

Adult Bronchitis, Bronchiolitis and Bronchiectasis

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Learning outcomes

Be able to:

- Be able to describe the pathophysiology of bronchitis, bronchiolitis and bronchiectasis.
- Provide relevant evidence based education to patients regarding the pathophysiology and treatment of bronchitis and bronchiolitis.
- Describe typical antibiotic and non-drug therapy for
 - Viral and bacterial bronchitis
 - Bronchiolitis
 - Bronchiectasis

COMMONWEALTH OF AUSTRALIA

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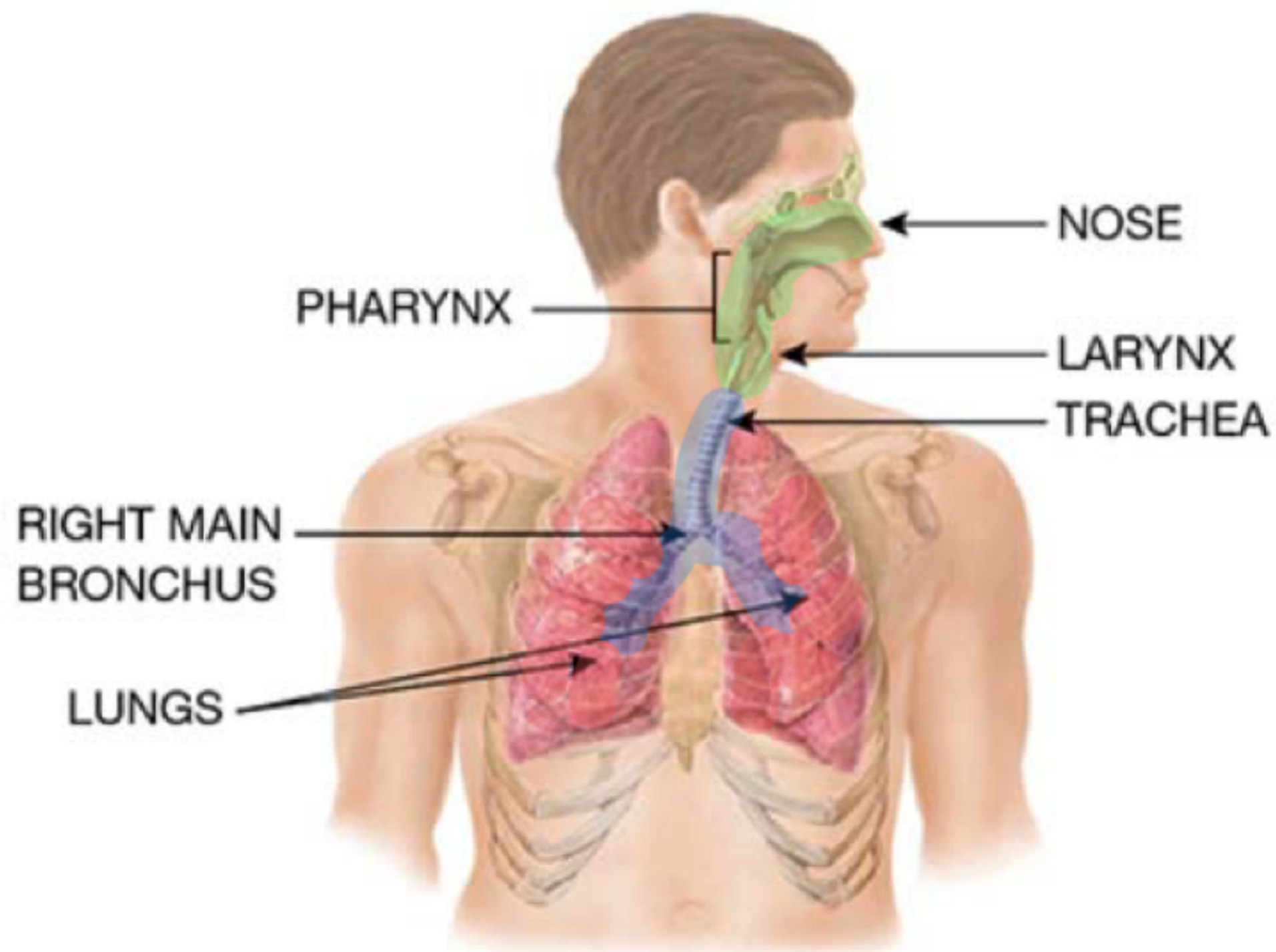
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Structure of the respiratory system



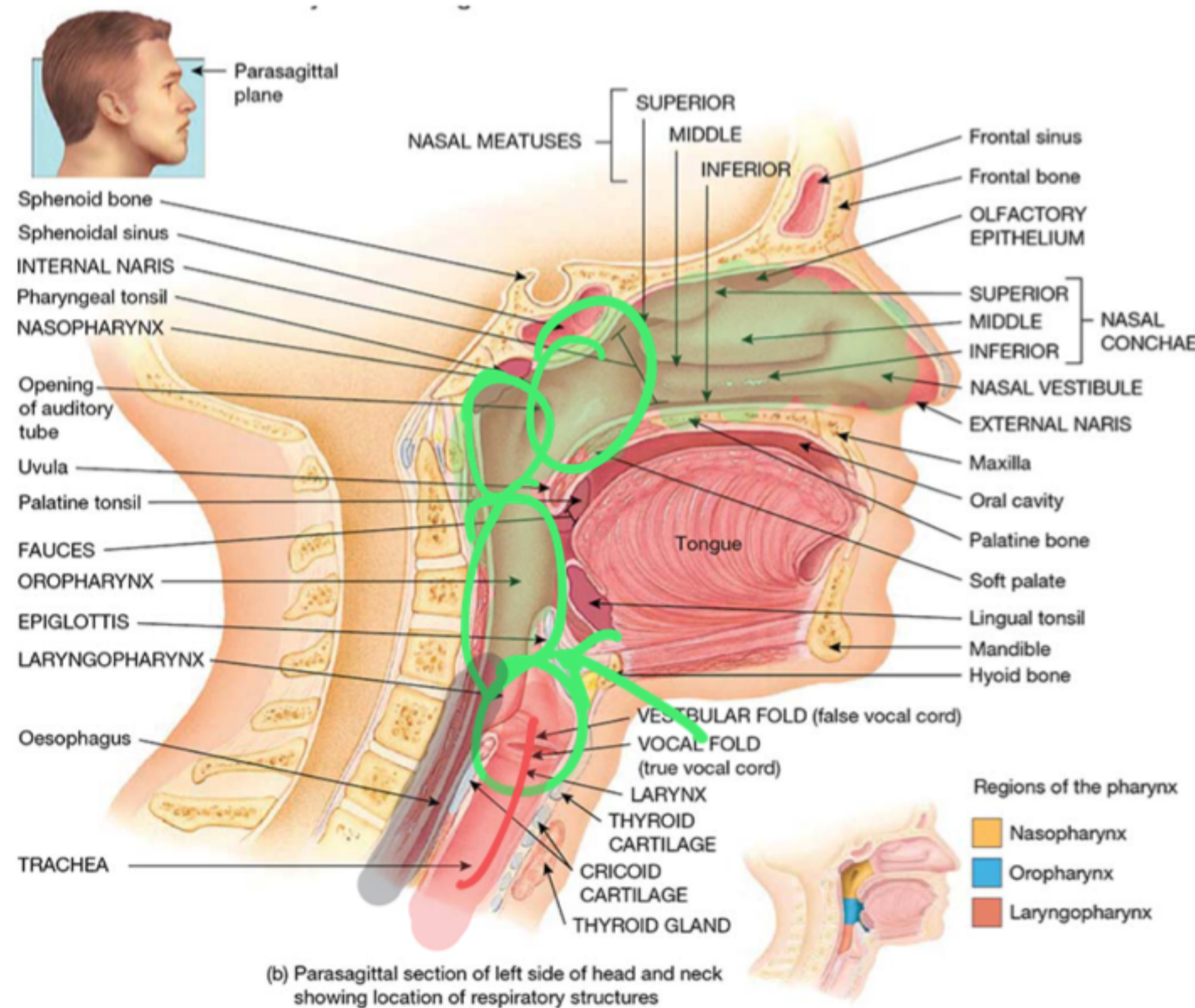
(a) Anterior view showing organs of respiration

• Figure 23.1

- Nose
- Pharynx
 - Nasopharynx
 - Oropharynx
 - Laryngopharynx
- Trachea
- Bronchus
- Lungs (R=3, L=2 lobes)
- Cardiac notch

Images taken from Tortora, GJ., Derrickson, B., Burkett, B., Peoples, G., Dye, D., Cooke, J., et al. Principles of anatomy and physiology. Second Asia-Pacific ed. Queensland, Australia: John Wiley & Sons; 2019.

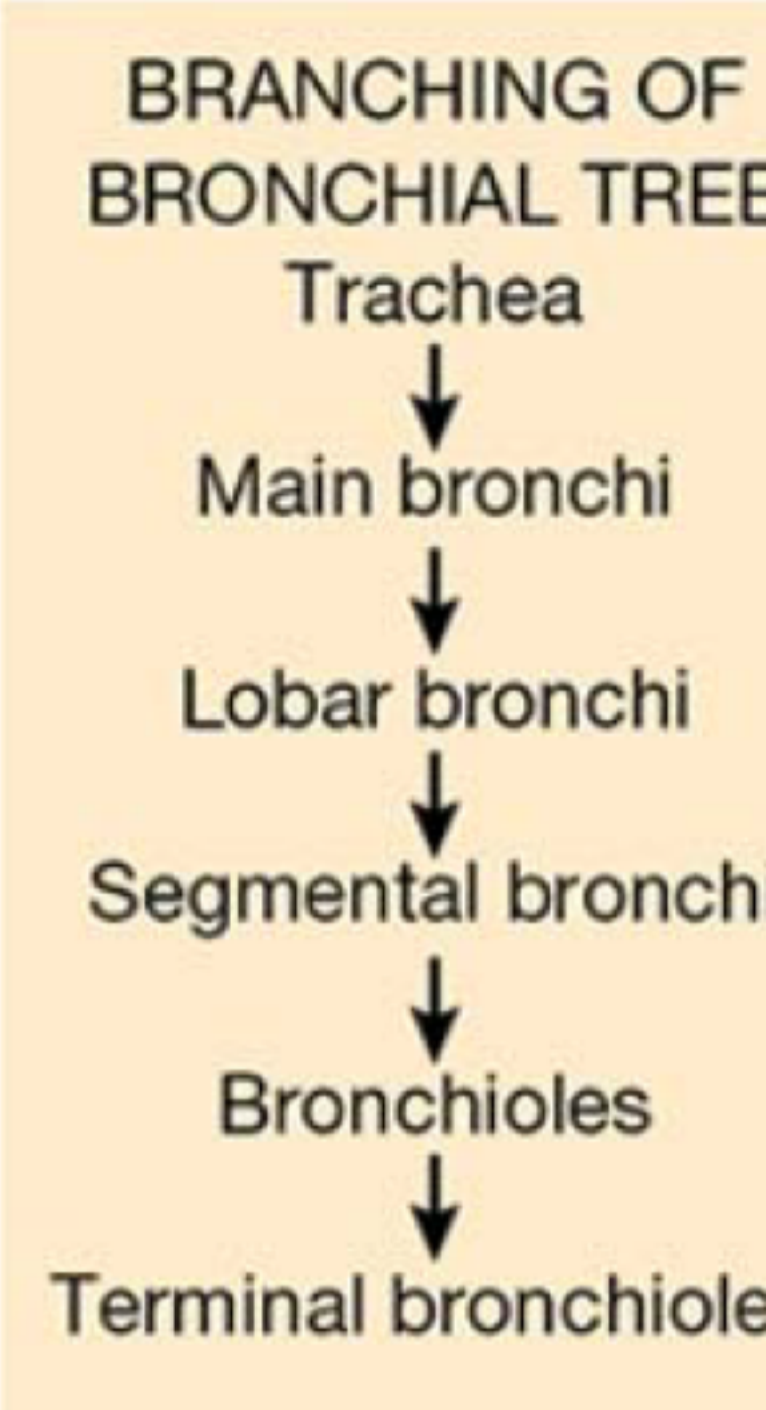
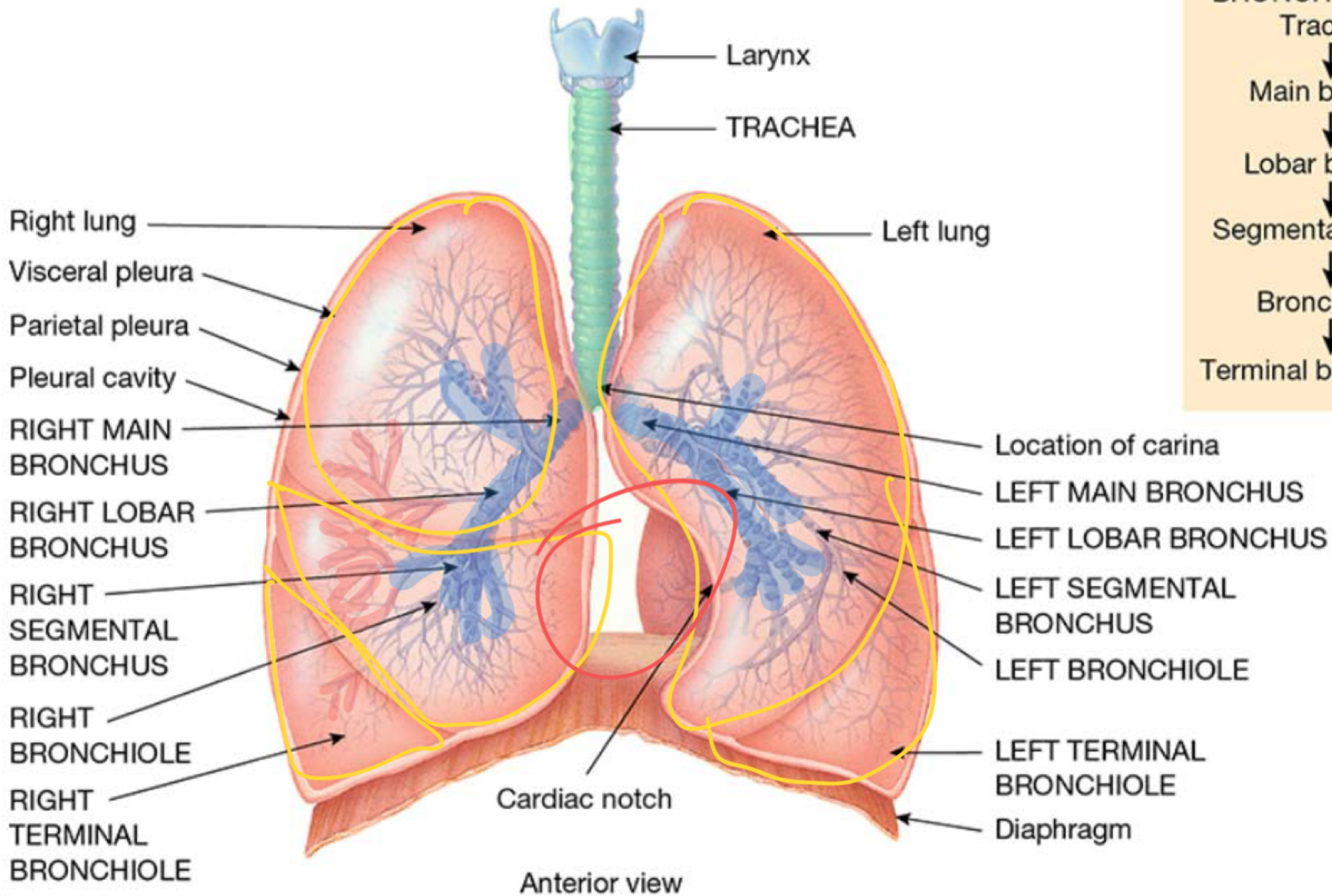
Respiratory structures of the head and neck



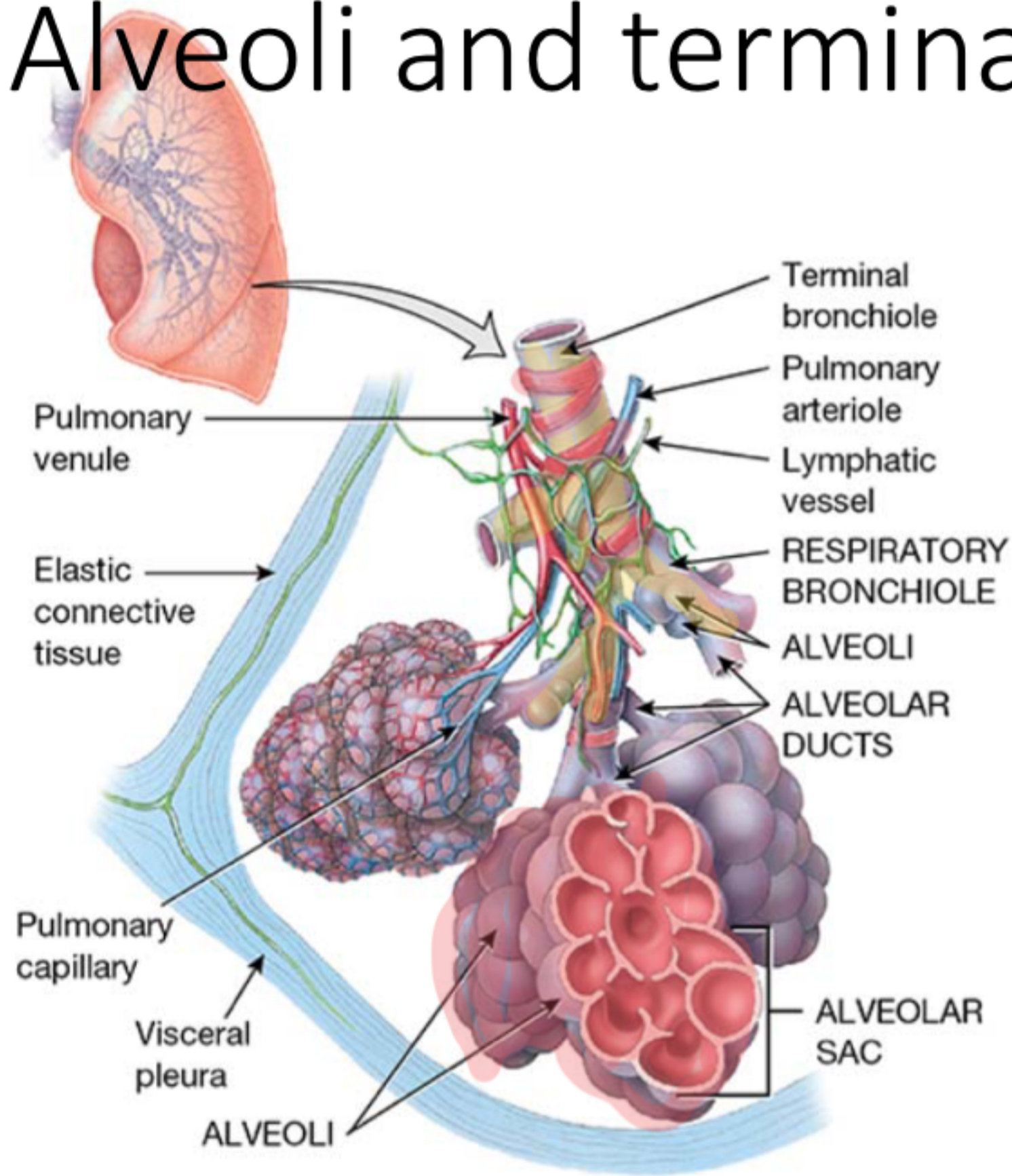
• Figure 23.2

- Nasal meatus
- Nasal Conchae
- Nasopharynx
- Oropharynx
- Laryngopharynx
- Thyroid cartilage
- Epiglottis
- Trachea
- Oesophagus

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Alveoli and terminal bronchioles



• Figure 23.10

- Helical arrangement of smooth muscle
- Lymphatic vessel
- Pulmonary arteriole
- Pulmonary venule
- Alveolar sac
- Alveoli

(a) Diagram of portion of lobule of lung

Images taken from Tortora, GJ., Derrickson, B., Burkett, B., Peoples, G., Dye, D., Cooke, J., et al. Principles of anatomy and physiology. Second Asia-Pacific ed. Queensland, Australia: John Wiley & Sons; 2019.

Bronchitis and bronchiolitis

- Bronchitis

- Affects bronchi – larger airways and is more common in older children and adults

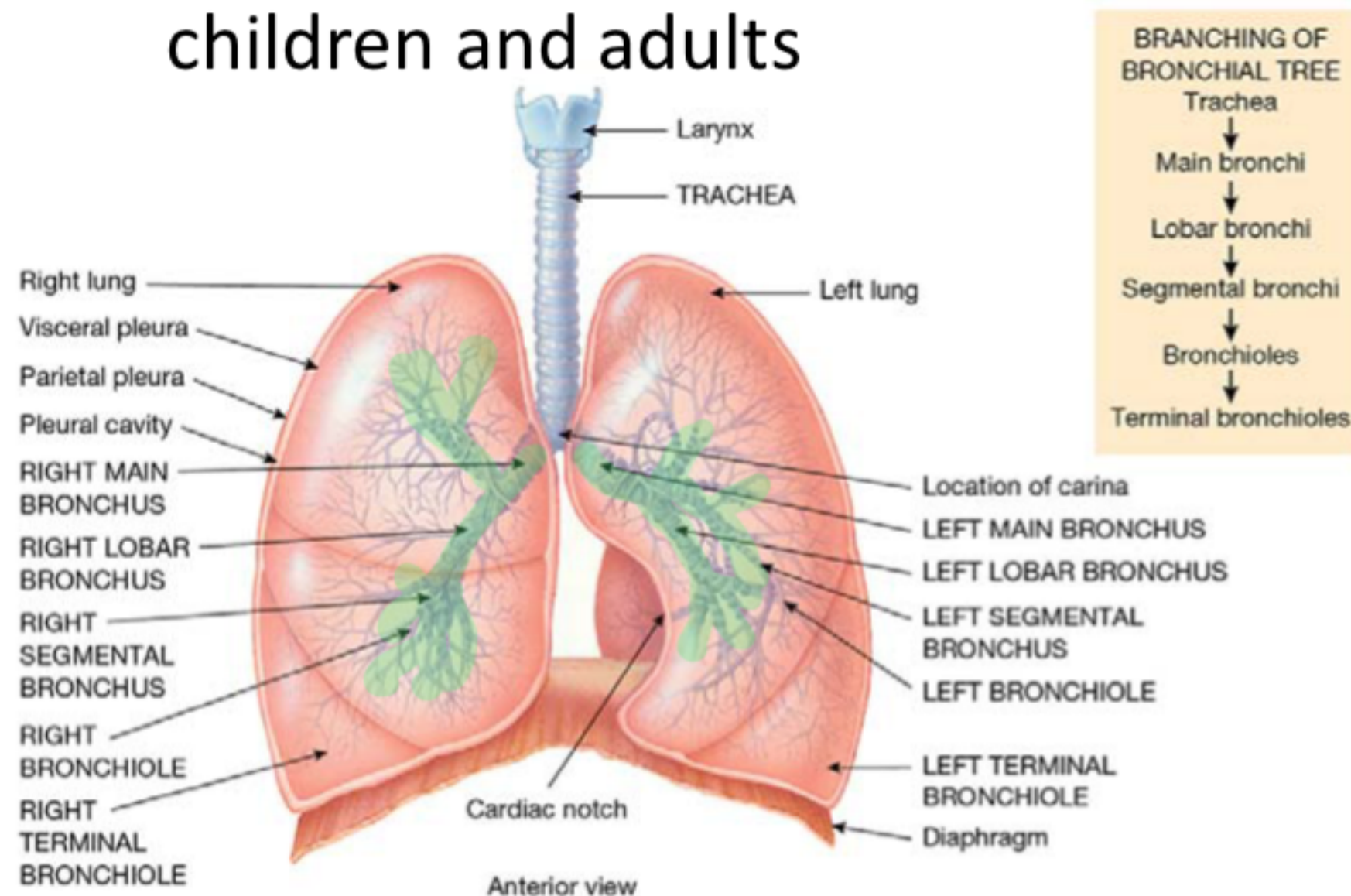
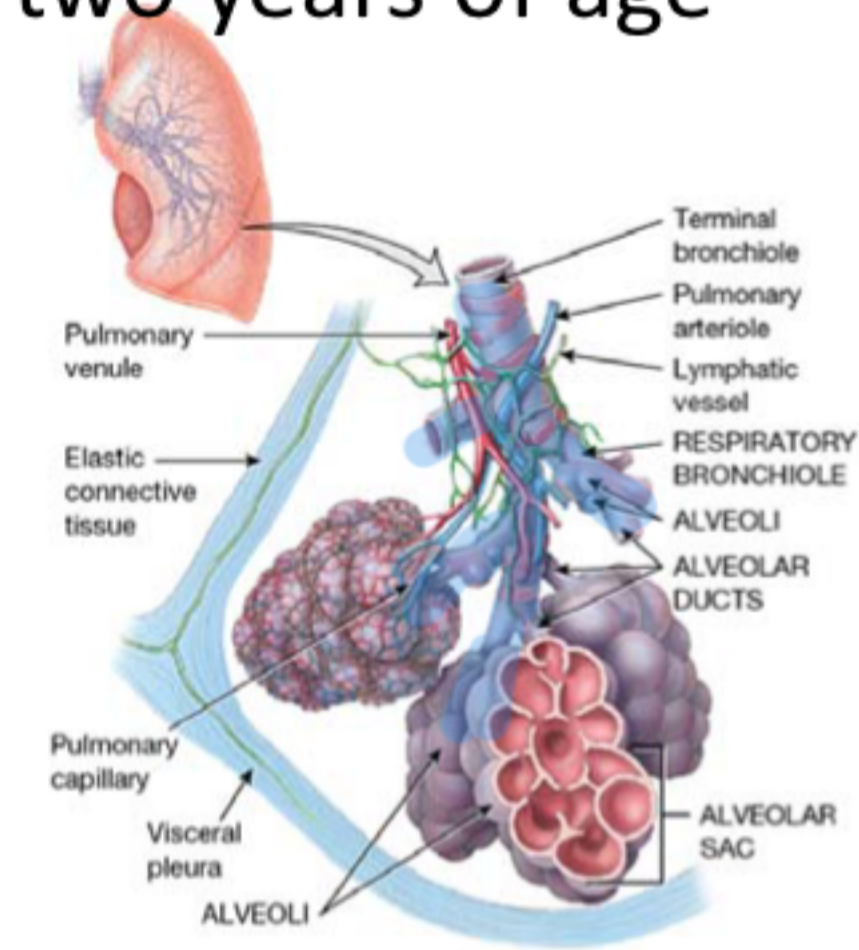


Image taken from Tortora, GJ., Derrickson, B., Burkett, B., Peoples, G., Dye, D., Cooke, J., et al. Principles of anatomy and physiology. Second Asia-Pacific ed. Queensland, Australia: John Wiley & Sons; 2019.

- Bronchiolitis

- Affects the smaller bronchioles and is more common in children under two years of age



(a) Diagram of portion of lobule of lung

Image taken from Tortora, GJ., Derrickson, B., Burkett, B., Peoples, G., Dye, D., Cooke, J., et al. Principles of anatomy and physiology. Second Asia-Pacific ed. Queensland, Australia: John Wiley & Sons; 2019.

Acute bronchitis - Adult

- Self limiting condition of the lower respiratory tract
- Inflammation of bronchi causing productive or non-productive cough
- 90% viral in cause
 - Influenza A & B
 - Parainfluenza
 - Rhinovirus
 - adenovirus
- Atypical bacterial infections can also cause bronchitis
 - *Mycoplasma pneumoniae*
 - *Chlamydoiphila pneumoniae*
- Cough lasts 2-3 weeks – usually resolved by 4 weeks
- Can persist for 8 weeks
- Frustrating / concerning for patients – most seek pharmacological resolution (antibiotics) for which there is mostly no indication.

Acute bronchitis - adult

- Self-limiting condition
 - Viral in nature
 - Antibiotics not typically indicated
 - Patient expectation
 - Antibiotics are reasonably commonly prescribed despite lack of evidence for benefit and risk of harm
 - May be used if the patient is at high risk of developing / has developed pneumonia
 - Pain from cough and fever:
 - NSAIDs or paracetamol
 - Quit smoking
 - Avoid irritants – dust, chemical fumes, other air pollutants
- Useful to communicate this risk to patients who might ask you about antibiotics and bronchitis
 - Antibiotic resistance
 - Thrush infections
 - Clostridium difficile
 - Diarrhoea
 - Rash
 - Nausea
 - Hypersensitivity reactions

Acute bronchitis - Adult

- Prevention

- Flu vax yearly
- Pneumococcal vax every 5 years
- Quit smoking ✓
- Avoid irritants ✓

- Signs of bacterial infection

- Mycoplasma pneumonia and Chlamydia pneumonia
 - Tetracyclines
 - Doxycycline
 - Macrolide antibiotics
 - Azithromycin
 - Clarithromycin
 - Erythromycin
 - Roxithromycin
 - Quinolones
 - Ciprofloxacin ORAL
 - Moxifloxacin

Acute bronchitis - Adult

- Signs of bacterial infection
 - **Bordetella pertussis**
 - Macrolide antibiotics
 - Azithromycin
 - Clarithromycin
 - Trimethoprim + Sulfamethoxazole

Acute Bronchiolitis

- Non-specific inflammatory injury that affects the small airways (airways <2mm in diameter with no cartilage)
 - Better known in children than adults
 - In adults it typically represents a pathophysiological response to injury
 - Treatment will depend on underlying cause and symptoms
- In adults can be triggered by
 - *Mycoplasma pneumoniae*,
 - RSV,
 - measles,
 - influenza,
 - pertussis,
 - parainfluenza, and
 - adenovirus

Acute Bronchiolitis

- Usually self limiting in healthy adults.
- Many morphological types of bronchiolitis
 - Treatment depends on type
 - Antibiotic therapy to reflect bacterial agent present

Bronchiectasis

- Permanent dilatation (widening) of bronchi and bronchioles
- Persistent or recurrent bronchial infection
- Symptoms include
 - Cough
 - Usually sputum production
- Results in chronic airway inflammation and resulting permanent airway damage
 - Muco-ciliary escalator impaired (damaged or mucus impaired)
 - Accumulation of secretions and bacterial overgrowth in bronchiectatic sections
 - Does not provoke cough until mucous / puss in bronchi
 - Airway obstruction
 - Recurrent infection causes bronchial fibrosis

- Chronic inflammation causes loss of bronchial wall structure and balloon-LIKE dilatations → saccular bronchiectasis

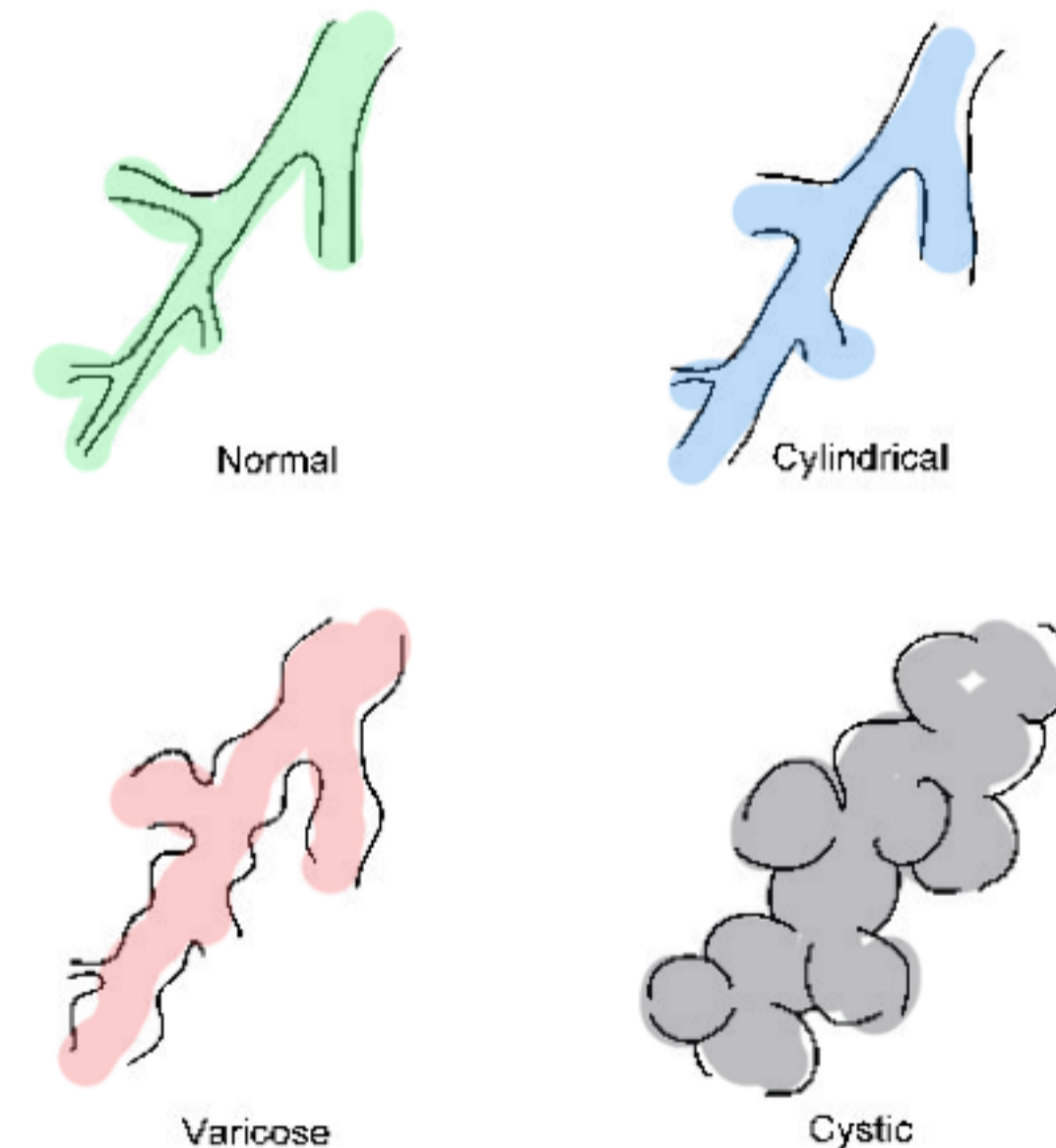


Diagram taken from Veves, P., Guerra, M., Ponce, P et.al. Non-cystic fibrosis bronchiectasis. Interactive Cardiovascular and Thoracic Surgery. 2011; 13(6):619-25

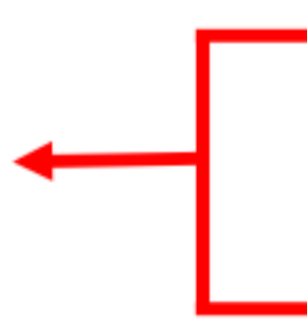
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- Chronic inflammation causes loss of bronchial wall structure and balloon-like dilatations → saccular bronchiectasis
- Can be localized to one segment of the airway or generalized across both lungs
- Causes
 - No known cause (idiopathic) in 50% of patients
 - Pneumonia – pseudomonas aeruginosa
 - Intraluminal obstruction such as endobronchial tumour or foreign body
 - Extrinsic compression of airway by enlarged lymph nodes
 - Many other less common causes

Bronchiectasis

- Symptoms
 - Chronic cough
 - Sputum – purulent and may be blood stained
 - Wheeze and shortness of breath common during exacerbations
 - Crackles in lungs
- Treatment
 - Mobilise secretions
 - Respiratory physiotherapy
 - Breathing and coughing techniques
 - Breathing training devices
 - Decrease sputum viscosity
 - Hypertonic saline
 - Dry powder mannitol
 - Bronchodilators
 - Salbutamol
 - Anti inflammatory drugs
 - Inhaled steroids
 - Weight management and strength
 - Diet and exercise
 - Spirometry to monitor lung function
 - Manage cross infection to limit reinfection
 - Immunisations
 - Flu vax yearly
 - Pneumococcal vax every 5 years
 - Pulmonary rehabilitation may benefit

Bronchiectasis

- Symptoms
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 - For reversible component of airflow limitation
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Bronchiectasis

LIKELY INFECTIVE AGENTS
NON-P. AERUGINOSA
- S. PNEUMONIAE
- H. INFLUENZAE

- Non-severe exacerbations without P. aeruginosa
 - Amoxicillin 1g oral Q8H OR
 - Docycycline 100mg orally Q12H Or
 - Amoxicillin and clavulanate
 - 10 days
- Severe exacerbations without P. aeruginosa
 - As per non-severe or
 - Parenteral (IV) therapy
 - Ceftriaxone 2g daily or
 - Cefotaxime 2g Q8H or
 - Axoxicillin + clavulanate 1+0.2g Q8H
 - 10 days

Bronchiectasis

- Non-severe exacerbations with *P. aeruginosa*
 - Amoxicillin 1g oral Q8H OR
 - Doxycycline 100mg orally Q12H Or
 - Amoxicillin and clavulanate 875+125mg

- Oral
- 14 days

- Severe exacerbations with *P. aeruginosa*
 - Parenteral (IV) therapy
 - Ceftazidime 2g Q8H OR
 - Piperacillin + tazobactam 4+0.5g Q6H

Plus

- Tobramycin OD OR
- Ciprofloxacin 400mg Q8H
- Once stable – can switch to ciprofloxacin 750mg Q12H to complete 14 days therapy (IV + Oral)
- 14 days

Long term antibiotic therapy for bronchiectasis

- Inappropriate for most cases
- Increases development of antibiotic resistance
- If patient has more than 3 exacerbations per year and airway clearance and exercise therapy are optimized
- Long term AB therapy may reduce frequency of exacerbations

Long term antibiotic therapy for bronchiectasis

- Inappropriate for most cases
 - Increases development of antibiotic resistance
 - Oral macrolide antibiotics (azith, clarit, eryth, roxith)
 - Reduction in frequency of exacerbations
 - Variable improvement in QoL
 - Increased AB resistance
 - GI adverse effects
 - If patient has more than 3 exacerbations per year and airway clearance and exercise therapy are optimized
 - Long term AB therapy may reduce frequency of exacerbations
 - Do not use long term use of quinolones – ciprofloxacin is only oral drug treatment for P. aeruginosa
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