATURES

- Intermittent dry cough
- Wheezing
- Breathlessness
- Chest tightness

- Nonspecific
  - Fatigue
  - Exercise intolerance
  - Poor sleep

- Recurrent
- Worse during the night or early morning
- Obviously triggered by an allergen, irritant or viral infection

Acute cases

- Significant respiratory distress
- Cyanosis

Hyperinflation of chest

- Bronchiolitis
- Gastro Esophageal Reflux
- Hypersensitivity Pneumonitis
- Foreign Body inhalation
- Cystic fibrosis

PEFR

- Morning- Evening variation >20%

Low FEV1

FEV1/FVC <0.8

Bronchodilator response (β_2 agonist)

- Improvement in FEV1 ≥12%

Exercise challenge

- Worsening in FEV1 ≥ 15%

INVESTIGATION

CXR	Hyperinflation
AEC	May be increased
Allergy test	Limited role

Clinical

Lung function test- Spirometry

The absence of physical signs (including wheezing) does not exclude a diagnosis of asthma

Wheeze does not necessarily indicate asthma

TREATMENT

- Goals
  - **Maintain normal activity**
  - **Prevent sleep disturbance**
  - **Prevent chronic asthma symptoms**
  - **Prevent severe exacerbation**
  - **Less or No side effects from drug therapy**

ASTHMA MANAGEMENT: COMPONENTS

Asthma pharmacotherapy

- Acute exacerbation
- Long term management

Regular assessment & monitoring

Control of factors contributing to asthma severity

Patient education

LONG TERM MANAGEMENT

Step wise

Grading of asthma severity

Step down management

DRUGS

Quick Relief medications

β_2 agonists (Inhaled)

- **Salbutamol**
- **Terbutaline**

Inhaled anticholinergics

- **Ipratropium**

Short course systemic steroid

- **Oral Prednisolone**
- **Methyl prednisolone**

DRUGS

Long term control medication " controller"

Inhaled steroids: low/ medium/ high dose

- **Budesonide**
- **Beclomethasone**
- **Fluticasone**
- **Flunisolide**
- **Mometasone**

DRUGS

NSAID

- Cromolyn
- Nedocromil

Leukotriene modifiers

- Montelukast
- Zafirlukast
- Zileuton

Long acting inhaled β_2 agonist

- Salmeterol
- Formeterol

Sustained release Theophylline Long-acting

LONG TERM MANAGEMENT

STEP 1 MILD INTERMITTENT

- Day symptom: <3/week
- Night symptom: <3/ month
- Lung Fx: PEF ≥ 80% of exp
  - PEF variability <20%

Treatment

Short acting β_2 agonist SOS

No need of controller medicine

LONG TERM MANAGEMENT

STEP 2 MILD PERSISTENT

Day symptom: ≥3/ wk

Night symptom: 3-4/ mon

Lung Fx: PEF ≥ 80% of expected

PEF variability 20-30%

Treatment

Short acting β_2 agonist SOS

Anti-inflammatory

- **Low dose inhaled steroid**
  - OR
- **Cromolyn**
  - OR
- **Leukotriene modifier**

Theophylline SR

Low-dose

STEP 3 MODERATE PERSISTENT

- Day symptom: daily
- Night symptom: >1/ week
- Lung Fx: PEF >60% & <80% of exp
- PEF variability > 30%

Short acting β_2 agonist

Anti inflammatory

Inhaled steroid (*Medium dose)*

OR

Inhaled steroid (*Low dose)*

+

LABA OR Leukotriene Modifier

SR Theophylline
Oral LABA

} **Alternative**

STEP 4 SEVERE PERSISTENT

- Day symptom: continual, limited activity
- Night symptom: frequent
- Frequent exacerbations
- Lung Fx: PEF ≤60% of expected
- PEF variability >30%

TREATMENT

- Short acting B2 agonist
- Anti inflammatory
  - Inhaled steroid (*High dose*)

    AND
  - LABA OR Leukotriene Modifier

    OR

    SR Theophylline

    OR

    Oral LABA

PREFERRED

- Oral Prednisolone @ 1-2 mg/Kg short course if needed

DRUG DELIVERY SYSTEMS

INHALER

ROTAHALER

SPINHALER

TURBOHALER

NEBULIZER

MDI

Multi dose device

Contains micronised powdered medication with dispersal agent & propellent system

Good co ordination required

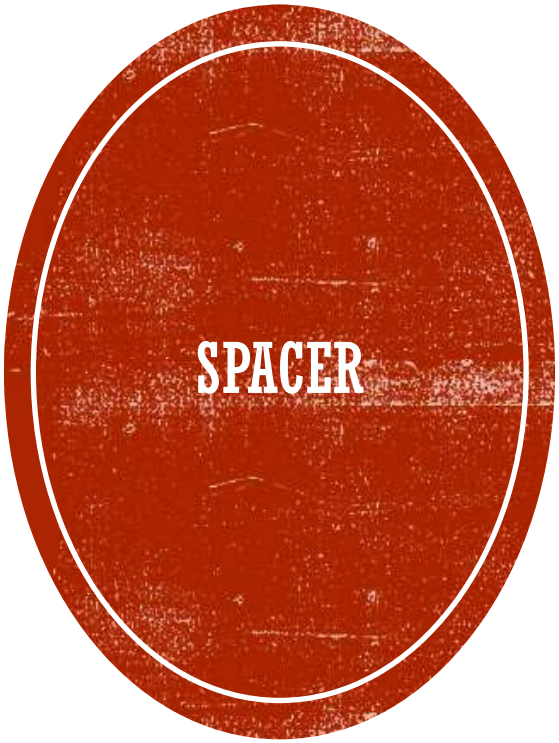
Not effective in children <7yrs

Spacer: can be used in conjunction

Autohaler

Breath activated MDI

Not dependent on inspiratory flow rate



- Spacer
  - by all patients who have poor coordination when using an MDI.
  - Children under 4 years can use an MDI and a small-volume valved with a face mask.
  - during an acute attack for practically all patients using inhaled steroids

Accuhaler

- Breath activated
- Multi dose DPI
- produces accurate and consistent drug delivery over a range of inspiratory flow rates (30-120 L/min)

Aerolizer

- breath-activated single-dose dry powder inhaler

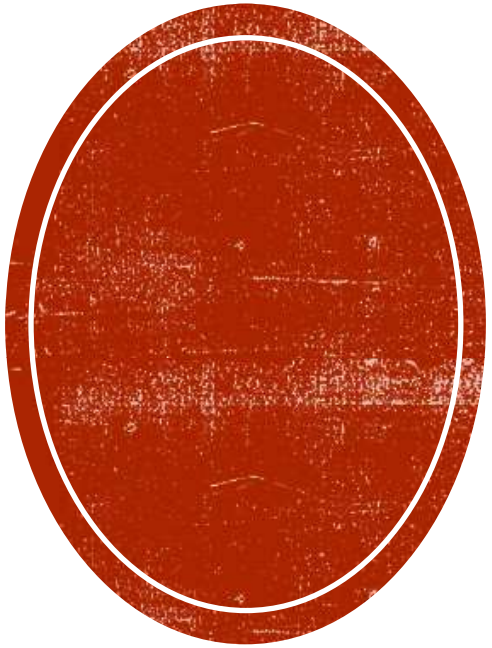
Rotahaler

- helps ensure reliable delivery without the need to coordinate inspiration with drug release.

Turbuhaler

- breath-activated inhaler containing 60 or 200 doses of medication, depending on the drug.
- equipped with a dose indicator.

ACUTE SEVERE ASTHMA



INITIAL ASSESSMENT OF SEVERITY OF ACUTE ASTHMA IN CHILDREN

SYMPTOMS	MILD	MODERATE	•SEVERE & LIFE-THREATENING
Altered consciousness	No	No	Agitated Confused/drowsy
Accessory muscle use/recesssion	No	Minimal	Moderate Severe
Oximetry on presentation (SaO_2)	> 94%	94-90%	< 90%
Talks in	Sentences	Phrases	Words Unable to speak
Pulsus paradoxus	Not palpable	May be palpable	Palpable
Pulse rate	< 100	100-200	> 200
Central cyanosis	Absent	Absent	Likely to be present
Wheeze intensity	Variable	Moderate-loud	Often quiet
Peak expiratory flow	> 60%	40-60%	< 40% Unable to perform
FEV_1 (% predicted)	> 60%	40-60%	< 40% Unable to perform
Arterial blood gases	Test not necessary	If initial response is poor	If initial response is poor Yes

• Any of these features indicates that the episode is severe. The absence of any feature does not exclude a severe attack.

- β_2 Agonist *via* Nebulizer OR MDI with Spacer
- If *Improvement*
  - Can be discharged
  - β_2 agonists MDI± Spacer 6-8hrly
  - Double dose of steroids (if already on inhaled steroid)
  - Oral steroid short course (Consider)
- If NO *Improvement* → *treat as severe form*

- Supplemental Oxygen
- Inhaled β_2 Agonist *via nebulizer*
  - **Salbutamol 0.15mg/Kg/dose**
  - **Every 20 min for 1st Hour**
  - **Then 1-4hrly if improved**
- Oral Prednisolone 1-2mg/Kg/d

- ICU care
- Hydrocortisone IV 10mg/kg 6-8 hrly

  OR

- Methylprednisolone IV

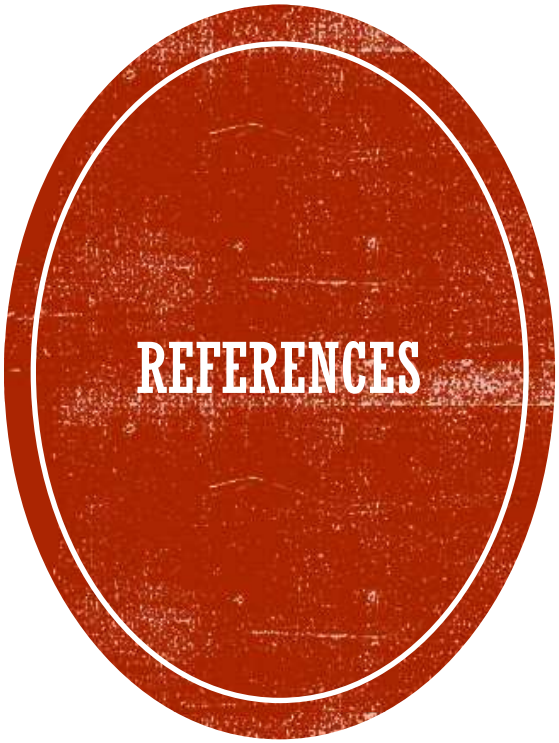
- Ipratropium inhaled

- Aminophylline infusion

Magnesium sulphate 25mg/kg (max 2g) IV over 30 min

Heliox (70:30 Oxygen Mixture)

May require Mechanical Ventilation



- Ghai Essential Pediatrics-10th edition
- Nelson Essential of Pediatrics