Government of **Western Australia**
Child and Adolescent Health Service

Wal-yan
RESPIRATORY RESEARCH CENTRE
Healthy lungs for every child, for life

Chronic Wet Cough in Aboriginal Children

with thanks to A/Prof André Schultz

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Acknowledgement of Country

I would like to acknowledge the traditional custodians of the land, the Whadjuk Noongar people, and pay my respects to their elders, past, present and emerging.

Cough

- The single most common presenting symptom in those seeking primary health care
- 80% of children with chronic cough have seen a doctor for their cough on 5+ occasions in the previous year, and 53% had been to the doctor on 10+ occasions
- Chronic cough in childhood is associated with decreased Quality-of-Life

Britt H et al. 2009. General practice series no. 26. Cat. no. GEP 26. Canberra: AIHW
Marchant JM et al. *Chest* 2008; 134:303–30
Newcombe PA et al. *Chest* 2010; 139:576–580.

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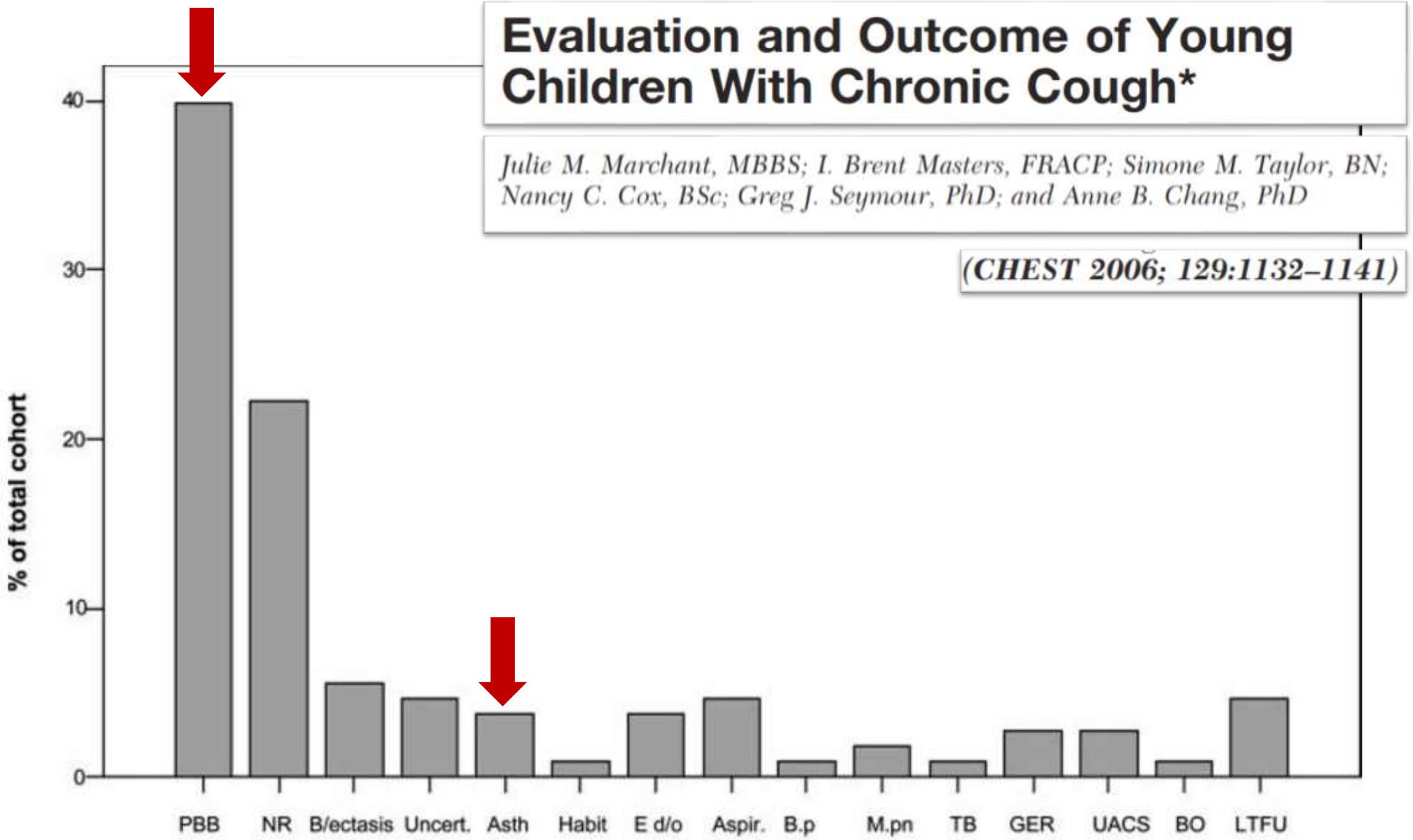
Evaluation and Outcome of Young Children With Chronic Cough*

Julie M. Marchant, MBBS; I. Brent Masters, FRACP; Simone M. Taylor, BN; Nancy C. Cox, BSc; Greg J. Seymour, PhD; and Anne B. Chang, PhD

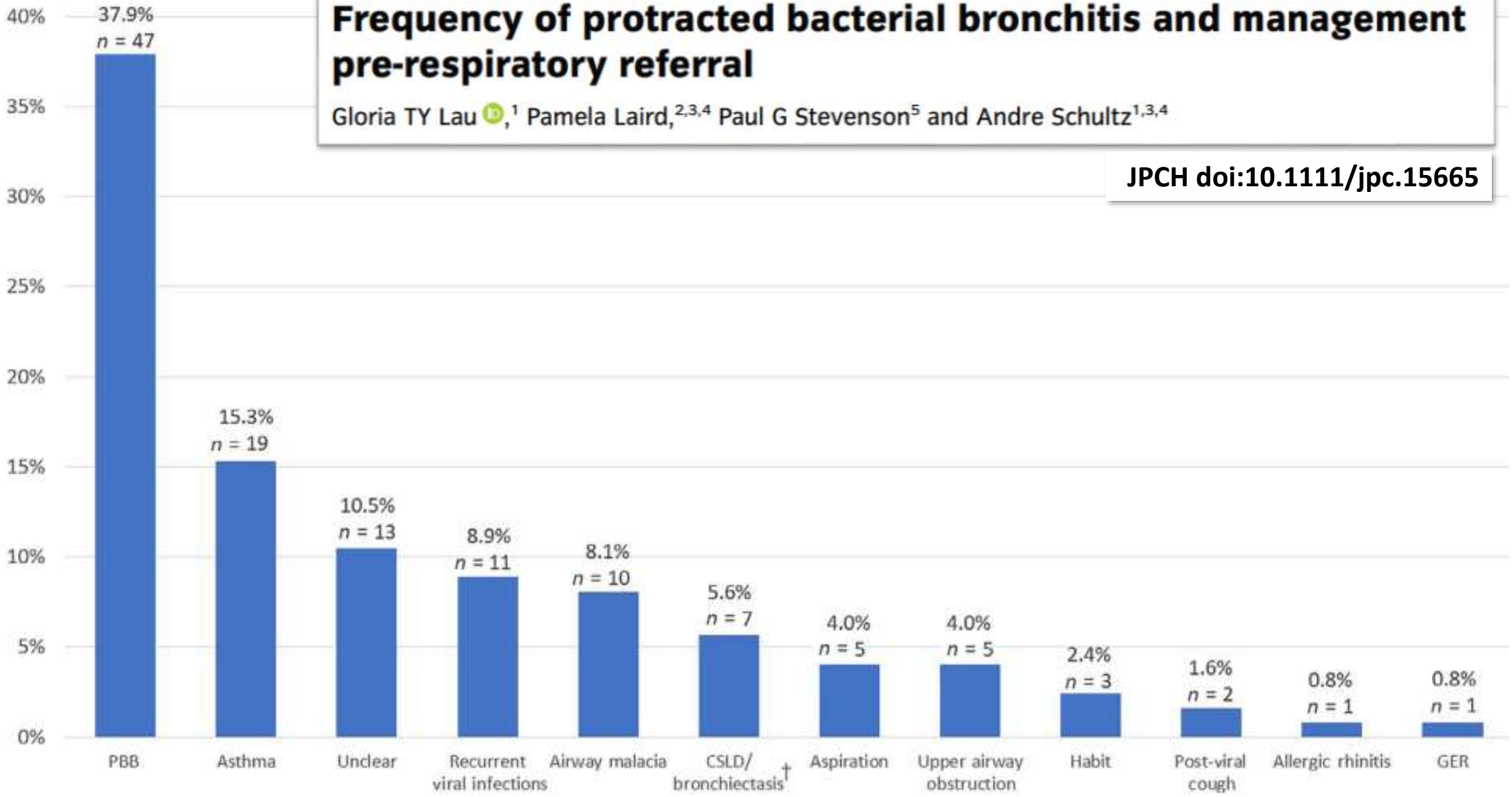
(CHEST 2006; 129:1132–1141)



Frequency of protracted bacterial bronchitis and management pre-respiratory referral

Gloria TY Lau,[1] Pamela Laird,[2,3,4] Paul G Stevenson[5] and Andre Schultz[1,3,4]

JPCH doi:10.1111/jpc.15665



Protracted Bacterial Bronchitis

Case Definition: PBB

Protracted Bacterial Bronchitis (PBB)

Defined as wet cough lasting for > 4 weeks without specific pointers of an alternative cause, and which responds to antibiotic therapy.

- Formally recognised as a diagnostic entity in 2006
- PBB was found in 10% of all preschool Aboriginal children in the Kimberley
- Early identification and treatment halts the progression to bronchiectasis

Marchant JM et al. *Chest* 2006;129:1132-1141
Laird P et al. *ERJ* Open Res 2019;5:00248--2019

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Answer

- 19% of Indigenous children hospitalised with chest infections will have bronchiectasis if followed up a year later

- National guidelines recommend primary care follow-up at 4-weeks post discharge

RACGP
Royal Australian College of General Practitioners

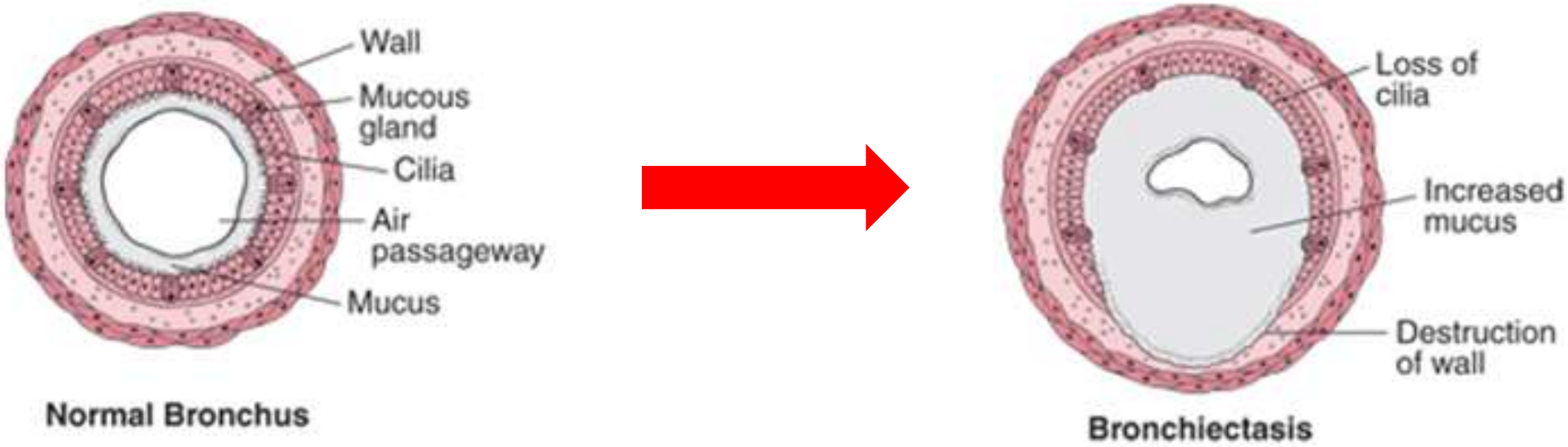
NACCHO
National Aboriginal Community Controlled Health Organisation
Aboriginal health in Aboriginal hands
www.naccho.org.au

McCallum GB et al. *Pediatr Pulmonol* 2016;51(6):613-623
National AHCO & RACGP: National guide to a preventive health assessment for ATSI people. RACGP; 2018

Case Definition: Bronchiectasis

Bronchiectasis is a progressive disease characterised by dilated, thick-walled bronchi, usually with associated chronic bacterial infection and inflammation.

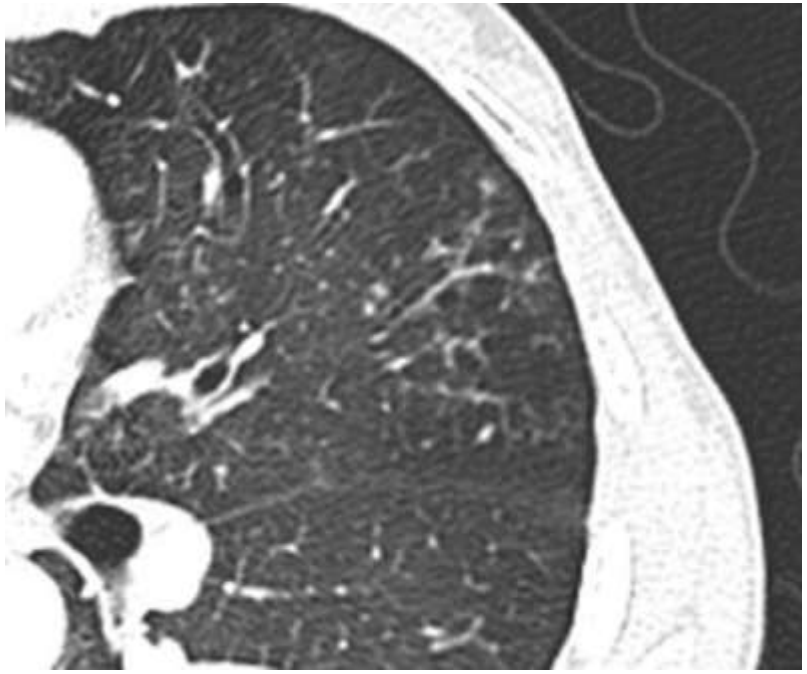
- The diagnosis is made with High Resolution CT (HRCT) scan. This is usually ordered under advice from Paediatrician.

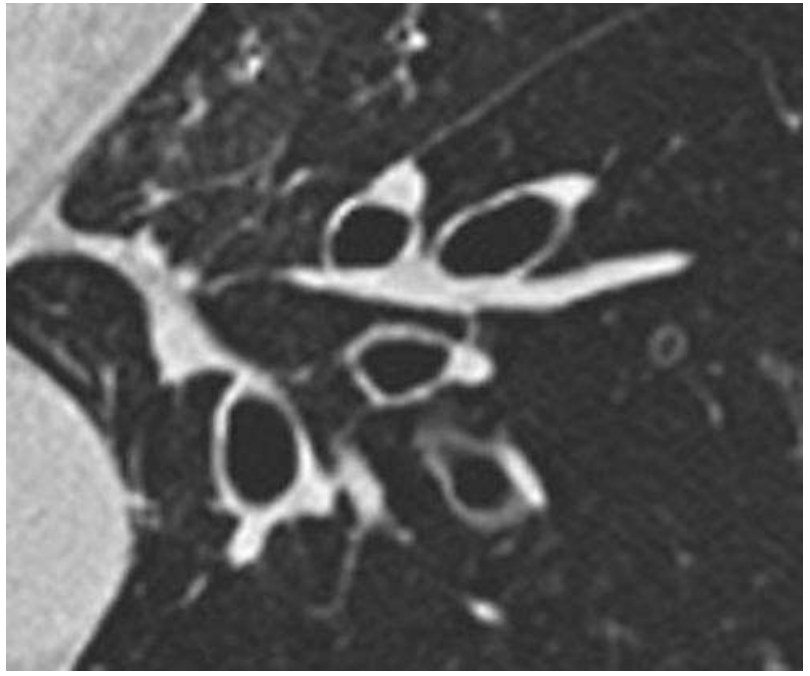


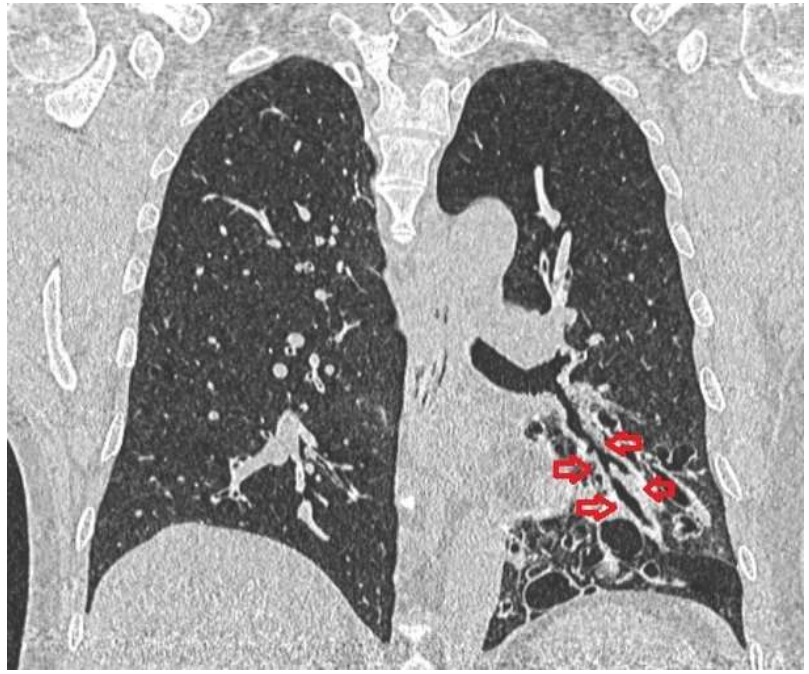
Normal Bronchus

Bronchiectasis

Quick Facts: Bronchoscopy – MSD Manual Consumer Version







CT chest – early bronchiectasis

CT chest – moderate bronchiectasis

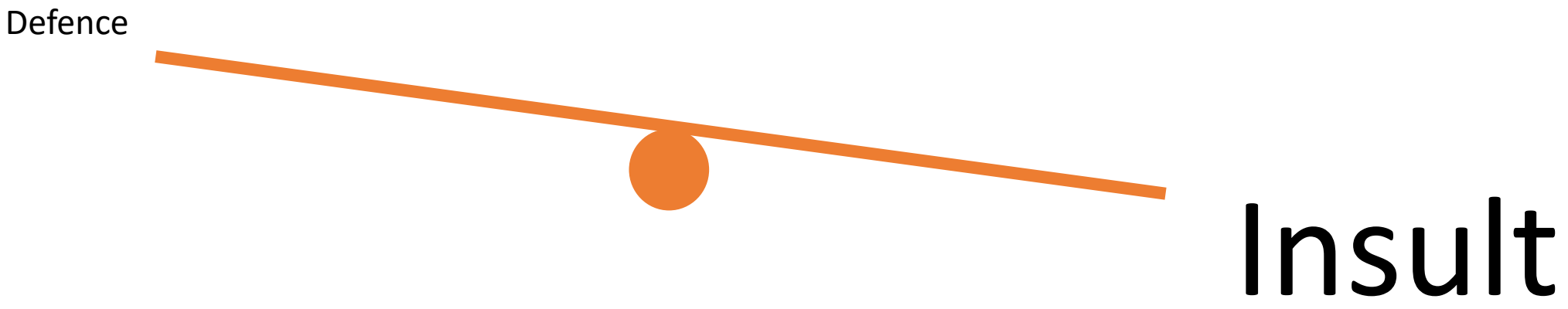
CT chest – severe bronchiectasis

Causes of bronchiectasis

Defence

Insult

Causes of bronchiectasis

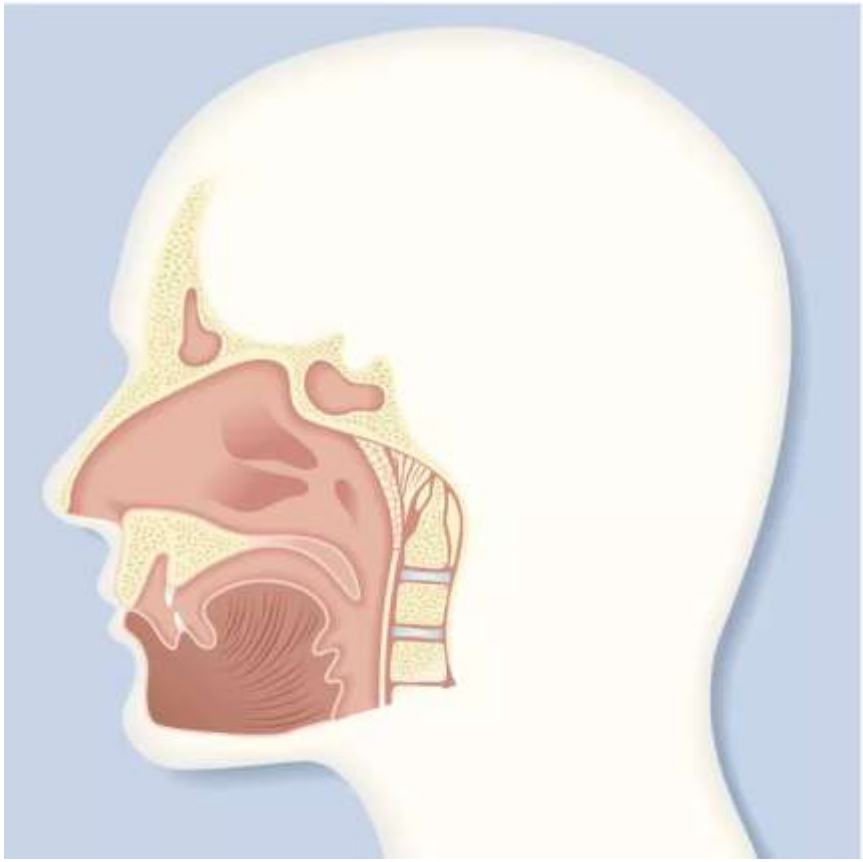


Healthy Pulmonary Defences

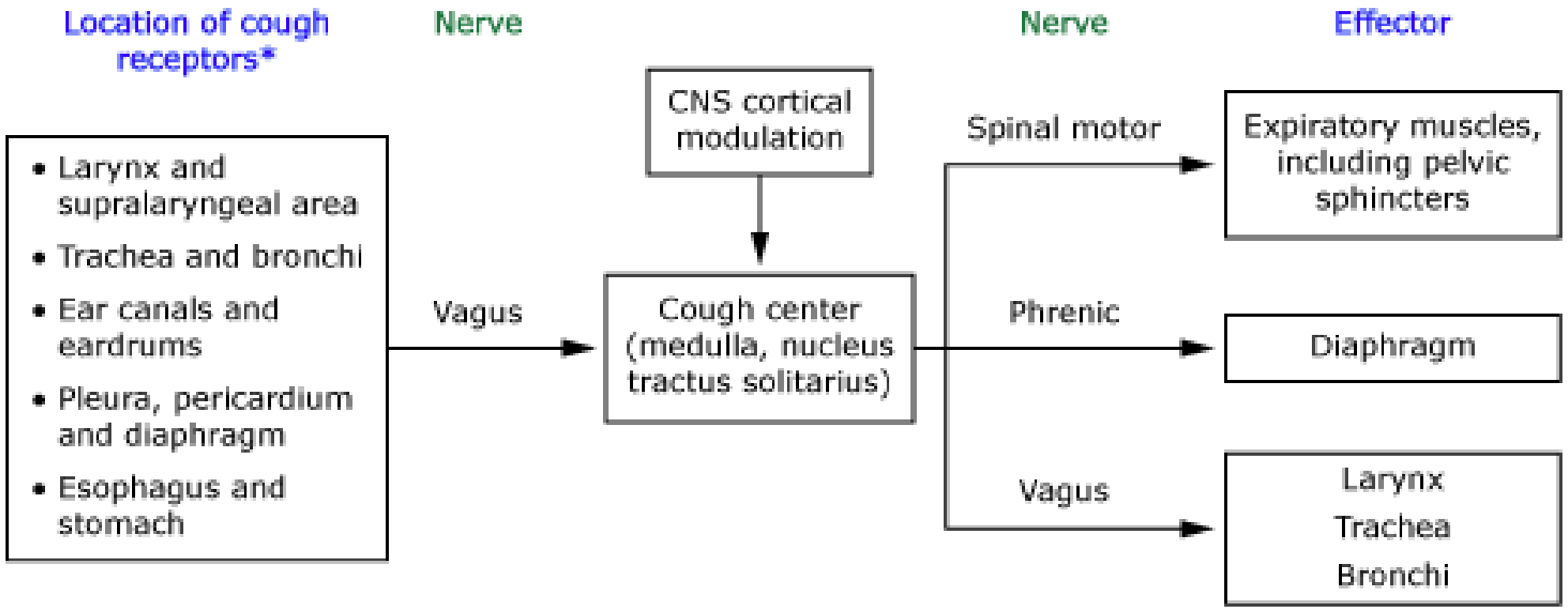
- Upper airway filtering & sneezing
- Cough
- Mucociliary clearance
- Immune mechanisms

Upper airway filtering

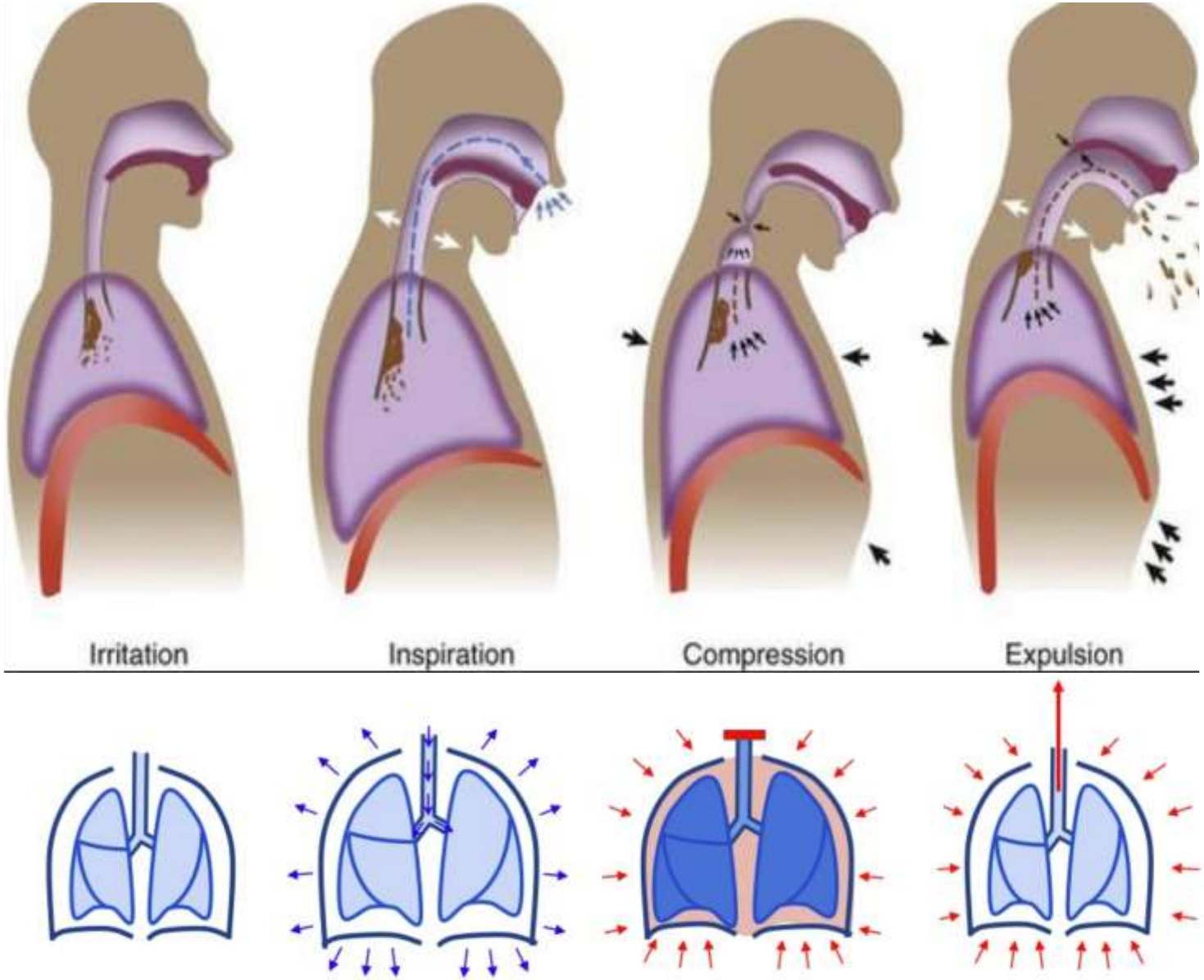
- Nasopharyngeal anatomy
- Hair & mucosal folds over the nasal turbinates direct airflow through nose
- Most particles (>15 µm) are carried in the mucous to pharynx and swallowed
- If particles are allergic/irritant → rhinorrhoea and sneezing



Cough



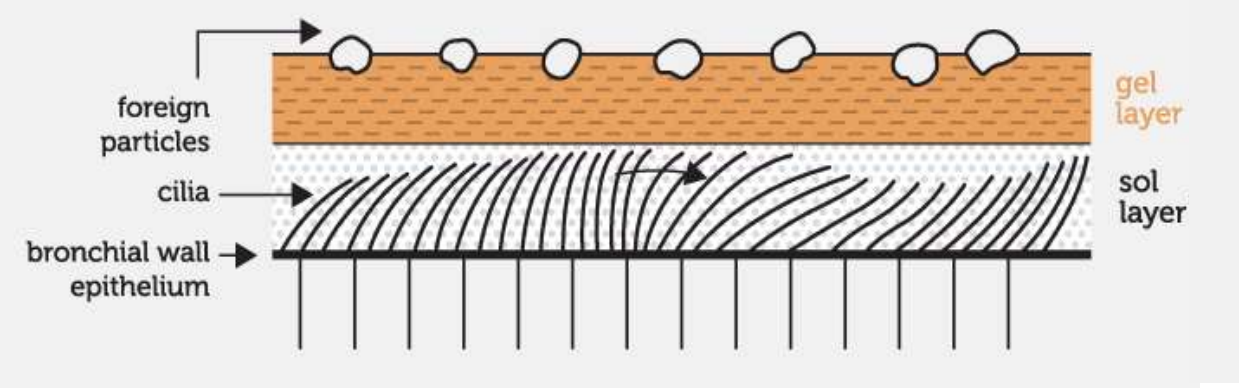
UpToDate Graphic 55232



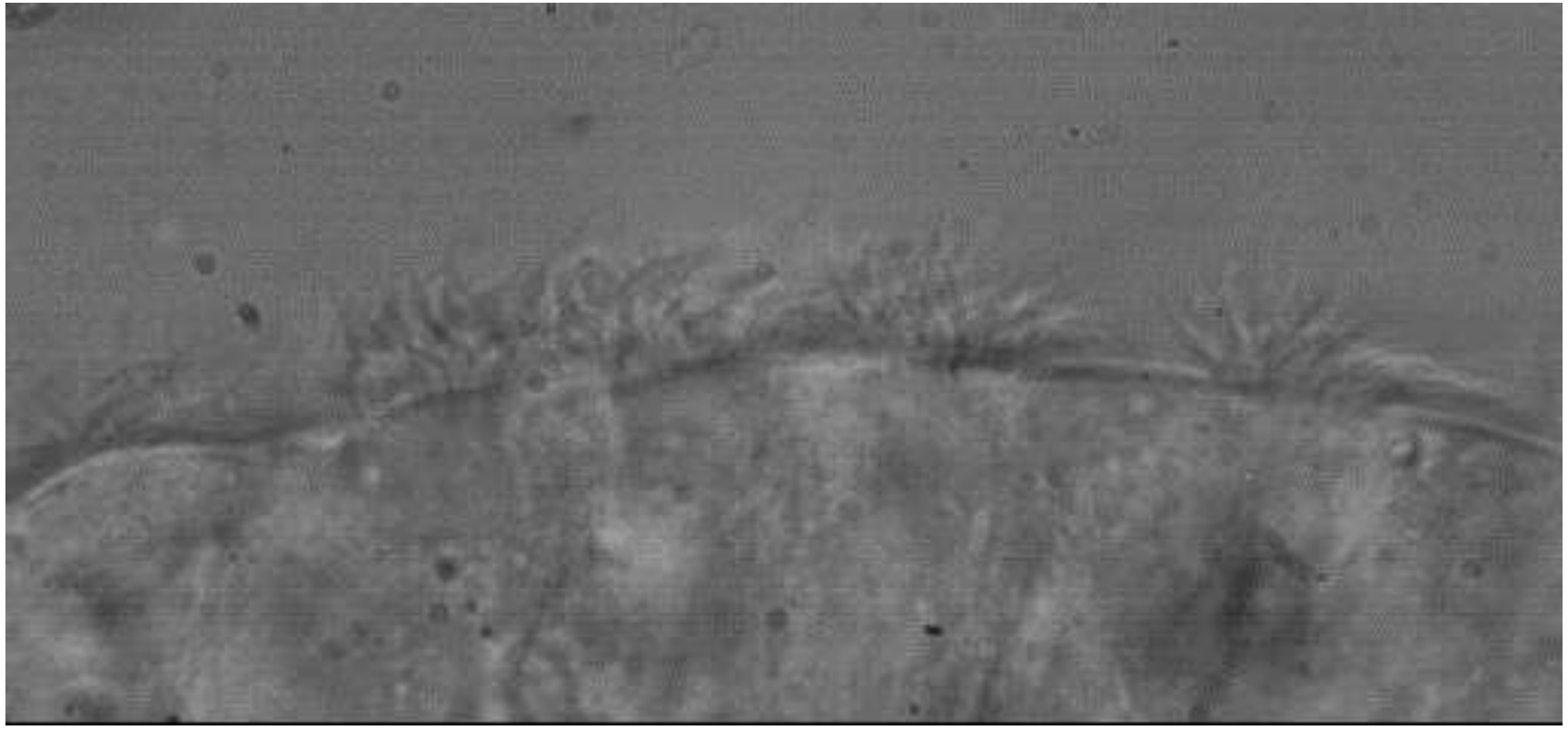
Middleton's Allergy: Principles & Practice, 8th Ed. 2013.

Mucociliary Clearance

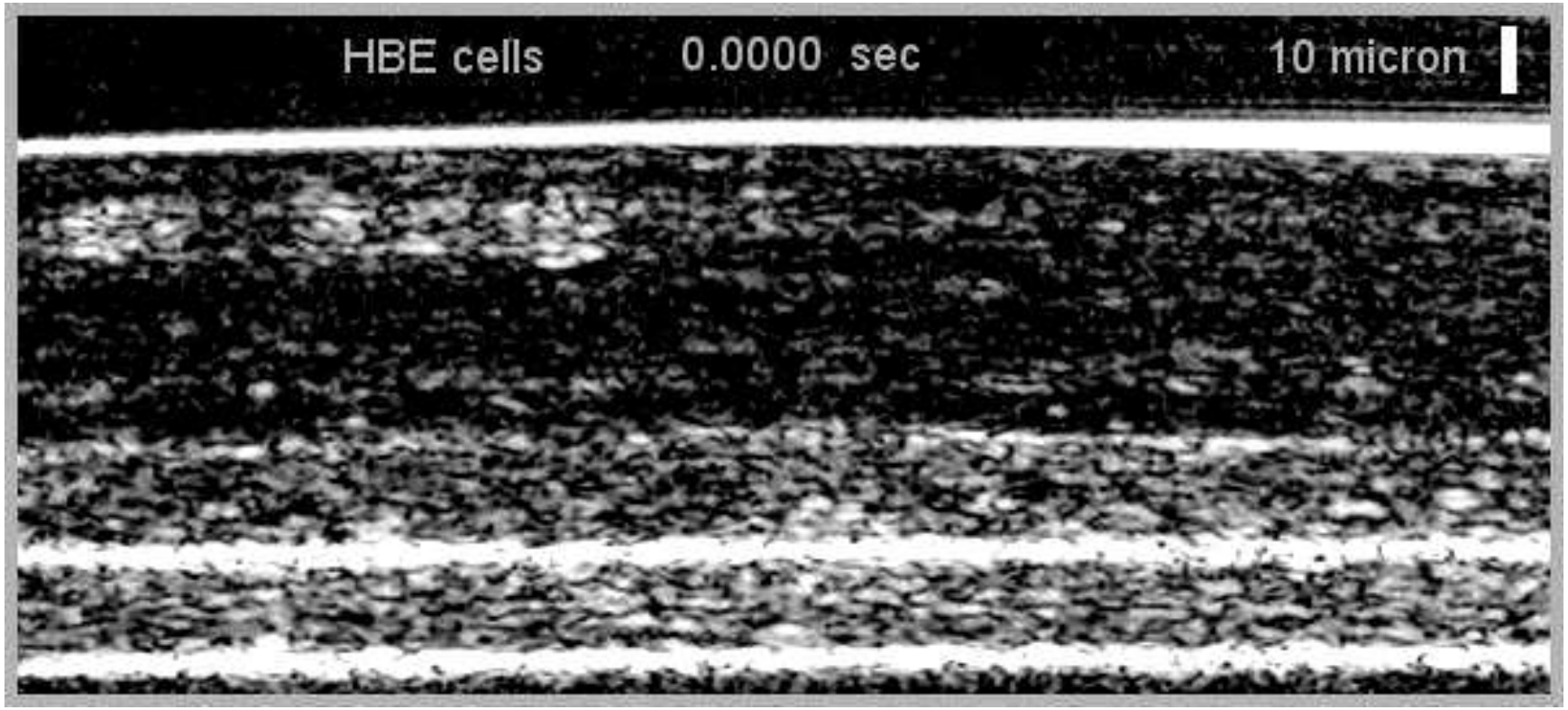
- Airways are lined with cilia and are covered by an airway surface liquid
- Cilia pushes secretions from the peripheral to the central airways where they are swallowed or expectorated
- Removes nearly all particles >5µm



Normal cilia

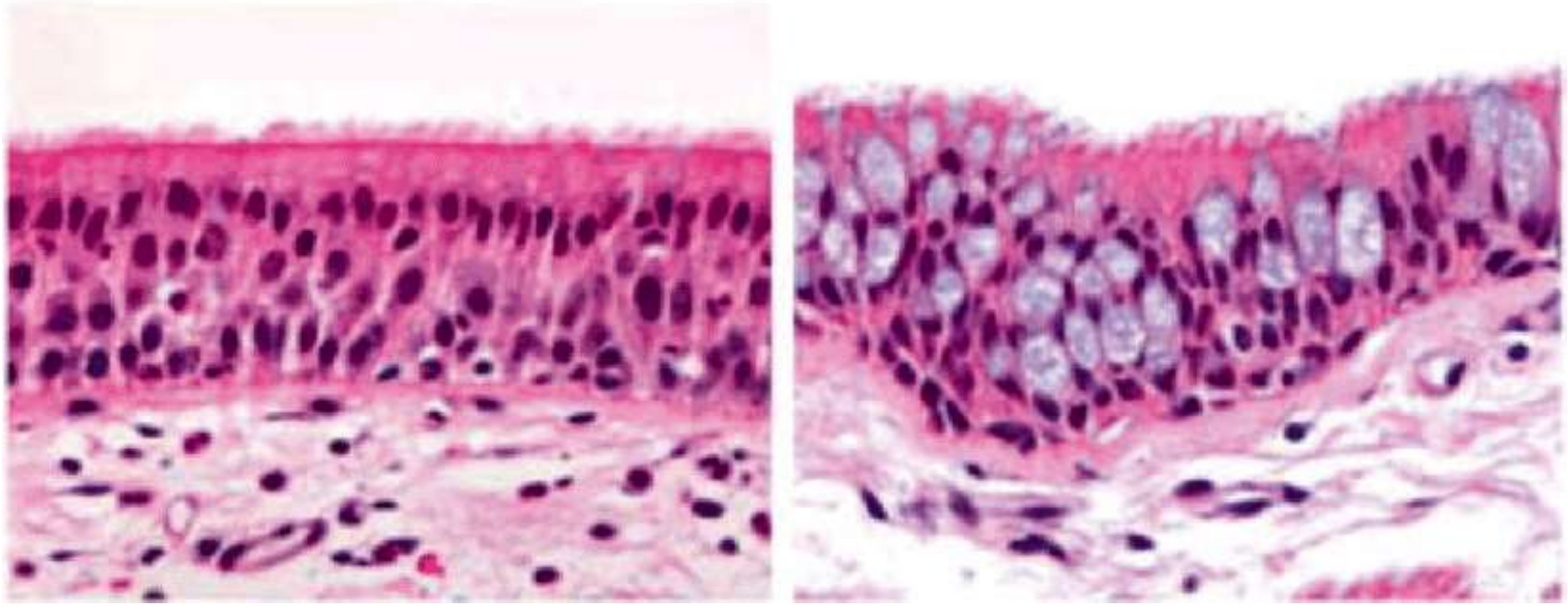


Mucociliary clearance



Impaired mucociliary clearance

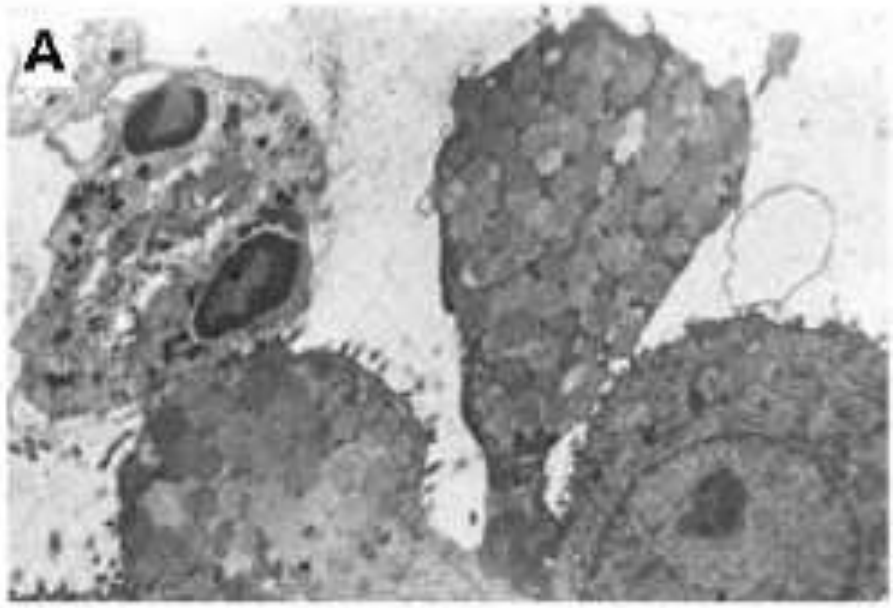
- Mucosal hypersecretion/abnormal mucous
  - Chronic bronchitis
  - Cystic fibrosis



Tilley et al. *Annu Rev Physiol* 2016;77:379-406

Impaired mucociliary clearance

- Defects in ciliary motion
  - Congenital – Primary Ciliary Dyskinesia
  - Acquired – Chronic bronchitis, smoking, environmental pollution



Wong et al. *Thorax* 2005; 60:582-587

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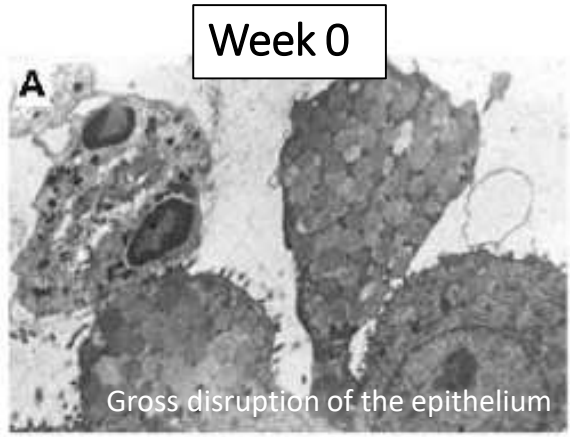
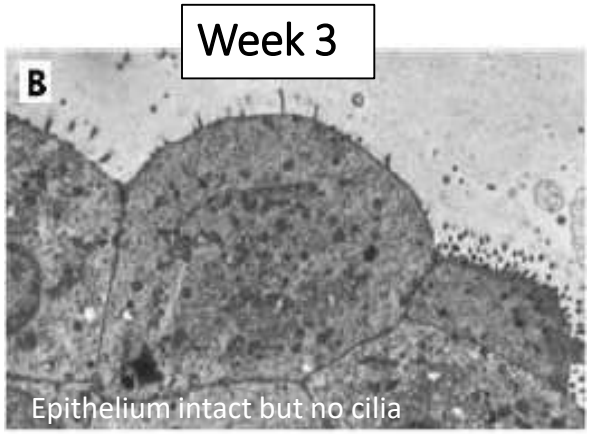
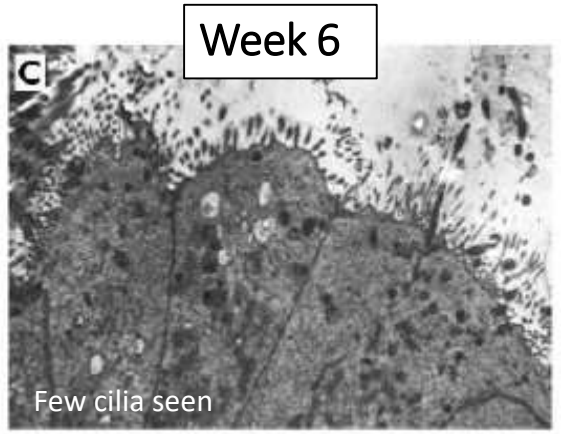
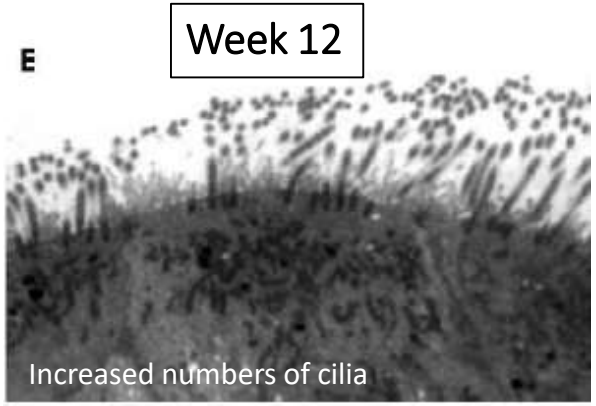
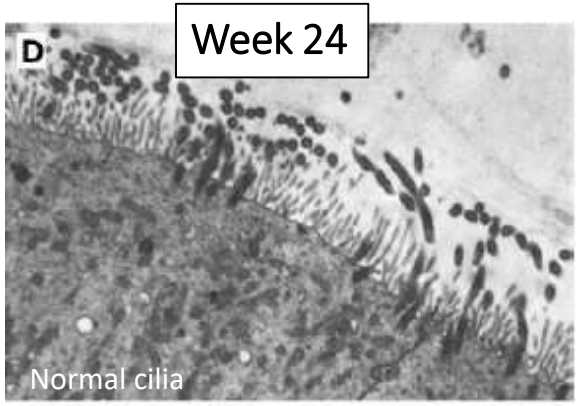
Vulnerability as recovery can take 15 weeks!







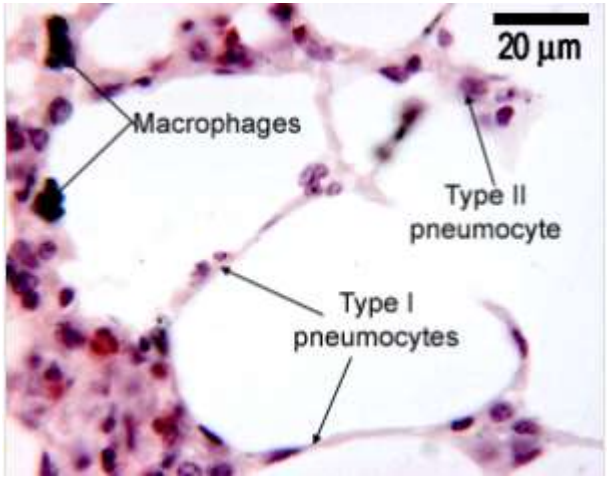




Wong et al. *Thorax* 2005; 60:582-587

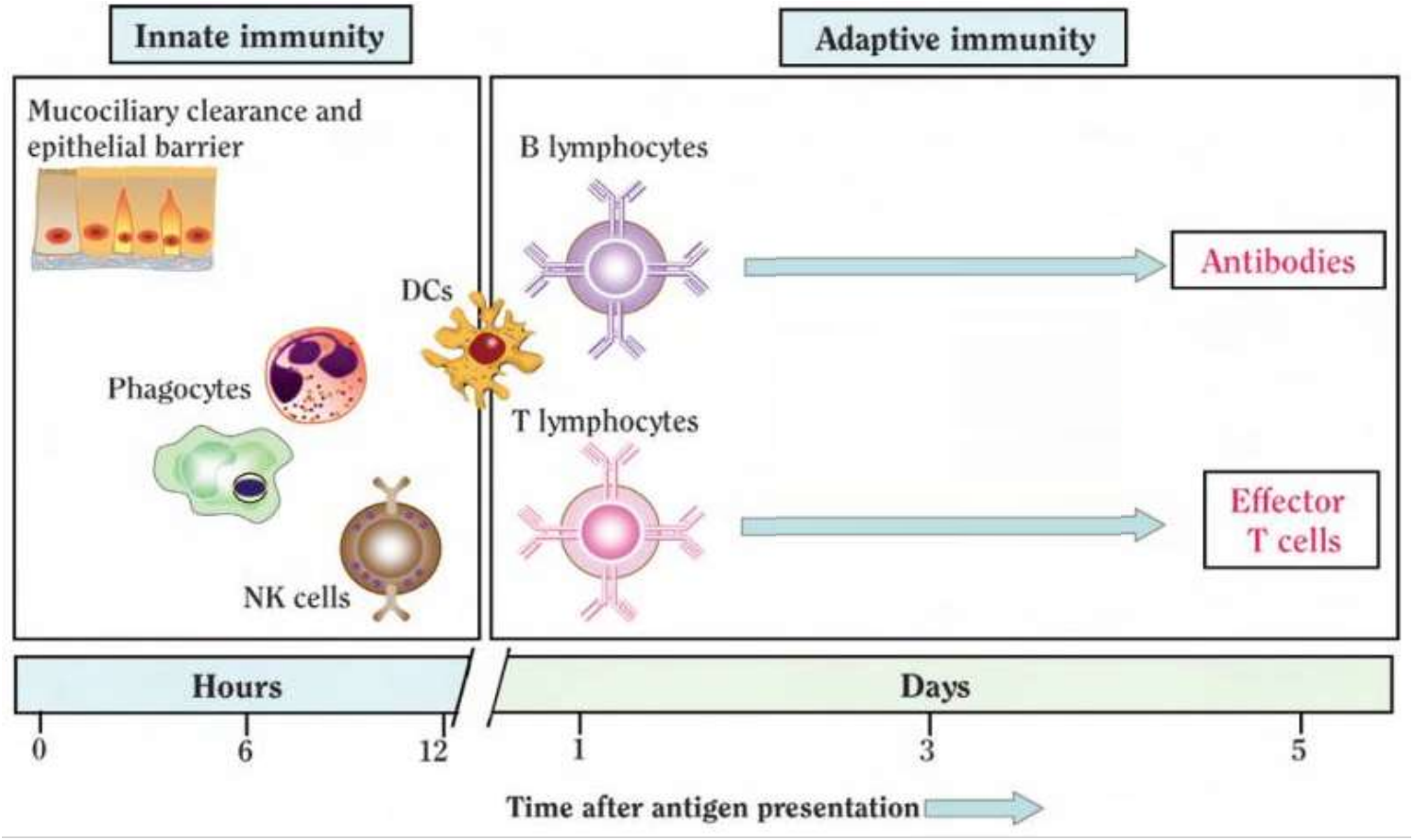
Alveolar macrophages

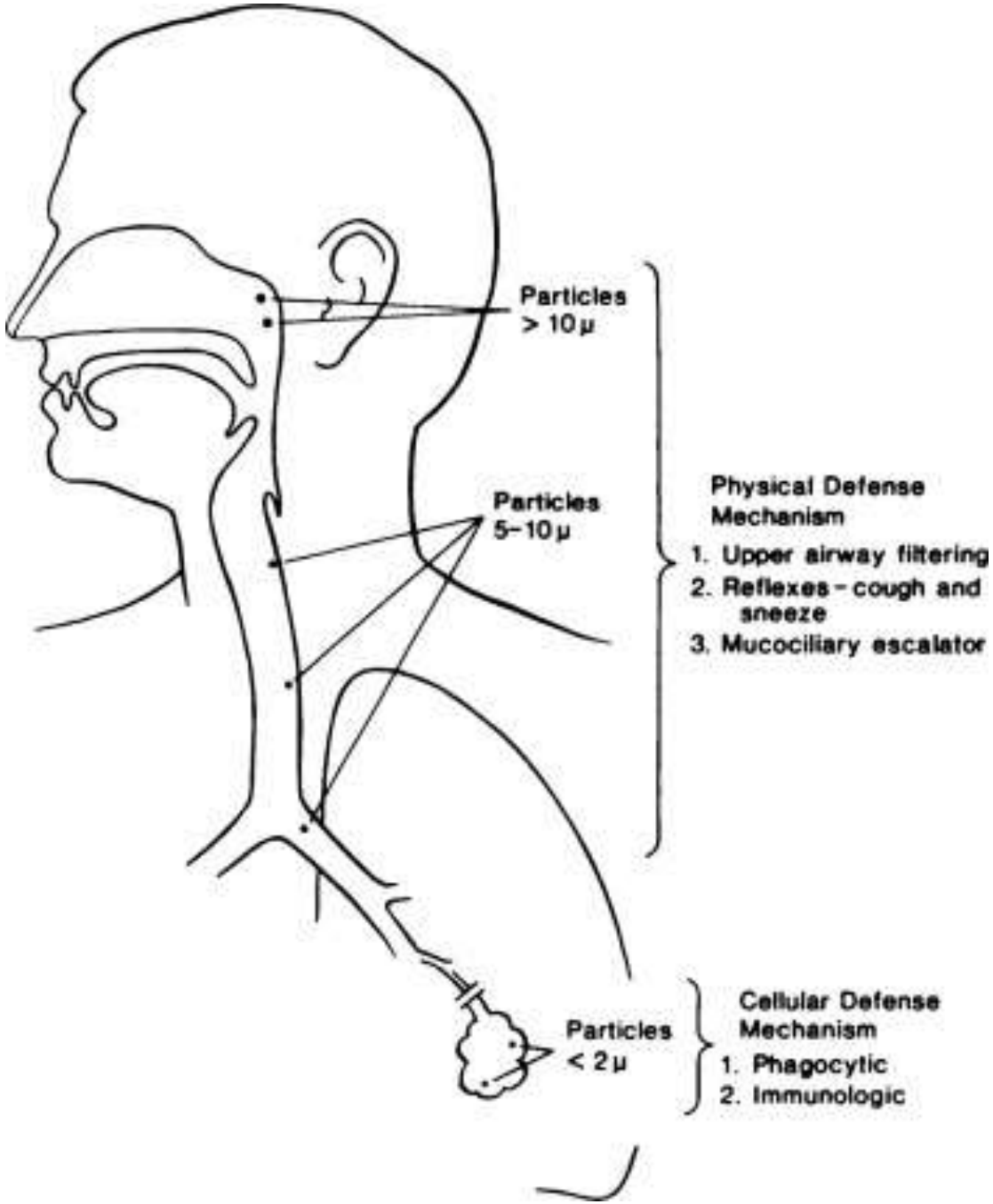
- Handles particles <5µm
- Phagocytosis & intracellular killing– microbes get coated by surfactant and get engulfed by macrophages
- Immune interactions – initiates lung inflammation through release of interleukins, leading to activation of neighbouring cells and attracting neutrophils



Histology Guide. Faculty of Biological Sciences, University of Leeds.

Adaptive immune system

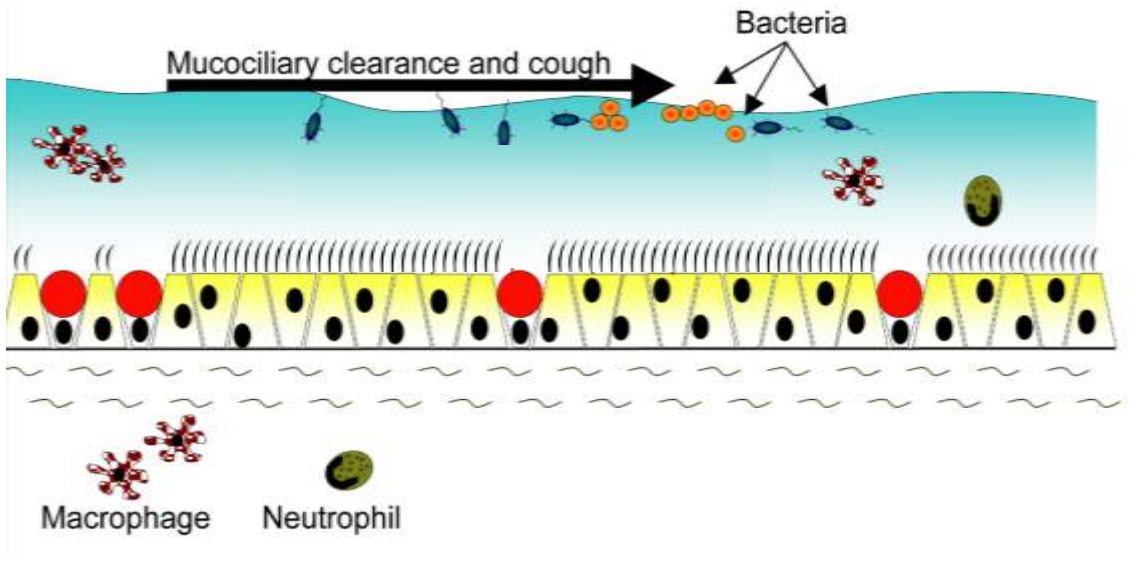




Nicod LP et al. *ERS* 2005;14:45 - 50

Compromised Defences

- Impaired cough
- Impaired anatomical barriers
- Impaired mucociliary clearance
- Impaired immune responses



Excessive Lung Insults

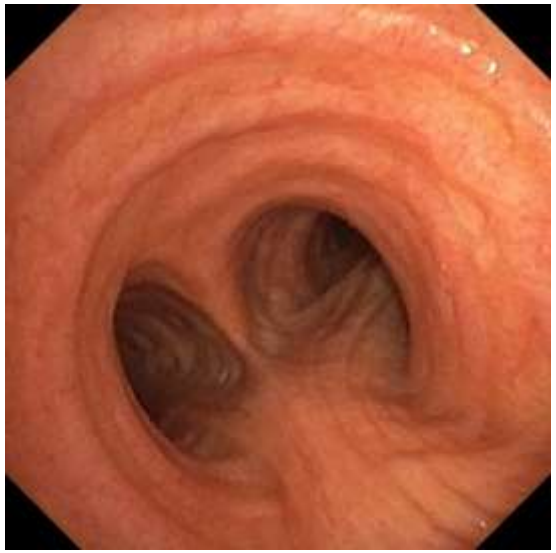
- Chronic aspiration
- Tobacco smoke
- Environmental
  - Dust exposure
  - Pollution
  - Fire smoke
- Recurrent infections

When there is an imbalance between lung defences and insults to the lungs, then infection takes hold

Symptoms of PBB

- Leading symptom is chronic wet cough
- Cough is present day and night
- Wheeze can occur based on obstruction by mucous
- Fever generally absent
- Chest auscultation and physical exam is often normal

It starts as a wet cough that doesn’t go away



Normal

Protracted Bacterial Bronchitis

Bronchoscopy Atlas, University Hospital of Lausanne
Chang et al. *Pediatr Pulmonol* 2016;51(3):225-242

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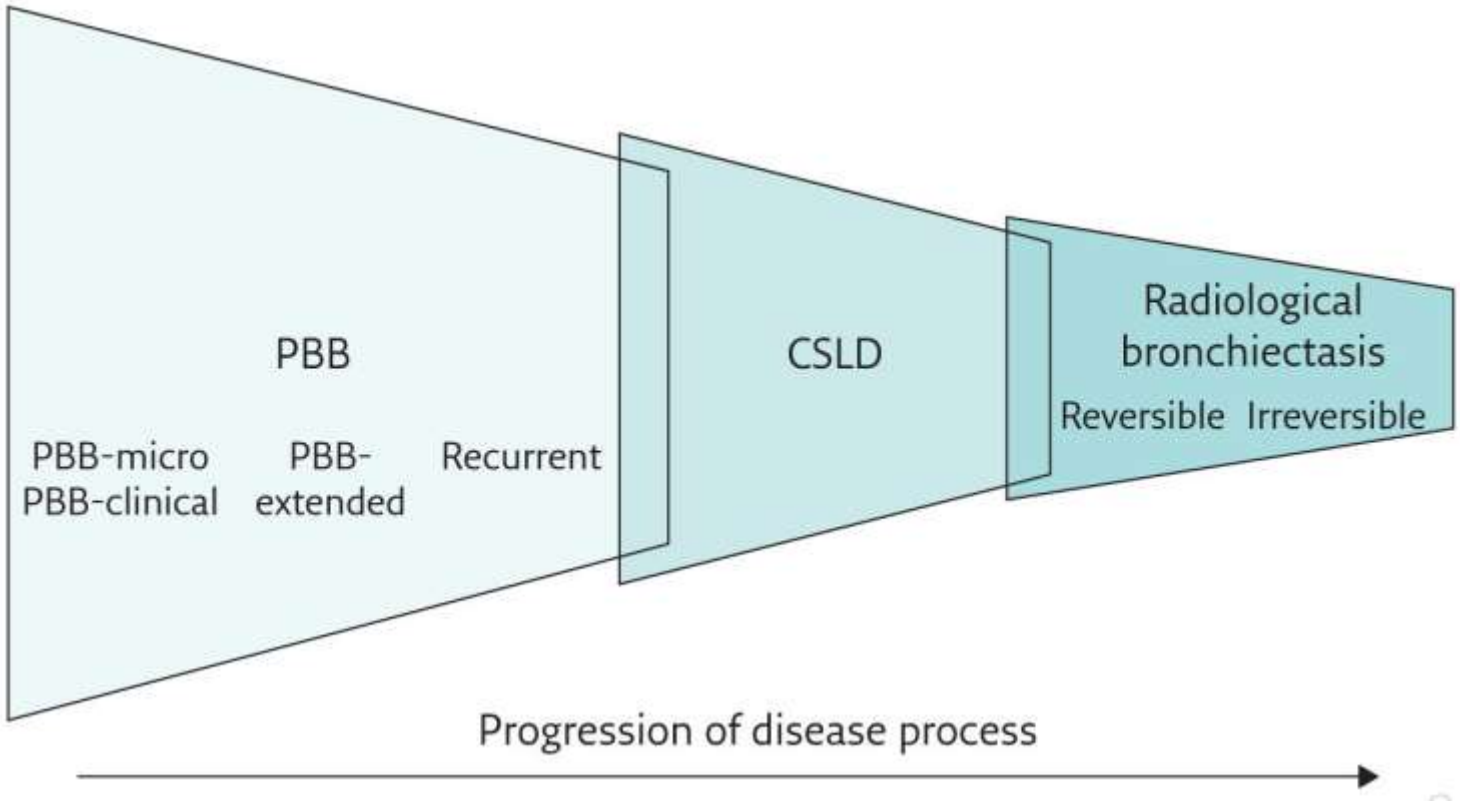
	Wet cough	
	Yes, n = 143, n (%)	No, n = 89, n (%)
No infection	59 (41.3)	58 (65.2)
Any bacterial species	70 (49)	24 (27)
H. influenzae	49 (34.3)	11 (12.4)
H. influenzae (BLP)	17 (11.9)	1 (1.1)
H. influenzae (BLN)	32 (22.4)	10 (11.2)
M. catarrhalis	26 (18.2)	7 (7.9)
S. pneumoniae	22 (15.4)	5 (5.6)
S. aureus	8 (5.6)	3 (3.4)
Any viral species	37 (25.9)	13 (14.6)
Adenovirus	21 (14.7)	6 (6.7)
Parainfluenza	9 (6.3)	3 (3.4)
RSV	2 (1.4)	6 (6.7)
Influenza	2 (1.4)	2 (2.2)
Viral–bacterial co-infection	23 (16.1)	6 (6.7)
Adenovirus and *H. influenza*	10 (7)	3 (3.4)

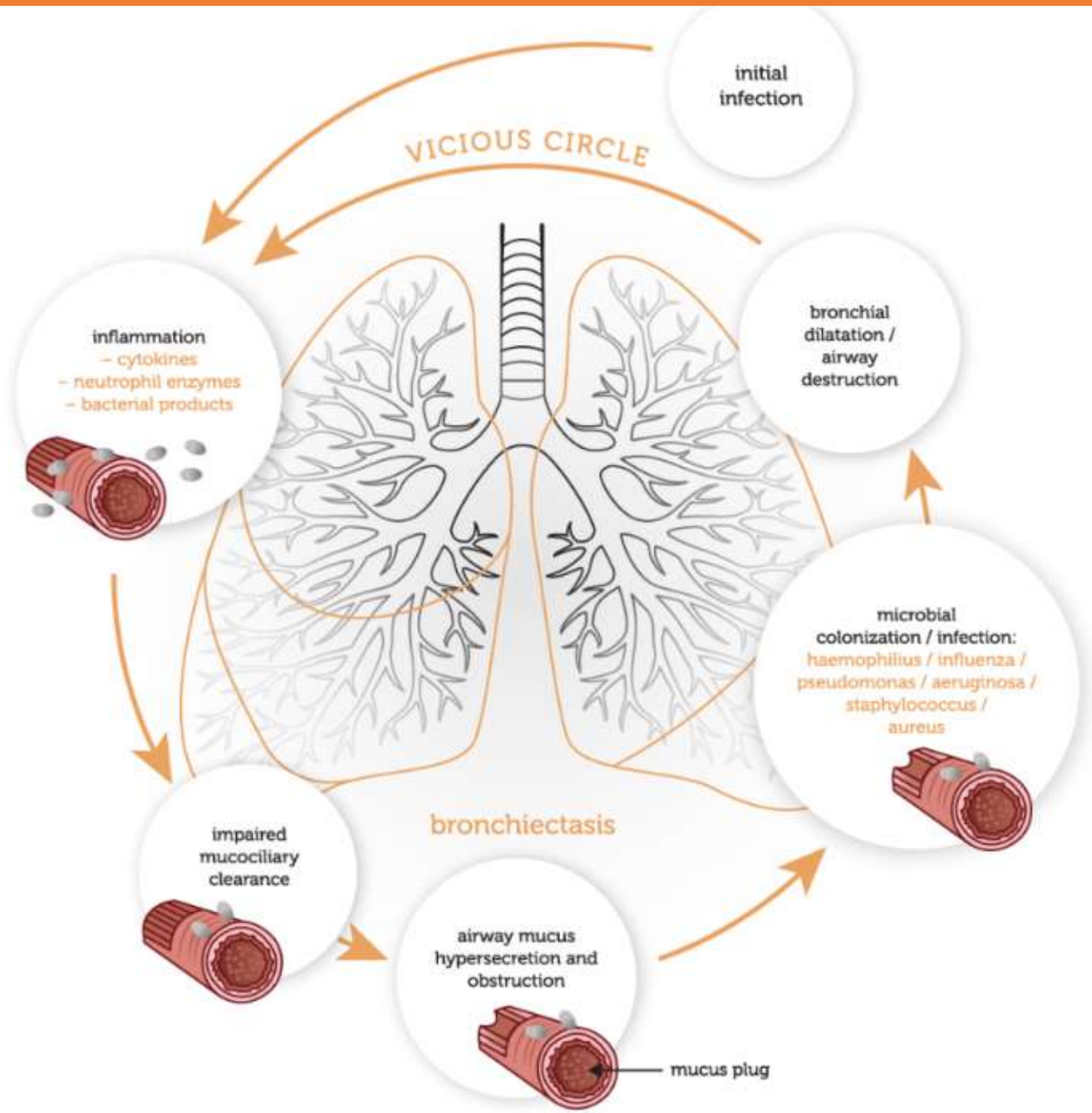
BLP, beta-lactamase positive; BLN, beta-lactamase negative.

Wurzel DF et al. *Ped Pulm* 2014;49:561-568

Progression of disease



Modified from: Chang AB et al. Pediatr Pulmonol 2016; **51**: 225–242



Bronchiectasis Toolbox. Available from: https://bronchiectasis.com.au/bronchiectasis/bronchiectasis/pathophysiology

Impact of bronchiectasis on patients

- Impairs general health
- Reduces quality of life
- Reduces life expectancy
  - Admissions for bronchiectasis 2011 – 2016 across 6 Kimberley hospitals
    - Median age of death in Aboriginal adults hospitalised with bronchiectasis in the Kimberley is 37 years
    - 5 year overall mortality was 23%

Barton J et al. *Aust J Rural Heatlh* 2018;26:238-244

When diagnosed and treated early, disease progression from PBB to CSLD and bronchiectasis can be halted.

Valery PC et al. Lancet Respir Med, 2013; Haidopoulou K et al. Pediatr Pulm, 2009

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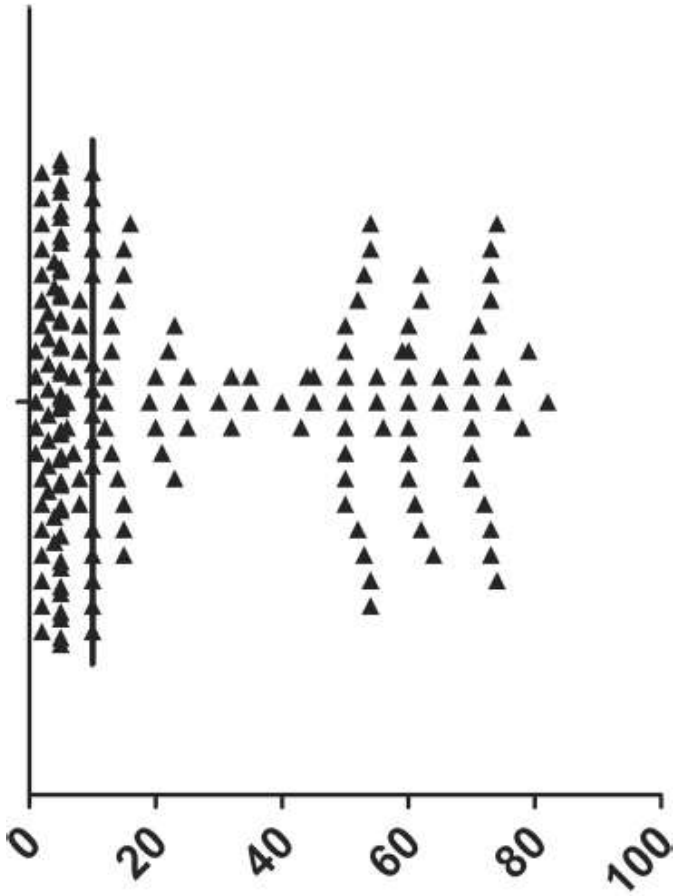
Age of onset of wet cough in adults with bronchiectasis



Diagnosis of bronchiectasis in children is commonly delayed by years to decades

King PT et al. *COPD* 2009;6(2):130-136

Misdiagnosis

- In a multicentre Australian study
  - 50% of children who presented with chronic cough had bronchiectasis spectrum disease
  - 16% had asthma
  - 70% received asthma treatment
- PCH cohort of children with chronic cough
  - 44% had bronchiectasis spectrum disease
  - 15% asthma
  - 59% received asthma treatment
  - In the children with PBB, 34% received asthma medications

Chang AB et al. *CHEST* 2012;142(4):943-950
Lau GTY et al. *JPCH 2021*

Normalisation of cough

“I would not have thought to mention that she has a cough as she has had a cough since she was 11 months old. In the morning she sounds like a smoker. But she has always had that…”

- Mother of a 7yo child with bronchiectasis cared for in one of our rural clinics

Google

chronic lung sickness flipchart

The Lungs

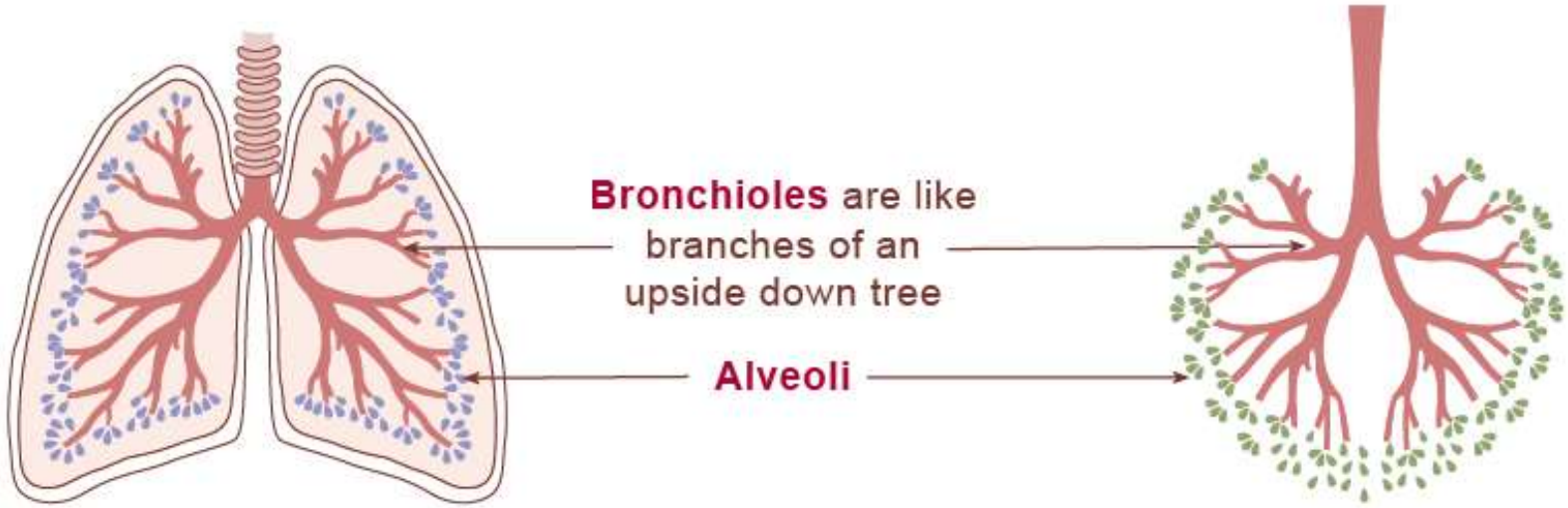
You have 2 lungs.

They sit inside your chest and surround your heart.

The lungs and the heart work together to bring oxygen to the whole body to give you life.

The Lungs

- The lungs look like an upside down tree.
- The tree trunk is like the windpipe **(trachea).**
- The 2 big branches are like the 2 main air tubes **(bronchi).**
- The smaller branches are like the smaller air tubes **(bronchioles).**
- The leaves are like the tiny air sacs **(alveoli).**



What is chronic lung sickness?

- A bad lung sickness that lots of Aboriginal children have.
- The breathing tubes get damaged and stop working properly.
- Your child may have a wet sounding cough which comes and goes or stays for a long time.

How do you get chronic lung sickness?

- Lots of chest infections like pneumonia or bronchiolitis when children are young can cause chronic lung sickness.

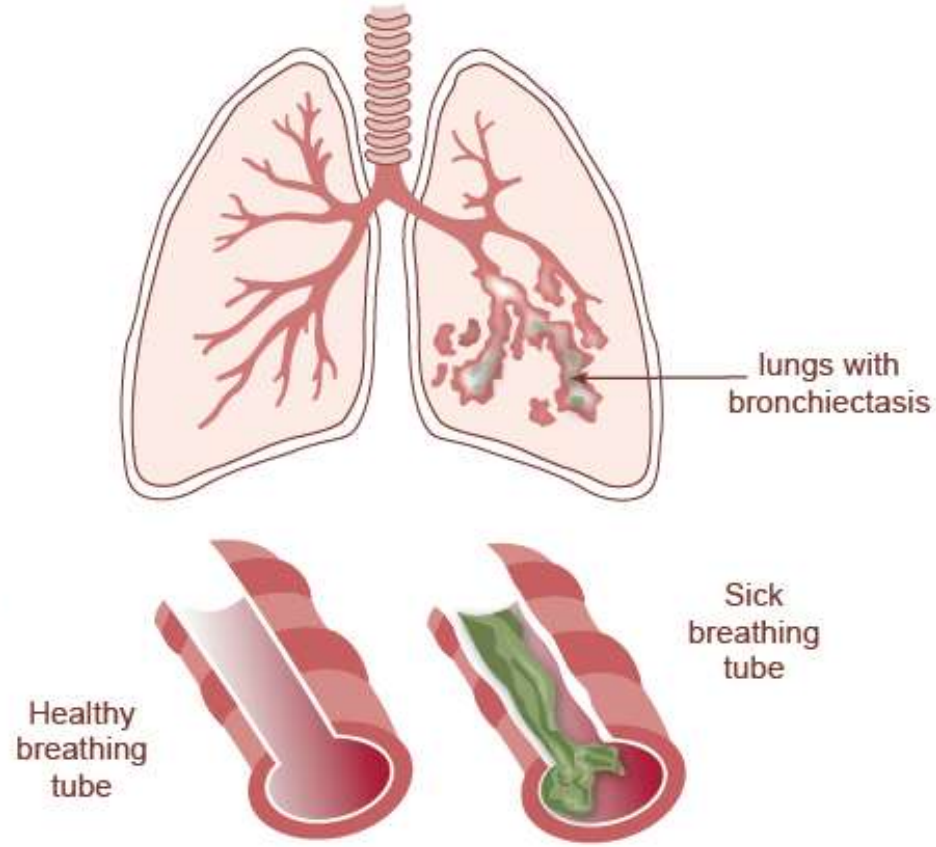
- There are other causes like a wet cough that doesn't go away or a blockage in the airway.

Risks that may cause chronic lung sickness

- Smoke from fires can damage lungs, so keep children away from smoke path.
- Cigarette smoking near children, especially in cars or inside a building can damage the lungs, even if they only use the building later.
- Dust can damage the lungs also.

What happens inside the lungs?

- The breathing tubes get damaged when the phlegm gets infected.
- Damaged airways causes lots more phlegm in side the breathing tubes.
- Sometimes it is hard to get rid of the phlegm and children cough a lot.



What can you do?

Bring your child to clinic:

- If your child has a wet cough for more than 4 weeks.
- If your child has phlegm/goonbee.
- If your child has short wind.

Bring your child to clinic:

- The health staff can check and help stop the coughing.
- Your child might need some antibiotics for the cough.
- If the health worker is not concerned about the cough, but your child has been coughing for more than 4 weeks, take someone with you who can help you tell the health worker.

Why are healthy lungs important?

- The lungs in children are still growing, so we have to look after them.

- Strong lungs helps children grow strong, live strong, to play and learn.

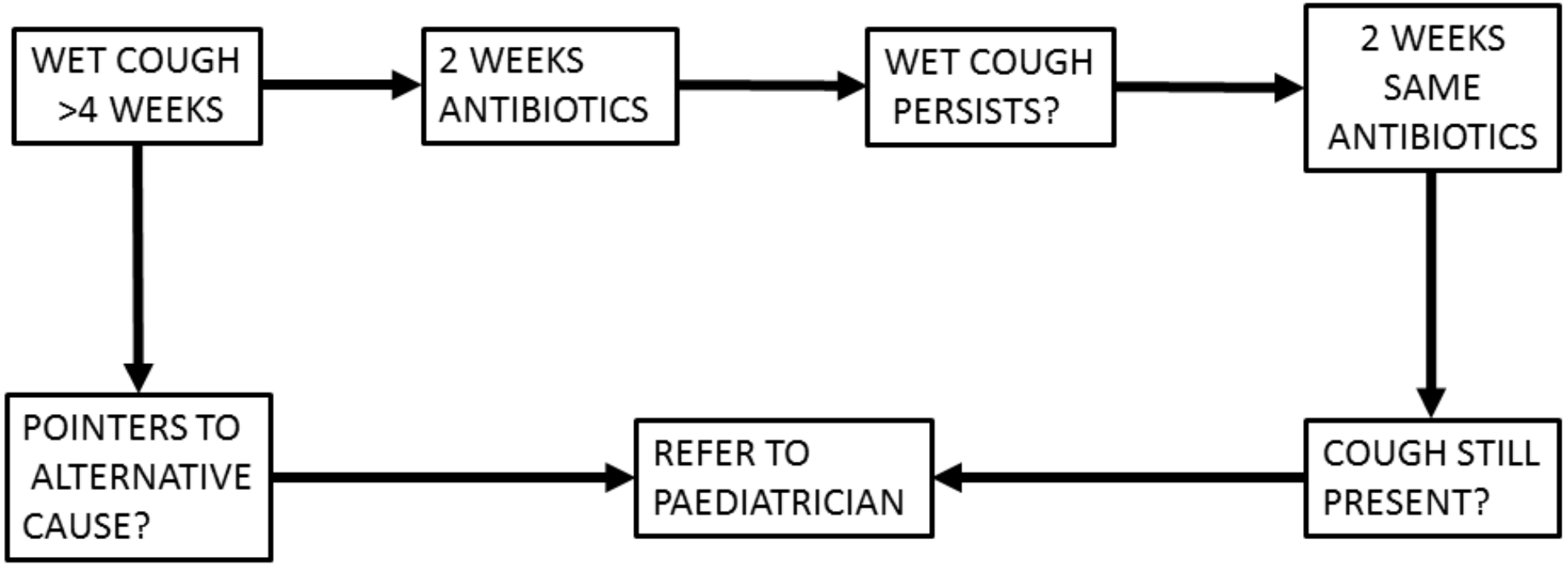
Ref:GM18000050

YouTube AU

Wet Cough in Kids and Lung health

“Chronic wet cough & lung sickness in Indigenous Kids”

Chronic Wet Cough Flow Chart



Based on Health Pathways and CARPA and Kimberley guidelines

Box 2. In children, triggers for referral to a specialist[1]

Triggers include one or more of the following:

- persistent wet cough not responding to four weeks of antibiotics
- >3 episodes of chronic (>4 weeks) wet cough per year responding to antibiotics
- a chest radiograph abnormality persisting >6 weeks after appropriate therapy.

Kimberley Clinical Protocols

Cough in Children

Chronic Wet Cough

Case Definition: PBB

Protracted Bacterial Bronchitis (PBB)

Defined as wet cough lasting for > 4 weeks without specific pointers of an alternative cause, and which responds to antibiotic therapy.

- Up to 40% of chronic wet cough in children referred to secondary care[1]
- Untreated PBB may contribute to development of chronic suppurative lung disease (CSLD) and/or bronchiectasis.
- Chest X-ray is not necessary for diagnosis
- Cough responds to antibiotic treatment but response can take 10 to 14 days.
- PBB often requires 2 to 4 weeks of antibiotic therapy.
- Common organisms are *Haemophilus influenza*, *Streptococcus pneumonia*, and *Moraxella cattarrhalis*.
- > 2 episodes of PBB in a year should be referred for further investigation to a paediatrician or paediatric respiratory service.

All children with suspected CSLD / bronchiectasis should be referred to a paediatrician for consideration of HRCT to confirm the diagnosis.

Principles of Management

Chronic wet cough (duration >4 weeks) in the absence of shortness-of-breath and wheeze is usually caused by:

1. PBB
2. CSLD
3. Bronchiectasis

Important to rule out:

1. Tuberculosis
2. Inhaled foreign body

Early diagnosis and intervention may prevent or delay progression.

Refer early to the regional Pediatrician, to confirm diagnosis, arrange investigations for treatable underlying causes, and to contribute to planning of ongoing care.

Physiotherapy is important in CSLD and bronchiectasis for helping to improve lung function and reduce exacerbations.

...tion: Bronchiectasis

...ressive disease characterised by dilated, ...ually with associated chronic bacterial ...n.

...with High Resolution CT (HRCT) scan. ...under advice from Paediatrician.

...mal in up to 50% of children with ...-ray may show peribronchiolar ...ated bronchi.

...al, or sometimes obstructive.

...infection, or be associated with ...stic fibrosis (CF), ciliary defects, ...-CF bronchiectasis is more ... Torres Strait Islander children.

...n: CSLD

...ppurative Lung Disease (CSLD) is used to ...escribe the clinical picture of children with recurrent episodes of PBB. They are at risk of having/or developing bronchiectasis, regardless of whether or not the child has had a HRCT scan to confirm the underlying diagnosis of bronchiectasis.

Think of CSLD if:

1. Wet or productive cough for more than 4 weeks
2. 2 or more chest infections in last year
3. Treated for pneumonia in last 4 weeks (up to 25% children post pneumonia will develop CSLD)
4. 3 hospital admissions for chest problems (ever)
5. Episode of severe pneumonia (admission to ICU)
6. Chest deformity
7. Persistent signs when listening with stethoscope (crackles, unequal air entry, bronchial breathing, wheeze)

Exacerbations of CSLD are usually due to infection and should be treated promptly and intensively to minimise the risk of serious acute illness, as well as reducing long-term progression by minimising the amount of harm done to airways during each exacerbation.

Therapeutic Protocols

Medication

Empirical antibiotic treatment for PBB and exacerbations of CSLD is the same.

If no sputum culture is available to guide treatment, use broad spectrum antibiotic e.g:

Amoxycillin/clavulanate 22.5 mg/kg (maximum 875 mg amoxycillin) twice a day for 14 days then REVIEW.

If penicillin-allergic, consider azithromycin 30 mg/kg/dose once a week for 4 weeks

Check Paediatrician communication/if prior sputum results are known as this may guide antibiotics choice.

If not improving in 2 weeks

- Give same antibiotic at same dose for another 14 days

If wet cough still present after 4 weeks of antibiotics –refer Paediatrician as may need to send to hospital for IV antibiotics

Asthma

Asthma may be also be present – manage as per Australian guidelines:

http://www.asthmahandbook.org.au/management/children

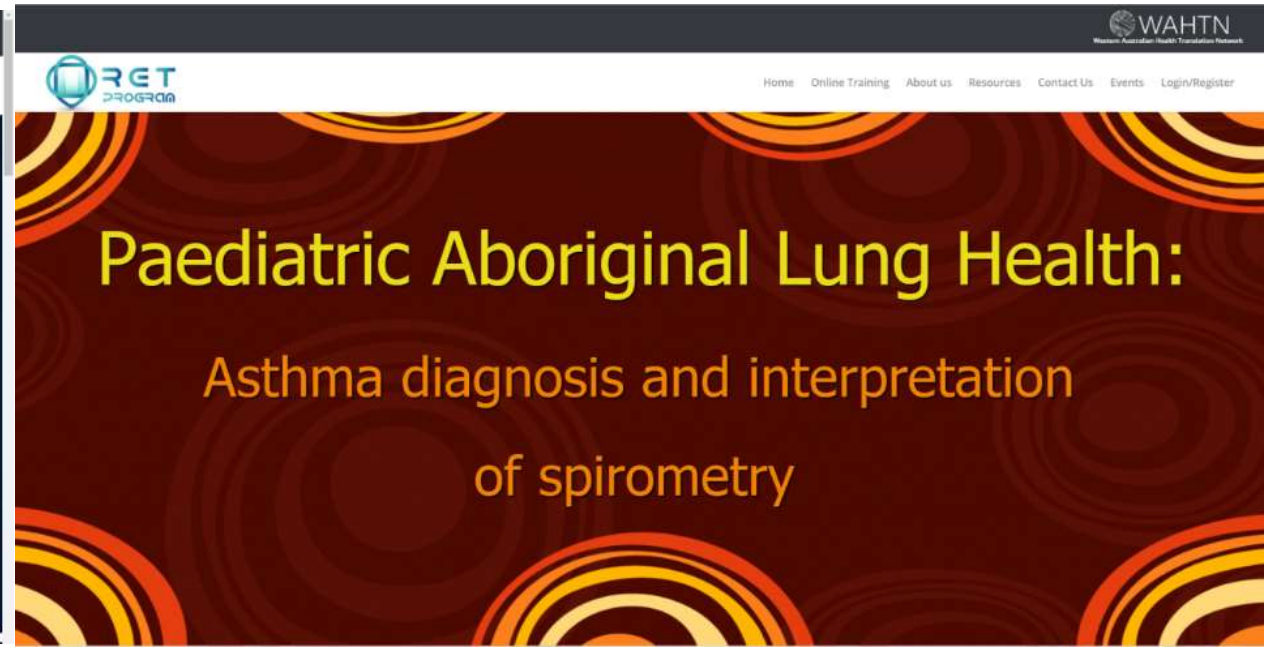
Available from:
http://kahpf.org.au/clinical-protocols

Free training module

https://retprogram.org/training/

2 CPD points for RACGP!

https://retprogram.org/training/



2 CPD points for RACGP!

Thank you!