



# *Paediatric Asthma management and referral*

Canberra Region Paediatric Symposium

National Museum of Australia

Dr Tim McDonald

04/03/2017

# Paediatric Asthma

- Definition / Diagnosis
- Statistics
- Respiratory Patterns and Noises
- Classification including Infantile “asthma”
- Medications
- Emergency Asthma Treatment
- Asthma Management Plans
- Spirometry
- Difficult Asthma
- Thunderstorm Asthma

# ASTHMA - Definitions

“In what time does the peculiarity of the asthmatic exist?

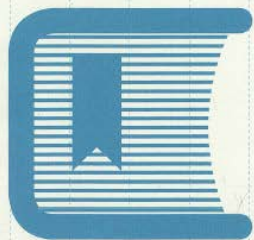
Manifestly it is a morbid proclivity of the musculonervous system of his bronchial tubes to be thrown into a state of activity.

There is no peculiarity in the stimulus, the air breathed is the same to the asthmatic as the non-asthmatic.

It is clear that the vice in asthma consists, not in the production of any special irritant but in the irritability of the part irritated.”

*Slater 1860*

National Asthma  
Council Australia



# AUSTRALIAN ASTHMA HANDBOOK

QUICK REFERENCE GUIDE

[asthmahandbook.org.au](http://asthmahandbook.org.au)

VERSION 1.0

<http://www.asthmahandbook.org.au>

# ASTHMA - Definitions

## Paediatric Definition

“Episodic wheeze and/or cough in a clinical setting where asthma is likely and other rarer conditions have been excluded”

Warner et al - Management of Asthma: A consensus Statement, 1989

# A Working Definition Of Asthma

- Asthma is a chronic lung disease, which can be controlled but not cured.
- In clinical practice, asthma is defined by the presence of **both** the following:
  - **excessive variation in lung function** ('variable airflow limitation', i.e. variation in expiratory airflow that is greater than that seen in healthy people)
  - **respiratory symptoms** (e.g. wheeze, shortness of breath, cough, chest tightness) that vary over time and may be present or absent at any point in time.
- **In young children in whom lung function testing is not feasible, including most preschool children, asthma is defined by the presence of variable respiratory symptoms.**

# Diagnosing Asthma In Children

A clinical definition of asthma in children

- Asthma is defined clinically as the combination of variable respiratory symptoms (e.g. wheeze, shortness of breath, cough and chest tightness) and excessive variation in lung function, i.e. variation in expiratory airflow that is greater than that seen in healthy children ('variable airflow limitation').

# Diagnosing Asthma In Children

There is no single reliable test ('gold standard') and there are no standardised diagnostic criteria for asthma.

The clinical diagnosis of asthma in children involves the consideration of:

- history of recurrent or persistent wheeze
- presence of allergies or family history of asthma and allergies
- absence of physical findings that suggest an alternative diagnosis
- tests that support the diagnosis (e.g. spirometry in children able to perform the test)
- a consistent clinical response to an inhaled bronchodilator or preventer.

# Beware..

It can be difficult to diagnose asthma with certainty in children aged 0–5 years, because:

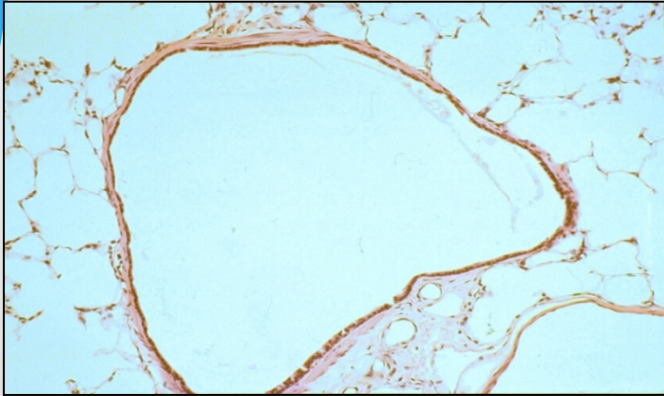
- episodic respiratory symptoms such as wheezing and cough are very common in children, particularly in children under 3 years
  - objective lung function testing by spirometry is usually not feasible in this age group
  - a high proportion of children who respond to bronchodilator treatment do not go on to have asthma in later childhood (e.g. by primary school age).
- 
- A diagnosis of asthma should not be made if cough is the only or predominant respiratory symptom and there are no signs of airflow limitation (e.g. wheeze or breathlessness).

# ASTHMA - Definitions

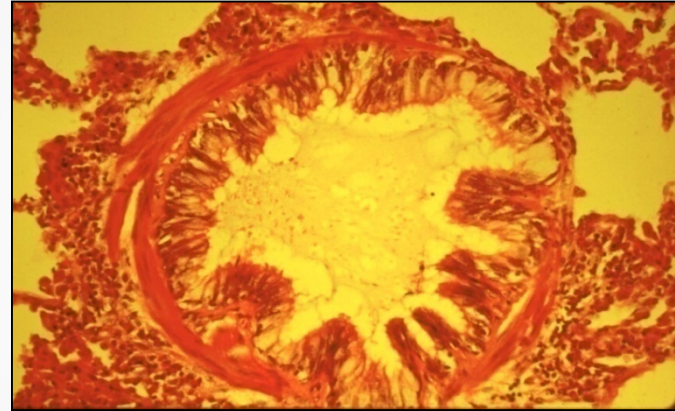
- Recurrent
- Reversible
- Small Airways Narrowing

• Tim McDonald - 1998

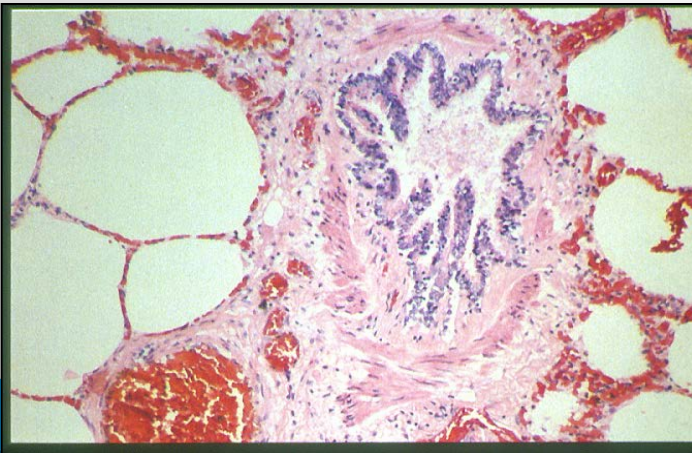
# The Many Faces of Asthma



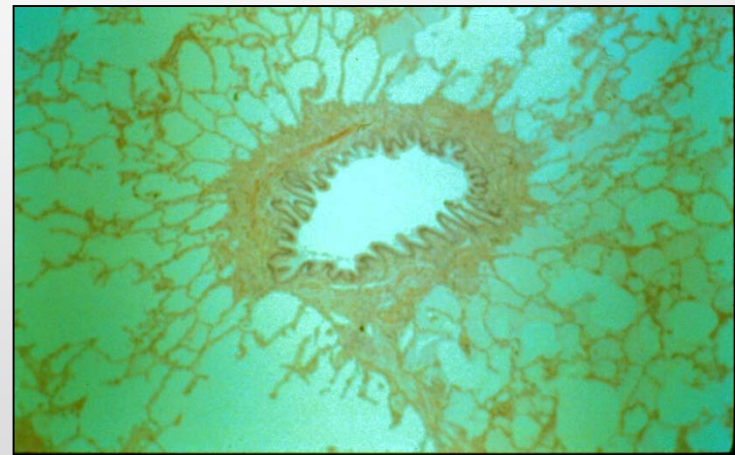
Normal Airway



Dying from asthma



Chronic Asthma



Irreversible

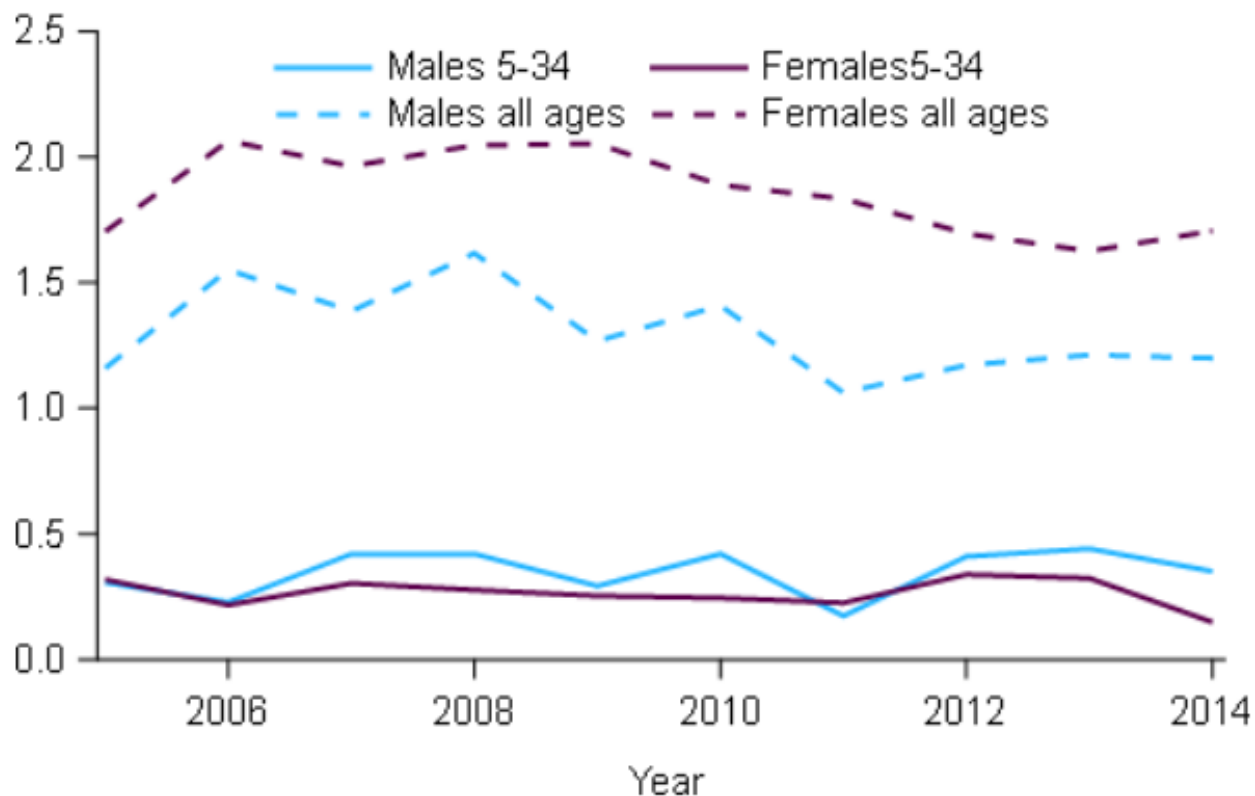
# Asthma Statistics

## People and asthma

- 1 in 9 Australians have asthma – around 2.5 million.
- 0 – 14 yrs - Boys > Girls
- >15 yrs – Females > Males
- Increasing Asthma prevalence with decreasing SES
- Indigenous Australians is almost twice as high especially in the older
- Prevalence significantly higher in inner regional areas
- Only 20% of people aged 15 and over have a written asthma action plan.
- 41% of children (under 15) have an asthma action plan. Everyone with asthma should have a written asthma action plan.

**Figure 1: Death rate due to asthma, by broad age group and sex, 2005–2014**

Deaths per 100,000 population



There were 419 deaths due to asthma in 2014.

The rate of all deaths due to asthma has remained stable since 2003,

Long-term declining trend in deaths due to asthma in those aged 5-34.

Mortality rates higher in more remote areas and in areas of lower SES and Indigenous

# What is wheeze?

- Defined as a continuous, high-pitched sound coming from the chest during expiration
- Indicates expiratory airflow limitation
- Does not include inspiratory sounds (e.g. rattling or stridor)
- Wheezing should be confirmed by seeing the child while symptomatic
- Consider asking parents to make an audio or video recording of noisy breathing, or showing parents a video of true wheezing and ask them whether signs match their child

# Normal Respiratory Patterns & Sounds

- Extra-Thoracic (URT) Obstruction
  - Prolonged Inspiration/Stridor/Snuffle
    - eg Croup/Adenotonsillar Hypertrophy/Pierre-Robin
- Intra-Thoracic (URT/LRT) Obstruction
  - Prolonged Expiration/Wheeze
    - eg Bronchiolitis, Asthma, Tracheobronchomalacia
- Stertor, Rattles & Wheezes
- Rhonchi, Rales & Crepitations

# Normal Respiratory Patterns & Sounds

## Snuffles/?Rattles

- Harsh low - multiple pitch - **Biphasic**
- Upper airways / oropharynx

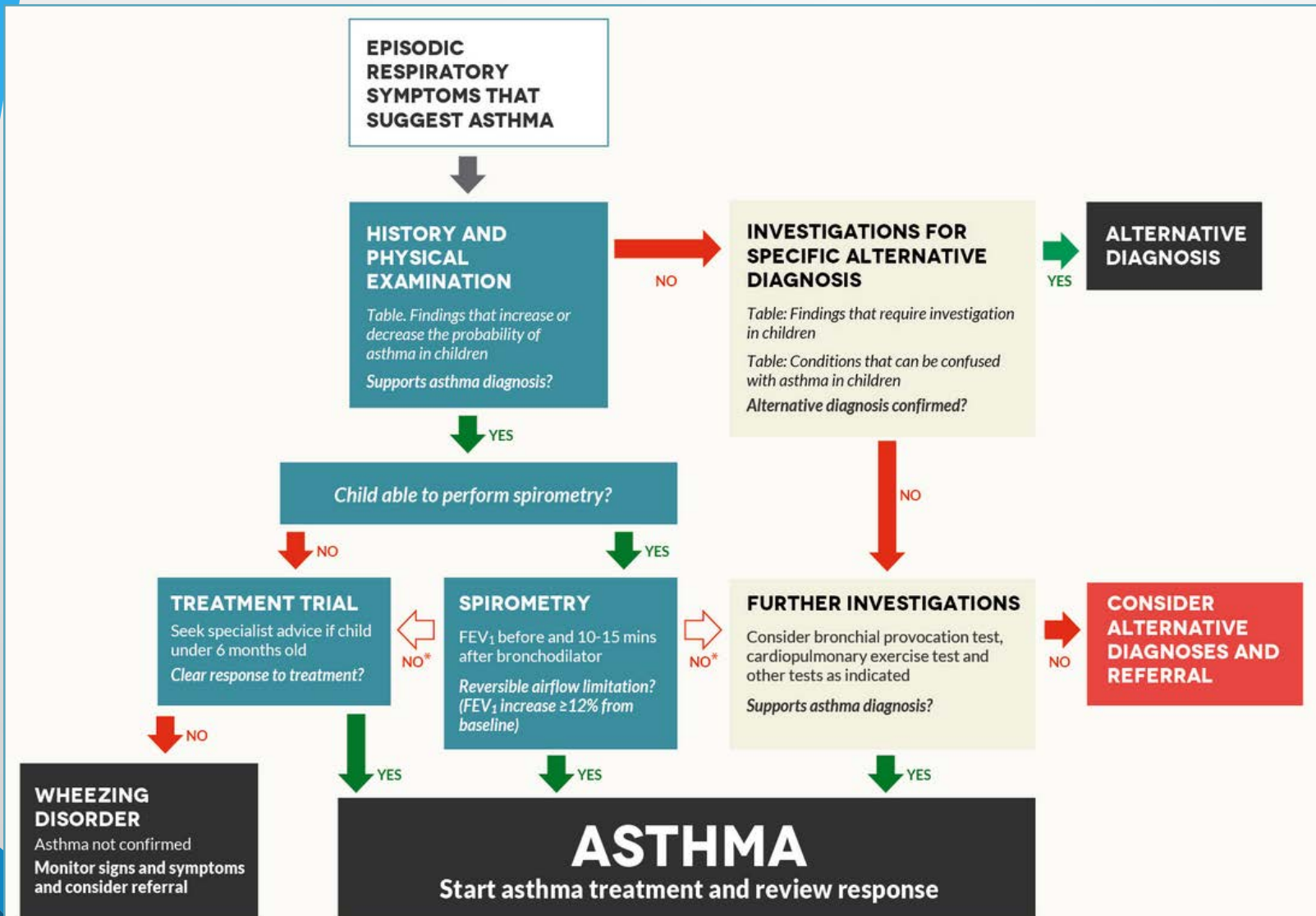
## Stridor

- harsh, medium-pitched, inspiratory sound
- tracheal or high laryngeal obstruction
- **Prolonged Inspiration - Easy Expiration**

## Wheeze/Rhonchi

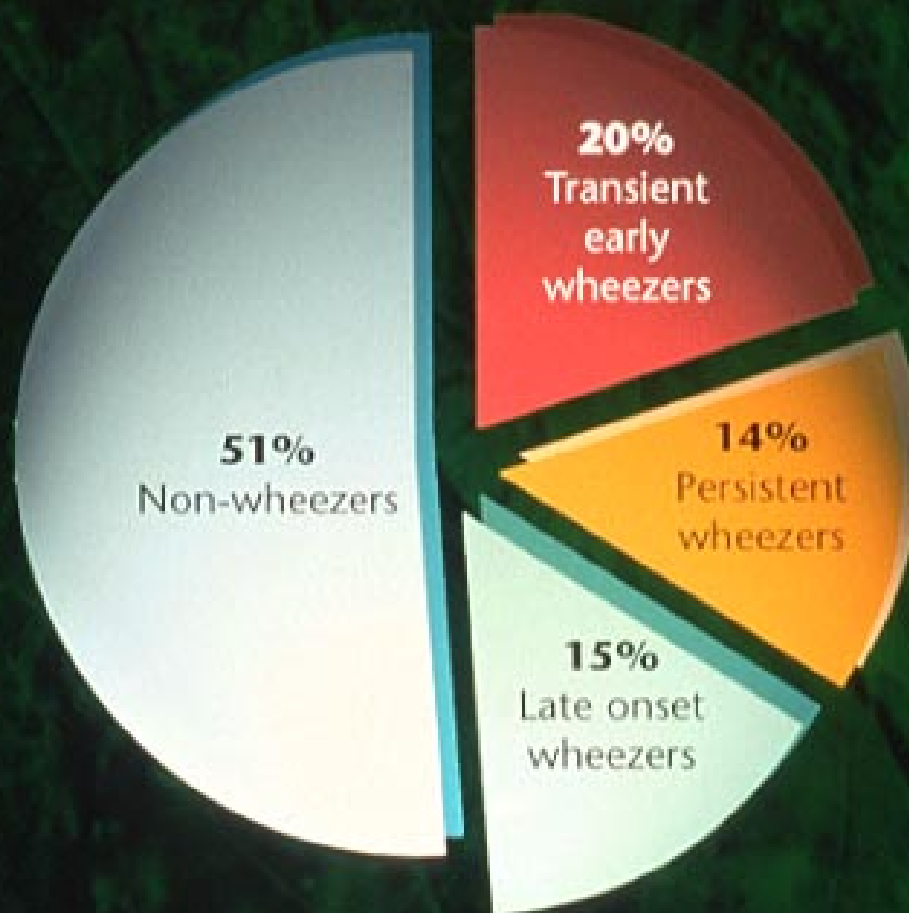
- High pitched polyphonic musical expiratory
- intra-thoracic / lower airways obstruction
- **Easy Inspiration - Prolonged Expiration**

# Steps in the diagnosis of asthma in children



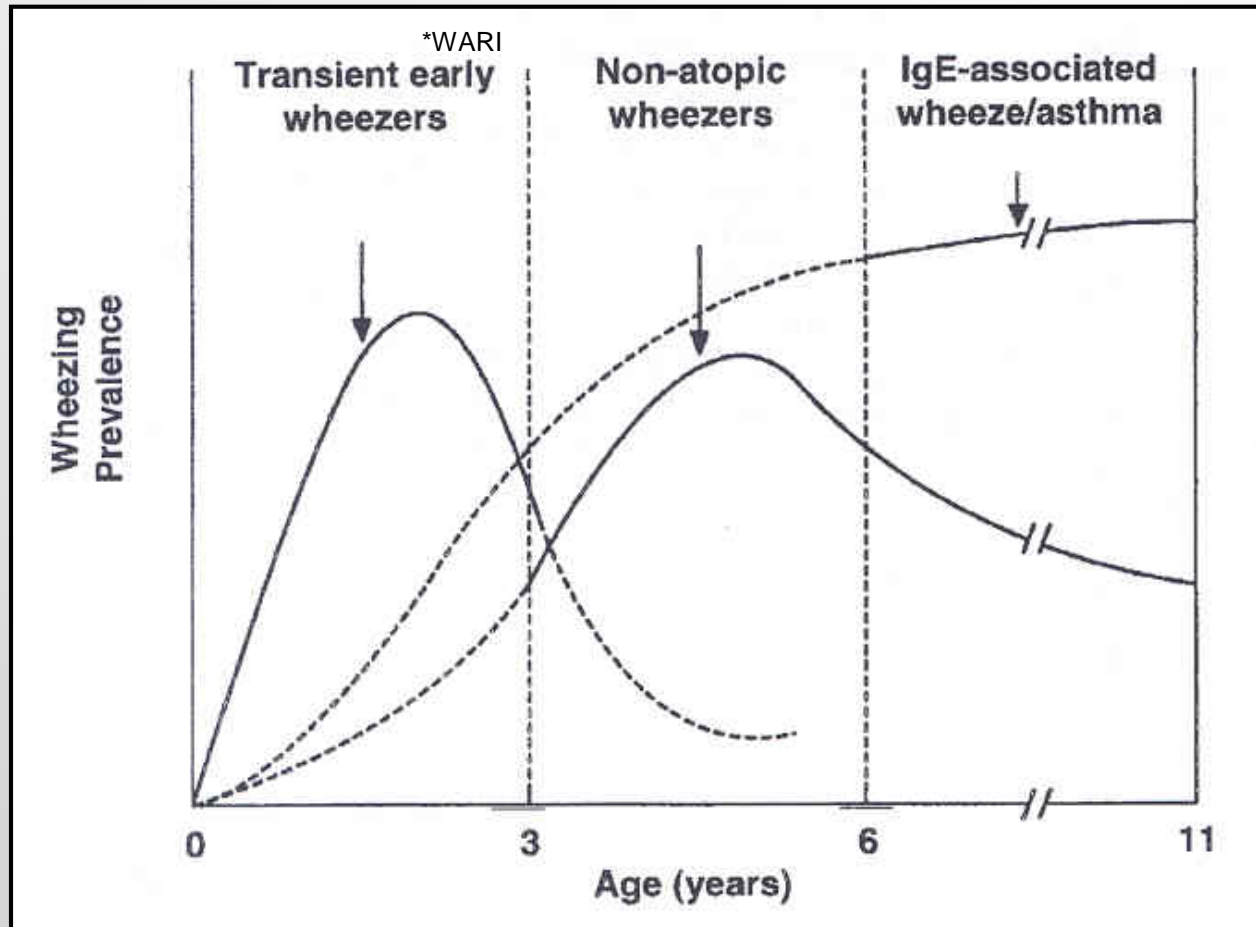


# Epidemiology of Wheeze in Infancy



*n = 826; from Martinez et al. NEJM 1995*

# Differential diagnosis: Wheeze phenotypes

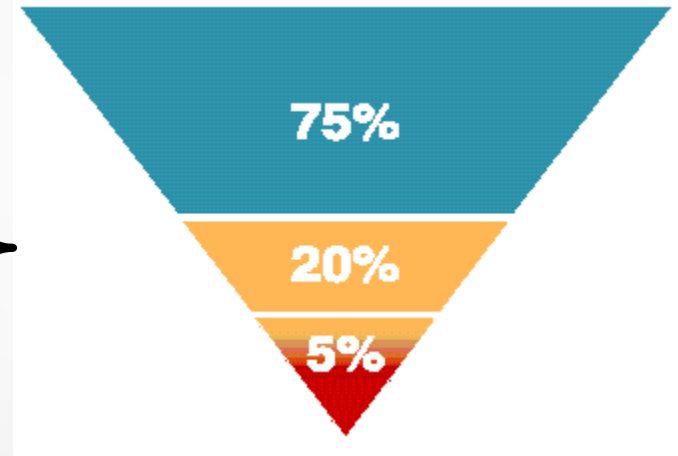
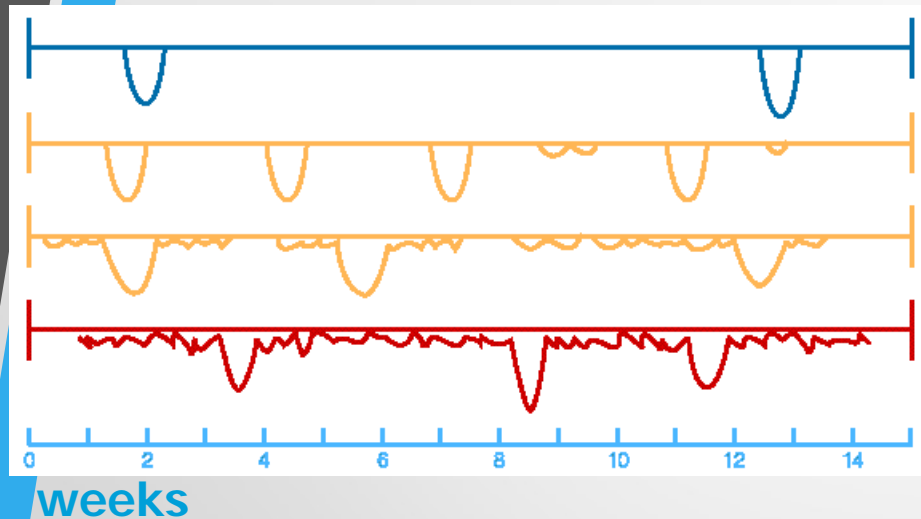


Category		Pattern and intensity of symptoms (when not taking regular treatment)
<i>Infrequent intermittent asthma</i>		Symptom-free for at least 6 weeks at a time ( <u>flare-ups</u> up to once every 6 weeks on average but no symptoms between <u>flare-ups</u> )
<i>Frequent intermittent asthma</i>		<u>Flare-ups</u> more than once every 6 weeks on average but no symptoms between <u>flare-ups</u>
<i>Persistent asthma</i>	<i>Mild</i>	At least one of: <ul style="list-style-type: none"> <li>• Daytime symptoms<sup>†</sup> more than once per week but not every day</li> <li>• Night-time symptoms<sup>†</sup> more than twice per month but not every week</li> </ul>
	<i>Moderate</i>	Any of: <ul style="list-style-type: none"> <li>• Daytime symptoms<sup>†</sup> daily</li> <li>• Night-time symptoms<sup>†</sup> more than once per week</li> <li>• Symptoms sometimes restrict activity or sleep</li> </ul>
	<i>Severe</i>	Any of: <ul style="list-style-type: none"> <li>• Daytime symptoms<sup>†</sup> continual</li> <li>• Night-time symptoms<sup>†</sup> frequent</li> <li>• <u>Flare-ups</u> frequent</li> <li>• Symptoms frequently restrict activity or sleep</li> </ul>

If they need their rescue therapy more than half the days of the month they need preventers every day of the month(s)/season

# Classification Determines Therapy

## Frequency of symptoms



**Infrequent episodic** → ■ = no preventer +/- SABA

**Frequent episodic & mild persistent** → ■ = 1st line preventer

**Moderate & severe persistent** → ■ = ICS +/- LABA required

Adapted from LTRA Handbook NAC 2003, p 4-54

# What's wrong with this photo?





# Medication Devices

## Short Acting Bronchodilators



Ventolin



Airomir



Airomir  
Autohaler



Asmol



Epaq



Bricanyl



Bricanyl  
Turbuhaler



Atrovent



Atrovent  
Autohaler



Atrovent Forte

## Non-Steroid Preventers



Intal Forte 5



Intal 1



Tilade 2

## Inhaled Corticosteroids



Becotide 50



Becotide 100



Becloforte 250



QVAR 50



QVAR 100



QVAR 50  
Autohaler



QVAR 100  
Autohaler



Respocort 50



Respocort 100



Respocort 250



Respocort 50  
Autohaler



Respocort 100  
Autohaler



Respocort 250  
Autohaler



Pulmicort 50



Pulmicort 100



Pulmicort 200



Pulmicort 100  
Turbuhaler



Pulmicort 200  
Turbuhaler



Pulmicort 400  
Turbuhaler



Flixotide 50



Flixotide 125



Flixotide 250



Flixotide 100  
Accuhaler



Flixotide 250  
Accuhaler



Flixotide 500  
Accuhaler

## Long Acting Bronchodilators



Serevent 25



Serevent 50  
Accuhaler



Oxis 6  
turbuhaler



Oxis 12  
turbuhaler



Foradile

## Combined Inhaled Corticosteroids / Long Acting Bronchodilators



Seretide 50-25



Seretide 125-25



Seretide 250-25



Seretide 100-50  
Accuhaler



Seretide 250-50  
Accuhaler



Seretide 500-50  
Accuhaler

# Spacer Devices



**Volumatic**



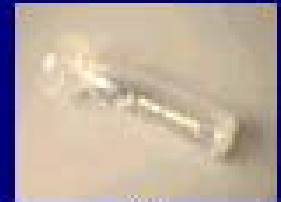
**Fisonair**



**Space Chamber**



**Space Chamber**



**Space Chamber**



**Aerochamber**



**Aerochamber**



**Aerochamber**



**Breath A Tec**



**Able spacer**

Acknowledgments Prof. Mike SOUTH (RCH Melb)

Ross Shannon(Pharmacy), Owen Stock (Med Student)

17-Mar-17 29



Montelukast 4 & 5 mg (10 mg)



Ciclesonide MDI  
80 & 160 ug



Symbicort Rapihaler  
50/3, 100/3 or 200/6 ug



Flutiform 50/5, 125/5 or 250/10 mcg



Breo Ellipta 100 & 200/25 ug



Symbicort Turbuhaler  
100/6, 200/6 or 400/12 ug

## Age appropriate delivery device

	Under 2 years	2- 4 years	5-7 years	8 years and older
Puffer + 150ml spacer with face mask	yes	yes		
Puffer + 750ml spacer		yes	yes	yes
Dry powder inhaler			possible	yes
Puffer alone				???yes
Chewable tablet		yes	yes	yes
Nebuliser	Rarely needed			



**Ventolin delivered via a spacer and tracheostomy**

# MDI & Spacer - Protocol

- **Dose:**
  - **Salbutamol**
    - <6 yrs - 6x100ug via pMDI and small volume spacer with face mask
    - >6 yrs - 12x100ug via pMDI and large volume spacer
  - **Ipratropium bromide - (1st hour)**
    - <6 yrs - 2x40ug
    - >6 yrs - 4x40ug

# Paediatric Asthma Workshop

## Emergency Management - 1

- Oxygen
- Salbutamol
  - MDI & Spacer V Nebulizer ( Continuous)
  - ? IVI (5 mcg/kg/min over 1 hour then 1 - 5 mcg/kg/min)
- Steroids
  - Oral -Prednisolone - 2mg/kg (max 50 mg) or
  - Oral - Dexamethasone – 0.3 - 0.6mg/kg (max 12mg)
  - IVI - Hydrocortisone - 8 – 10mgm/kg (max 300 mg)
    - then 4 - 5 mg/kg q6-12hrly or
  - IVI - Methylprednisolone - 2mg/kg (max 60mg)
    - then 1mg/kg q6-12hrly

# Paediatric Asthma Workshop

## Emergency Management - 2

- Nebulized Ipratropium ( Atrovent )
  - 250/500 mcg @ 20/60 X 3
- Fluids
  - Beware Overhydration/HypoK<sup>+</sup>/BSL

### For Life Threatening Asthma

- Magnesium Sulphate
  - 25 - 100 mg/kg IVI over 20 mins
- ? Aminophylline
  - Loading 10mg/kg then 0.7 - 1.1 mg/kg/hr
- CPAP

## ASTHMA ACTION PLAN FOR YOUNG PEOPLE

Name ..... Date .....

### WHEN WELL

Preventer (if prescribed):

..... Use ..... times/day

..... Use ..... times/day

Reliever: ..... Use .....

(Take only when necessary for relief of wheeze or cough.)

Symptom controller (if prescribed)

..... Use .....

Before exercise take ..... Use .....

### WHEN NOT WELL

At first sign of a cold or a significant increase in wheeze or cough, take:

Reliever: ..... Use ..... times/day

Preventer: ..... Use ..... times/day

..... Use ..... times/day

Symptom controller: ..... Use ..... times/day

When your symptoms get better, return to the doses you take when well.

### IF SYMPTOMS GET WORSE

Extra steps to take

☐ .....

☐ .....

Emergency Medication ..... Strength .....

Take .....

.....

When your symptoms get better, gradually return to the doses you take when well.

If you follow this plan but your symptoms get worse,  
see a doctor immediately or call an ambulance

Doctor's stamp:

Ambulance: (Tel) 000



## ASTHMA ACTION PLAN FOR YOUNG PEOPLE

### WHEN WELL

You will

- ☐ be free of regular night-time wheeze or cough or chest tightness
- ☐ have no regular wheeze or cough or chest tightness on waking or during the day
- ☐ be able to take part in normal physical activity without getting asthma symptoms
- ☐ need reliever medication less than 3 times a week (except if it is used before exercise)

### WHEN NOT WELL

You will

- ☐ have increasing night-time wheeze or cough or chest tightness
- ☐ have symptoms regularly in the morning when you wake up
- ☐ have a need for extra doses of reliever medication
- ☐ have symptoms which interfere with exercise

(You may experience one or more of these)

### IF SYMPTOMS GET WORSE, THIS IS AN ACUTE ATTACK.

You will

- ☐ have one or more of the following: wheeze, cough, chest tightness or shortness of breath
- ☐ need to use your reliever medication at least once every 3 hours or more often

### DANGER SIGNS

- ☐ your symptoms get worse very quickly
- ☐ wheeze or chest tightness or shortness of breath continues after using reliever medication or return within minutes of taking reliever medication
- ☐ severe shortness of breath, inability to speak comfortably, blueness of lips

### IMMEDIATE ACTION IS NEEDED: CALL AN AMBULANCE

Take this Action Plan with you when you visit your doctor.

## Asthma Action Plan



Name / ID label

Completed by: \_\_\_\_\_

Date: \_\_\_\_/\_\_\_\_/\_\_\_\_

To be reviewed in 6 months by your local doctor

When Well

Take PREVENTER medication:

Before exercise:

Stop RELIEVER medication after being well for \_\_\_\_ days.

Continue PREVENTER

When unwell - a cold, wheeze, cough (see back of page)

Take RELIEVER (blue puffer) medication:

Take \_\_\_\_ puffs of \_\_\_\_ with the spacer 3 to 4 times a day.

Continue PREVENTER: \_\_\_\_\_

Improving

Improving

Continue RELIEVER medication puffs 3 to 4 times a day  
Continue PREVENTER

If worsens - chest tightness, breathing quickly, shortness of breath, increased effort of breathing

Take RELIEVER (blue puffer) medication:

Take \_\_\_\_ puffs of \_\_\_\_ with the spacer every 3 to 4 hours (6-8 times a day) as necessary. If not improving see your doctor.

Take STEROID: \_\_\_\_ of \_\_\_\_ for \_\_\_\_ days

While taking oral steroids use RELIEVER medication at least 3 to 4 times a day

Improving

If severe - marked chest tightness, struggling to breathe, difficulty speaking, blue lips

Take 4 puffs of RELIEVER (blue puffer) IMMEDIATELY. Wait for 4 minutes. If no improvement in 4 minutes, take another 4 puffs and go to your DOCTOR or the nearest HOSPITAL. If struggling to breathe, unable to speak or blue lips call an AMBULANCE URGENTLY ON '000'. On the way to the doctor or while waiting for an ambulance, continue to give blue puffer - 4 puffs every 4 minutes.

Please bring this plan with you when you visit your doctor or the hospital

October 2003  
SHH Health

## What to look for in an attack of Asthma or When to use reliever (blue puffer)

### Wheeze

You may or may not hear a wheeze. A wheeze sounds like a whistling noise, which is usually heard when the child breathes out.

### Cough

A dry cough may be a sign of an asthma attack.

### Chest tightness or "pain"

An older child may feel chest tightness. Younger children may complain of "chest pain" or "tummy pain".

### Shortness of breath

Feels like it's difficult to breathe.

### Increased effort of breathing

Sucking in between ribs or under ribs or at the base of the throat.

In younger children, stomach moving in and out obviously.

In older children, chest rising and falling fast.

### Struggling to breathe

The child may be gasping for air or exhausted from the effort of breathing.

## Getting Better

- You will know your child is getting better because the signs above will happen less often or go away.
- As your child improves they will need to use their reliever (blue puffer) less often (some children will need their blue puffer before exercise).

## Remember

- When taking oral steroids, use the reliever medication (blue puffer) at least 3 - 4 times a day.
- Not all symptoms listed need to be present in an asthma attack.
- Symptoms can worsen very quickly.

If there is anything you don't understand about this form, please ask your doctor.

## **Asthma Action Plan for J T**

DOB 08/06/2012

Plan prepared by: Dr Tim McDonald – 11<sup>th</sup> May 2016

Weight 17.05 kg

Height 109 cm

### **If symptoms of Asthma (wheezing/chest-tightness/shortness of breath)**

For mild symptoms: take **2 puffs** of **Ventolin**.

For more severe symptoms: take **up to 6 puffs** of **Ventolin**

Use your spacer if you have one. Repeat doses as often as you need to.

Don't stop taking your preventer. If you need **Ventolin** more often than every 3 hours, see your doctor or go to hospital.

### **Preventer Treatment**

**Singulair 4 mgm daily**

**In event Singulair is ineffective then add Flixotide Junior (50 ugm) 2 puffs twice a day then after 2 weeks cease Singulair**

- Use your preventer everyday

- If you use an inhaled steroid (eg. Flixotide) - via the spacer, you should rinse your mouth out after using it

### **Prednisolone**

If from previous experience you suspect this is a more severe attack, or if the symptoms are not getting better in about 6 to 8 hours with regular use of **Ventolin** take **Prednisolone** immediately then once each morning.

**Take 35 mgm ( 7 mls ) on day 1 then 3.5 mls ( 17.5 mgm ) on days 2 - 5 if required**

### **When to seek help from the doctor/hospital**

- If you have a bad attack or are worried

- If you need **Ventolin** more than every 3 hours

- If you get little or no relief from **Ventolin**

- Wheezing lasts more than 24 hours and is not getting better

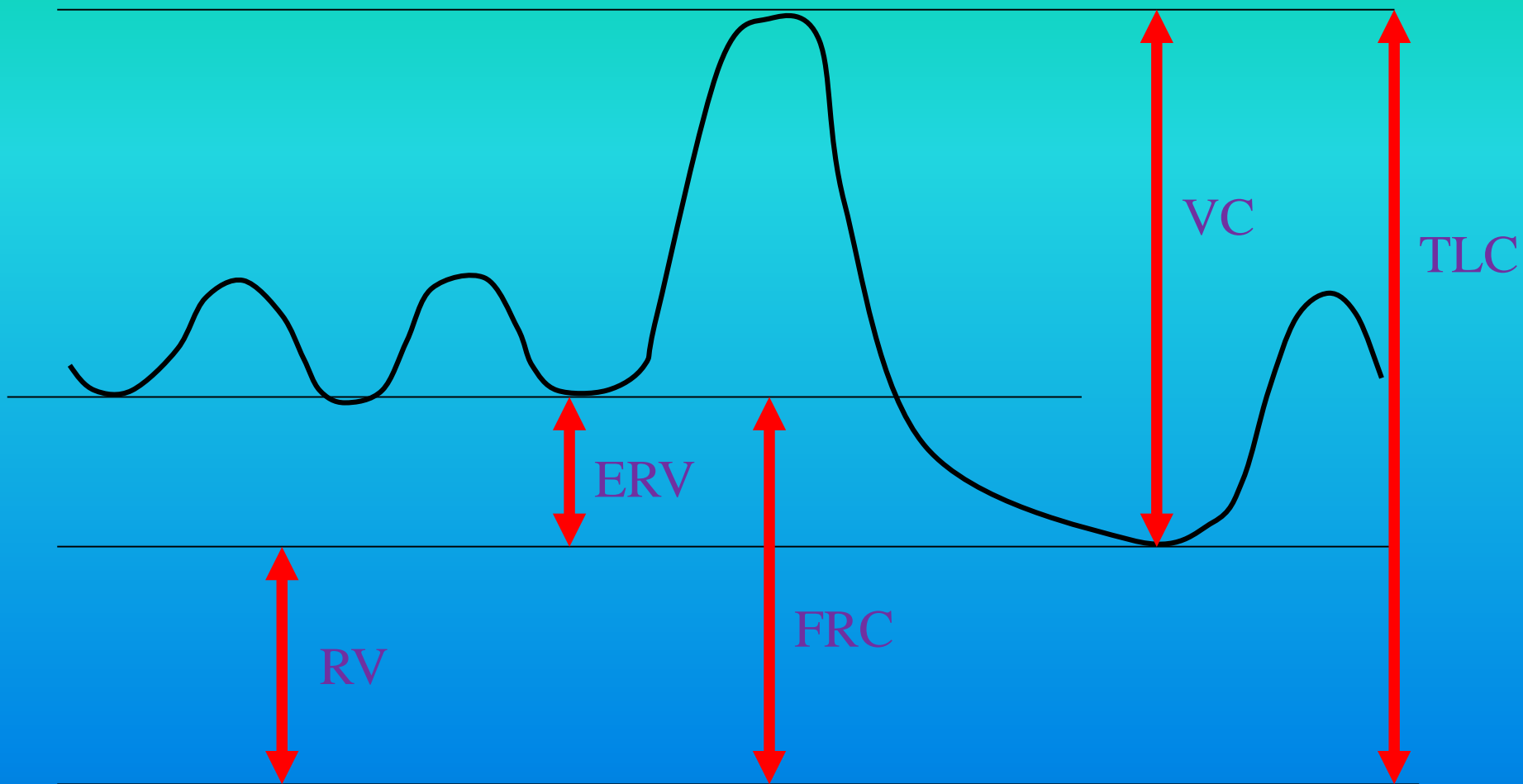
**If you have a very severe attack: call an ambulance and take up to 6 puffs of Ventolin every 15 to 30 minutes.**

Keep this plan readily available at all times. Please take this plan and all medications to all doctors visits. Give copies to others who are involved in the care of the patient (eg. grandparents, ~~carer~~, kinder, school) If you use a spacer, wash it in soapy water at least once a month and let it drip dry.

**Community Health Intake (02) 6207 9977**

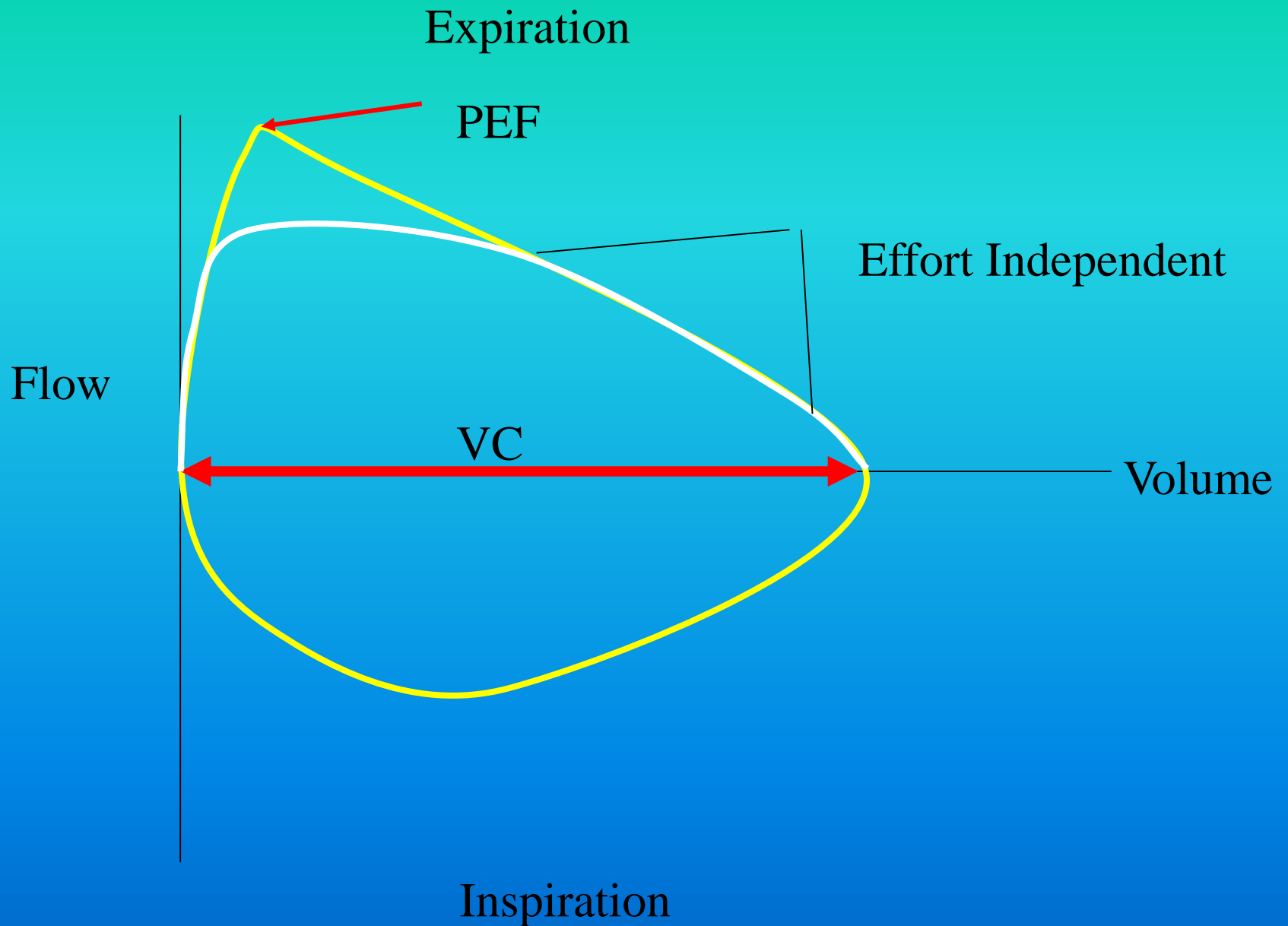


# Spirometry



tidal volume ( $V_T$ ),  
expiratory reserve volume (ERV), and  
residual volume (RV).

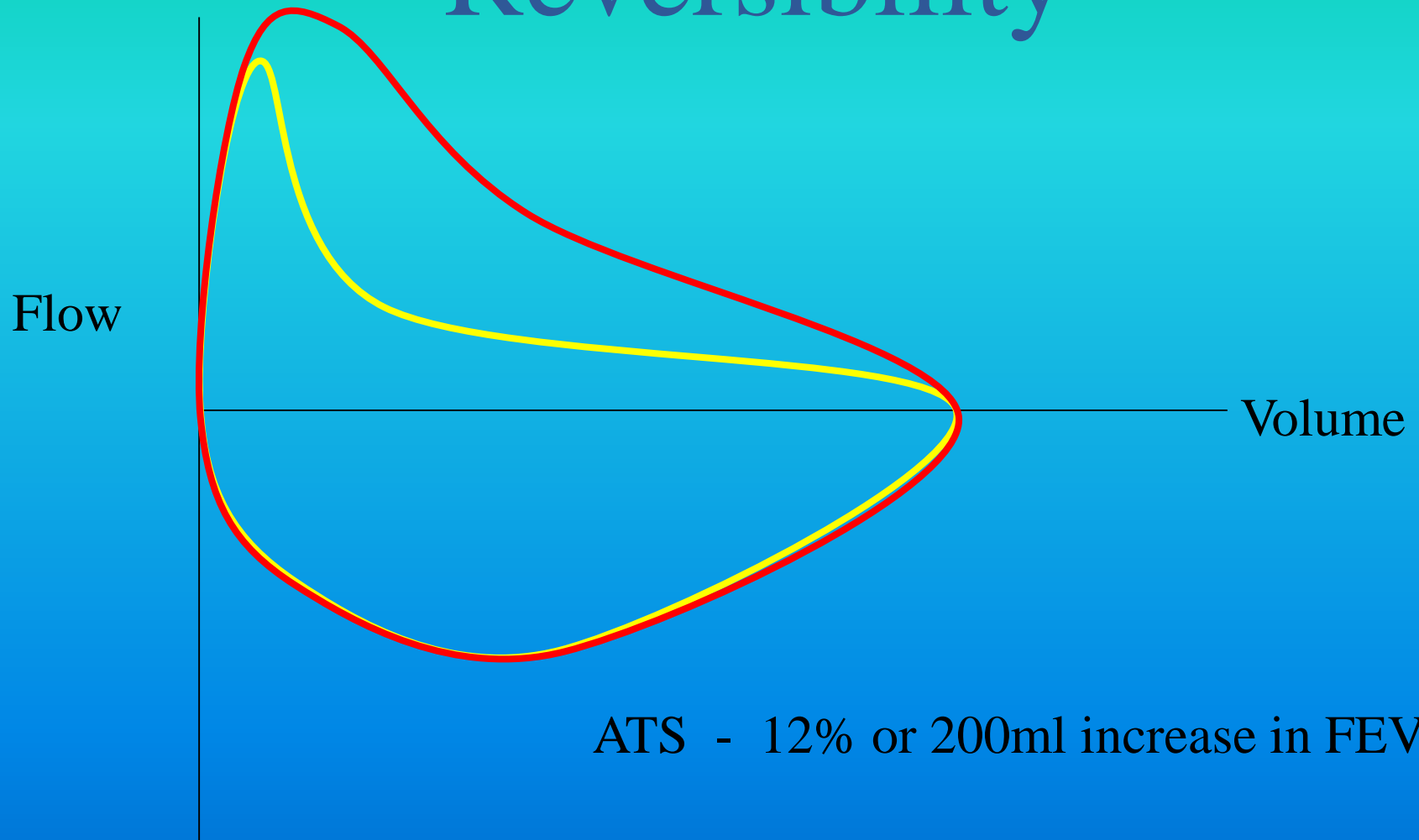
total lung capacity (TLC), functional residual capacity (FRC) and vital capacity (VC).



# Obstruction

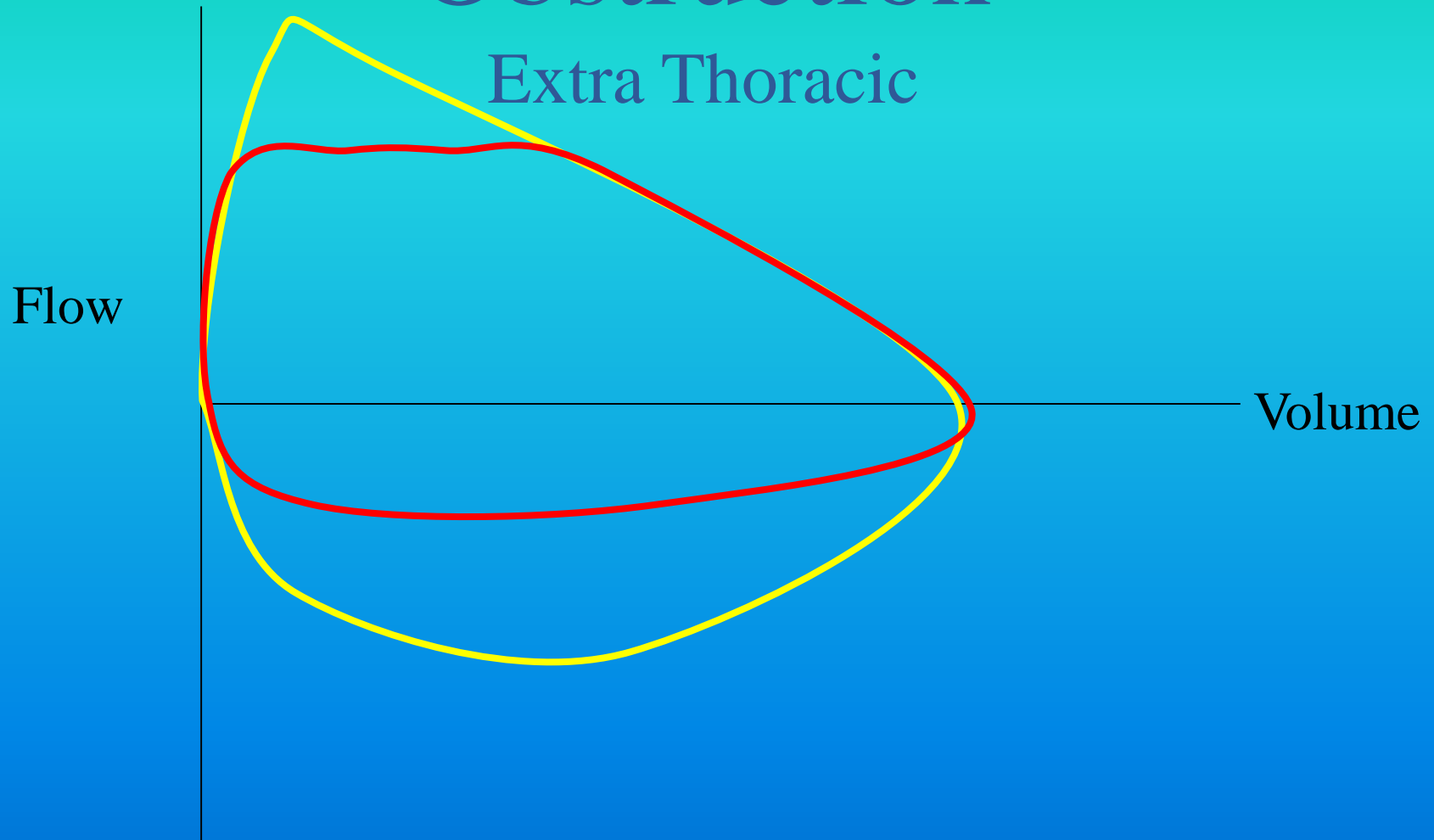


# Reversibility



# Obstruction

Extra Thoracic



# Restriction





# RespACT

LUNG FUNCTION TESTING

Central Booking Number

1300 780 239

[ ] Dr. Bill Burke - 038617AH

[ ] Dr. Tim McDonald - 033175BH

**Test Comments:** Good patient effort & cooperation. The results of this test appear to be valid, although the ATS standard for three acceptable maneuvers was not met, best efforts reported.

A.P..... Date: 20/02/2017

DOB: 16/01/2008 Age: 9 Gender: Female Race: <Unspecifi

Height: 138.00 Cms Weight: 36.60 Kgs BMI: 19.2

Smoker: Never Smoked How Long: Quit:

Clinical Details: Frequent episodic asthma

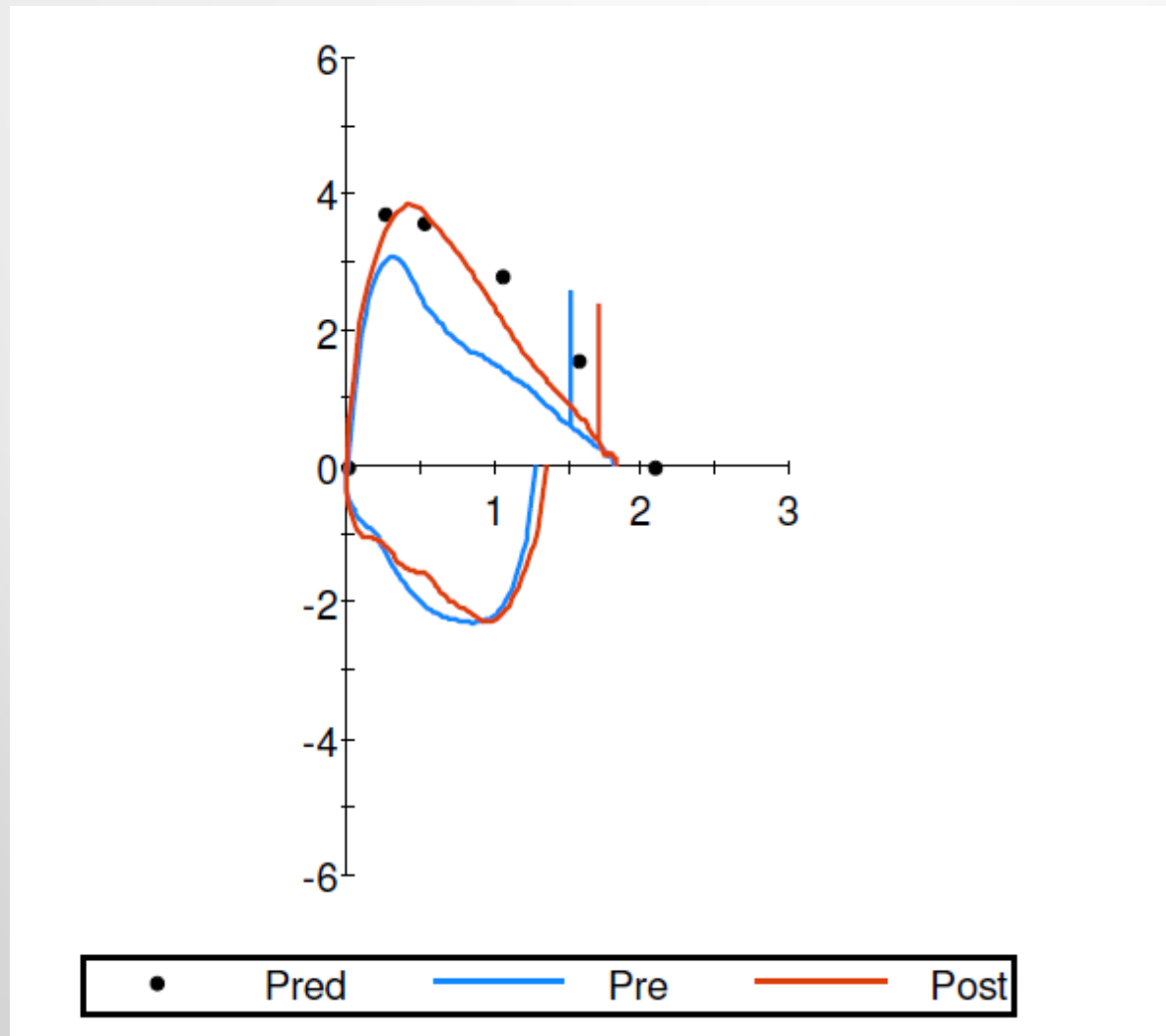
Referring Doctor: McDonald, Tim

Family Doctor: MEAGHER, William Copies to Jaffe, Adam

Respiratory Scientist: JH

	Pre-Bronch			Post Bronch			
	<u>Actual</u>	<u>Pred</u>	<u>% Pred</u>	<u>SD</u>	<u>LLN</u>	<u>Actual</u>	<u>% Chng</u>
--- SPIROMETRY ---							
FVC (L)	1.82	2.09	87	0.27	1.75	1.84	+0
FEV1 (L)	*1.53	1.99	*76	0.30	1.66	1.72	+12
FEV1/FVC (%)	84	95			79	94	+11
FEF 25% (L/sec)	*2.68	3.60	*74	0.87	3.01	3.83	+42
FEF 75% (L/sec)	*0.87	1.57	*55	0.42	1.31	*1.25	+43
FEF 25-75% (L/sec)	*1.51	2.23	*67	0.51	1.86	2.28	+50
FEF Max (L/sec)	3.17	3.72	85	0.87	3.11	3.82	+20
FIVC (L)	1.29					1.36	+5
FIF Max (L/sec)	2.30					2.29	+0

# Flow Volume Loops - A.P.





# RespACT

LUNG FUNCTION TESTING

Central Booking Number

1300 780 239

[ ] Dr. Bill Burke - 038617AH

[ ] Dr. Tim McDonald - 033175BH

**Test Comments:** Good patient effort & cooperation. The results of this test appear to be valid, although the ATS standard for "end of test" was not met. Resp. Meds: Ventolin prn

L.K.....

Date: 06/02/2017

DOB: 25/03/2006 Age: 10 Gender: Male Race: Caucasian

Height: 159.60 Cms Weight: 45.40 Kgs BMI: 17.8

Smoker: How Long: Quit:

Clinical Details: frequent episodic asthma

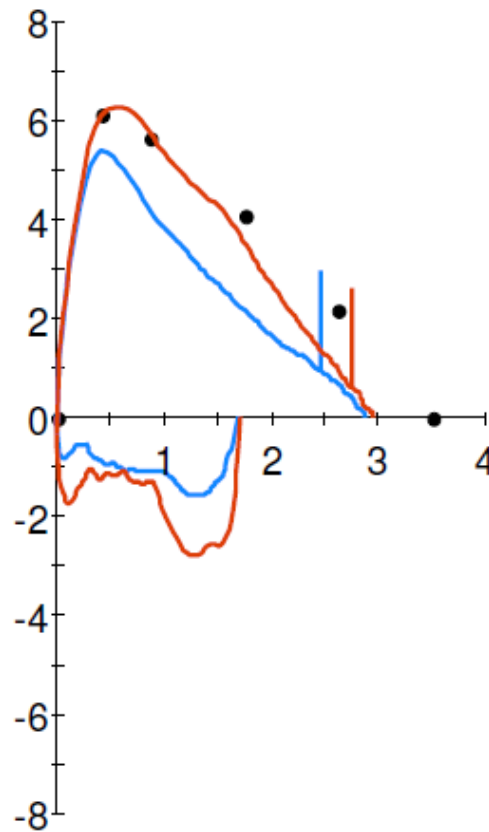
Referring Doctor: McDonald, Tim

Family Doctor: Copies to:

Respiratory Scientist: CH

	Pre-Bronch				Post Bronch		
	<u>Actual</u>	<u>Pred</u>	<u>% Pred</u>	<u>SD</u>	<u>LLN</u>	<u>Actual</u>	<u>% Chng</u>
--- SPIROMETRY ---							
FVC (L)	*2.87	3.50	*82	0.03	2.92	2.95	+2
FEV1 (L)	2.49	2.91	85	0.04	2.43	2.77	+11
FEV1/FVC (%)	87	83			69	94	+8
FEF 25% (L/sec)	4.71	5.64	83	0.75	4.71	6.14	+30
FEF 75% (L/sec)	*1.40	2.19	*63	0.41	1.83	2.24	+60
FEF 25-75% (L/sec)	2.52	3.01	83	0.69	2.51	*3.87	+53
FEF Max (L/sec)	5.34	6.13	87	0.07	5.12	6.24	+16
FIVC (L)	1.69					1.72	+1
FIF Max (L/sec)	1.57					2.80	+77

# Flow Volume Loops - L.K.



• Pred      — Pre      — Post



# RespACT

LUNG FUNCTION TESTING

Central Booking Number

1300 780 239

[ ] Dr. Bill Burke - 038617AH

[ ] Dr. Tim McDonald - 033175BH

**Test Comments:** Good patient effort & cooperation. The results of this test meet the ATS standards for acceptability and repeatability. Resp meds Singulair Ventolin. (took Singulair last night)

Patient: J.S.....

Date: 27/01/2017

DOB: 21/06/2004 Age: 12 Gender: Male Race: <Unspecifi

Height: 149.00 Cms Weight: 56.30 Kgs BMI: 25.4

Smoker:

How Long:

Quit:

Clinical Details: H/o frequent episodic asthma

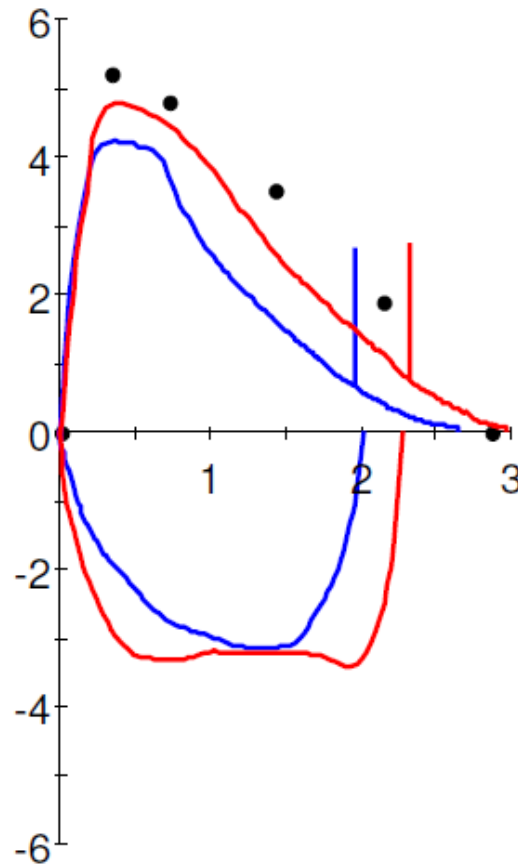
Referring Doctor: McDonald, Tim

Family Doctor: GAN, Michael Copies to:

Respiratory Scientist: JH

	Pre-Bronch			Post Bronch			
	<u>Actual</u>	<u>Pred</u>	<u>%Pred</u>	<u>SD</u>	<u>LLN</u>	<u>Actual</u>	<u>%Chng</u>
---- SPIROMETRY ----							
FVC (L)	2.65	2.86	92	0.03	2.39	2.97	+11
FEV1 (L)	*1.97	2.39	*82	0.04	2.00	2.35	+19
FEV1/FVC (%)	74	84			70	79	+6
FEF 25% (L/sec)	*4.00	4.82	*82	0.75	4.02	4.55	+13
FEF 75% (L/sec)	*0.62	1.89	*32	0.41	1.58	*1.43	+131
FEF 25-75% (L/sec)	*1.50	2.77	*54	0.63	2.31	2.59	+72
FEF Max (L/sec)	*4.27	5.22	*81	0.07	4.36	4.75	+11
FVC (L)	2.02					2.28	+12
FIF Max (L/sec)	3.16					3.42	+8

# Flow Volume Loops – J.S.





# RespACT

LUNG FUNCTION TESTING

Central Booking Number

1300 780 239

[ ] Dr. Bill Burke - 038617AH

[ ] Dr. Tim McDonald - 033175BH

**Test Comments:** Good patient effort & cooperation. The results of this test meet the ATS standards for acceptability and repeatability. For BP. On Singular.

**Patient:** A.O.....

**Date:** 15/12/2016

**DOB:** 19/04/2010    **Age:** 6    **Gender:** Female    **Race:** <Unspecifi

**Height:** 123.50 Cms    **Weight:** 24.60 Kgs    **BMI:** 16.1

**Smoker:** Never Smoked    **How Long:**    **Quit:**

**Clinical Details:**    H/o recurrent cough ?asthma

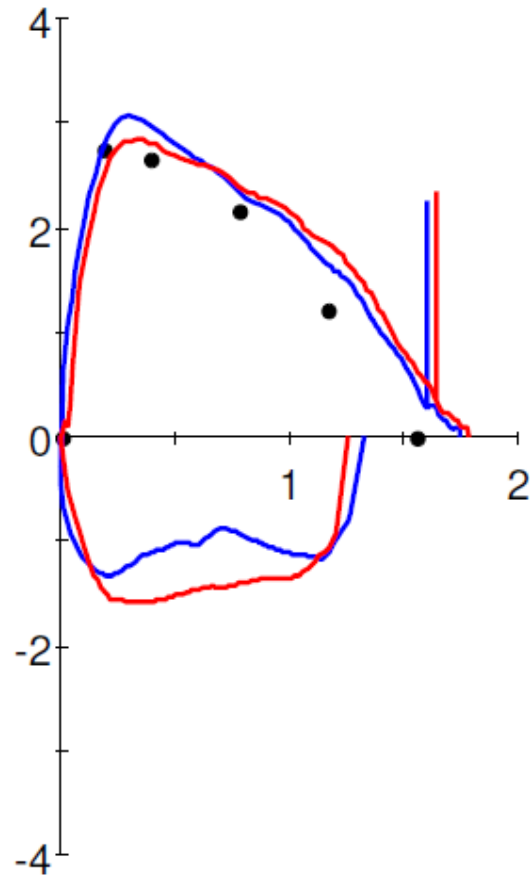
**Referring Doctor:**    McDonald, Tim

**Family Doctor:** Serafim, Andrew    **Copies to:**

**Respiratory Scientist:**    JH

	Pre-Bronch			Post Bronch			
	<u>Actual</u>	<u>Pred</u>	<u>%Pred</u>	<u>SD</u>	<u>LLN</u>	<u>Actual</u>	<u>% Chng</u>
--- SPIROMETRY ---							
FVC (L)	1.74	1.55	112	0.27	1.29	1.79	+2
FEV1 (L)	1.61	1.46	110	0.30	1.22	1.66	+2
FEV1/FVC (%)	92	94			78	93	+0
FEF 25% (L/sec)	2.91	2.67	108	0.87	2.23	2.76	-5
FEF 75% (L/sec)	1.33	1.21	109	0.42	1.01	*1.51	+13
FEF 25-75% (L/sec)	*2.08	1.74	*119	0.41	1.45	*2.18	+4
FEF Max (L/sec)	3.05	2.76	110	0.87	2.30	2.87	-6
FIVC (L)	1.33					1.26	-5
FIF Max (L/sec)	1.32					1.59	+20

# Flow Volume Loops – A.O.



• Pred — Pre — Post



**RespACT**  
LUNG FUNCTION TESTING

Bookings - 1300 780 239

Referring Physician:

Copies to:

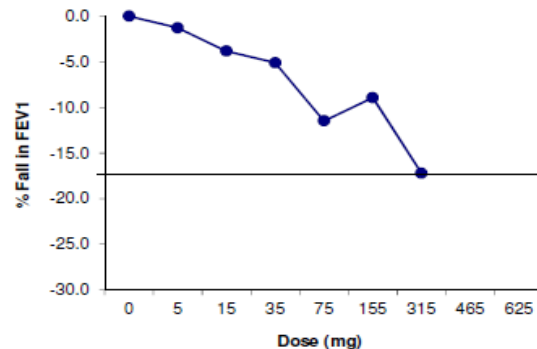
## *Aridol<sup>TM</sup> Challenge Test*

Name: A.O.....  
Height: 123.5  
Weight: 24.6  
D.O.B: 19/04/2010 0 yrs  
Gender: Female  
Test Date: 20/12/2016

Baseline FEV1 (L) 1.6

Cumulative Dose (mg)	FEV1 (L)	%Change
0	1.57	0.0
5	1.55	-1.3
15	1.51	-3.8
35	1.49	-5.1
75	1.39	-11.5
155	1.43	-8.9
315	1.30	-17.2
465		
625		

**PD15 = 261.0 mg**



# Bronchoconstriction with Ciclesonide



**RespACT**  
LUNG FUNCTION TESTING

Central Booking Number  
1300 780 239

[ ] Dr. Bill Burke - 038617AH

[ ] Dr. Tim McDonald - 033175BH

**Test Comments:** Good patient effort & cooperation. The results of this test meet the ATS standards for acceptability and repeatability. Challenge step was with 2 puffs Alvesco 80mcg. Post was after 400mcg Ventolin.

A.H.....

Date: 14/12/2016

DOB: 14/07/2003 Age: 13 Gender: Female Race: <Unspecifi

Height: 168.00 Cms Weight: 52.80 Kgs BMI: 18.7

Smoker: Never Smoked How Long:

Quit:

Clinical Details: Asthma - Previous response to Alvesco.

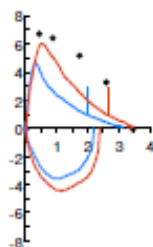
Referring Doctor: McDonald, Tim

Family Doctor: Carver, J

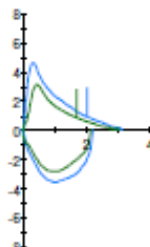
Copies to:

Respiratory Scientist: JH

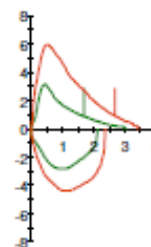
	Pre-Bronch			Challenge		Post-Bronch	
	Actual	Pred	% Pred	Actual	% Chng	Actual	% Chng
--- SPIROMETRY ---							
FVC (L)	3.12	3.42	91	3.02	-3	3.43	+9
FEV1 (L)	*2.03	3.05	*66	*1.72	-15	2.70	+33
FEV1/FVC (%)	*65	90		*57	-12	79	+21
FEF 25% (L/sec)	*2.89	6.44	*44	*2.15	-25	*5.31	+83
FEF 75% (L/sec)	*0.66	3.30	*20	*0.36	-45	*1.40	+110
FEF 25-75% (L/sec)	*1.31	3.65	*35	*0.85	*-35	*2.62	+100
FEF Max (L/sec)	*4.56	6.74	*67	*3.41	*-25	6.18	+35
FIVC (L)	2.21			2.13	-3	2.39	+8
FIF Max (L/sec)	3.56			2.85	-19	4.42	+24



\* Pred — Pre — Post



— Pre — Chlg



— Chlg — Post

# Ciclesonide Challenge report for A.O.

- “Spirometry performed before and after inhalation of Ciclesonide in this 13 year old girl with severe sudden asthma who reports increased symptoms after Ciclesonide. Baseline spirometry and flow volume loops consistent with moderate obstructive lung disease with  $FEV_1$  63% predicted, FVC 91% predicted with FER 65%.
- Post Ciclesonide challenge there was a 15% decrease in  $FEV_1$ , and 12% drop in FER.
- There was good response to bronchodilation with 31% increase in  $FEV_1$ , 9% increase in FVC with 21% increase in FER. There was a 100% increase in MMEFR from baseline and 300% increase from post Ciclesonide inhalation challenge.
- The findings support the clinical impression of bronchoconstrictor response to Ciclesonide”

# Other Therapies

- Azithromycin – anti-inflammatory / antibiotic agent used X 3 per week
- Nuelin SR approx. 10 mgm / kg / dose bd
- Methotrexate 5 – 10 mgm per week
- Prednisolone – alternate day
- Omalizumab
- Vitamin D

# Omalizumab

- IgE selective humanised monoclonal Ab.
- Add-on therapy in children > 6 yrs with severe allergic asthma (+ documented daily exacerbations despite high dose inhaled corticosteroid, IgE > 30 IU/mL);
- management of mod-severe allergic asthma in adults, adolescents on inhaled steroids, with IgE > 30 IU/mL



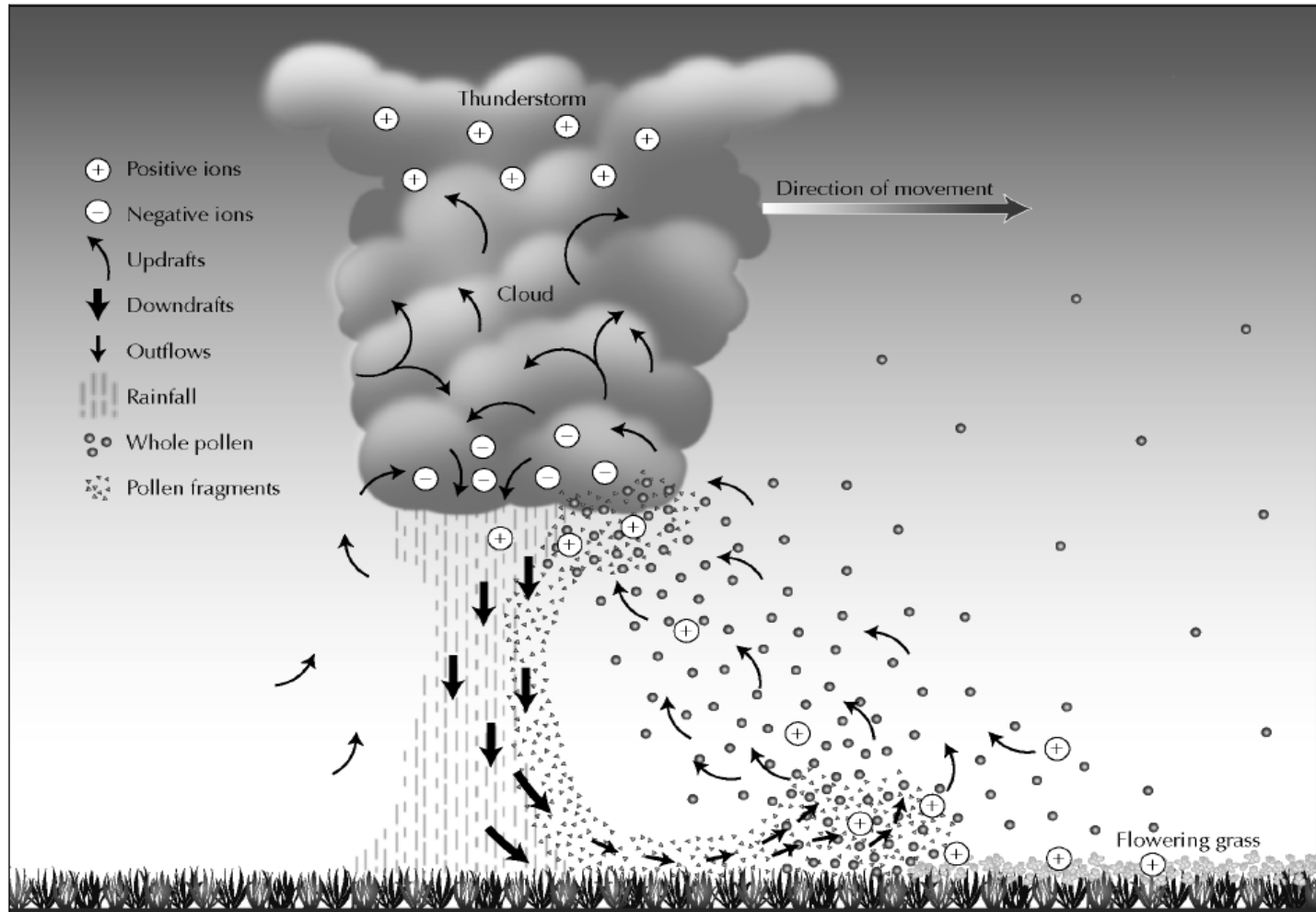
Michael Woodhead BMJ 2016;355:bmj.i6391



# Thunderstorm Asthma

- More than 8500 people attended ED from asthma-related illnesses when stifling heat, a high pollen count, strong winds and moisture in the air combined on November 21.
- 9 people died
  - (Female 20, Males 18 & 35.)
- Thunderstorm asthma has been witnessed just four times in the past 30 years in Melbourne,
- For many sufferers, they had never experienced asthma in any form. They panicked, phoned triple-o and waited for help.

# Thunderstorm Asthma



**Figure 1.** A proposed mechanism for explaining thunderstorm asthma. Dry updrafts entrain whole pollen grains into the high humidity at the cloud base of a maturing thunderstorm. Here, pollen may rupture, and cold downdrafts transport pollen fragments to ground level. Dry outflows distribute these respirable allergens at ground level and increase the exposure risks to humans. The turbulent front of the advancing outflow releases more pollen from flowering grasses, and then updrafts may entrain them into the cloud base. Strong electric fields develop in the thunderstorm. Positive ions are released from the ground and attach to particles entrained into the updrafts. Electric charge may enhance pollen rupture.

# Who is at Risk from Thunderstorm Asthma?

- May not have been previously known to suffer asthma,
- May suffer hayfever (such as those allergic to grass pollen or fungi) or other allergic conditions instead.
- Increased risk been outdoors during thunderstorms rather than indoors.



# NEED HELP WITH YOUR ASTHMA?



## General information and training

Asthma Foundation ACT (member of Asthma Australia)

**Phone: 1800 278 462**

[www.asthmafoundation.org.au](http://www.asthmafoundation.org.au)

or email [training@asthmaact.org.au](mailto:training@asthmaact.org.au)

## Children and young people

Asthma Nurse Educator Service (ACT Health)

**Phone: Community Health Intake (02) 6207 9977**

[www.health.act.gov.au](http://www.health.act.gov.au)

*(Free asthma education and support)*

## Adults with complex asthma

Adult asthma education at the Canberra Hospital

**Phone: (02) 6244 2066**

[www.health.act.gov.au](http://www.health.act.gov.au)

*(Free asthma education and support)*

Your Doctor or Specialist: Phone:

# Summary

- Recurrent / Reversible / Small Airways Narrowing
- <http://www.asthmahandbook.org.au>
- Respiratory Pattern & Sounds
- Asthma Phenotypes & Need for Preventers
- Acute Asthma Treatment
- Difficult Asthma
- Added Therapies
- Thunderstorm Asthma