

HIGH-YIELD RESPIRATORY SYSTEM NOTES

FOR USMLE STEP 1 AND STEP 2

By
Dr. Yesheswani Illuri



Dear IMG

High-Yield Notes for USMLE Step 1 & Step 2 CK

STEP 1 - PATHOPHYSIOLOGY & BASIC SCIENCE

RESPIRATORY EMBRYOLOGY

- Respiratory diverticulum → Grows from foregut (week 4)
- Tracheoesophageal septum separates → Trachea (ventral) from Esophagus (dorsal)
- Lung development stages: Embryonic → Pseudoglandular → Canalicular → Saccular → Alveolar
- Newborn + Bilateral choanal atresia + Cyanosis relieved by crying → Choanal atresia
- CHARGE syndrome association

- Premature infant (<28 weeks) + Respiratory distress + Ground-glass appearance on CXR → Neonatal respiratory distress syndrome (NRDS)
- ↓ Surfactant (made by Type II pneumocytes) → ↑ Surface tension → Atelectasis
- Lecithin:Sphingomyelin ratio <2 → Immature lungs
- Prevention: Maternal corticosteroids (Betamethasone) before preterm delivery
- Treatment: Surfactant + Oxygen + Mechanical ventilation

OBSTRUCTIVE LUNG DISEASES

- Obstructive → ↓ FEV1/FVC (<0.7)

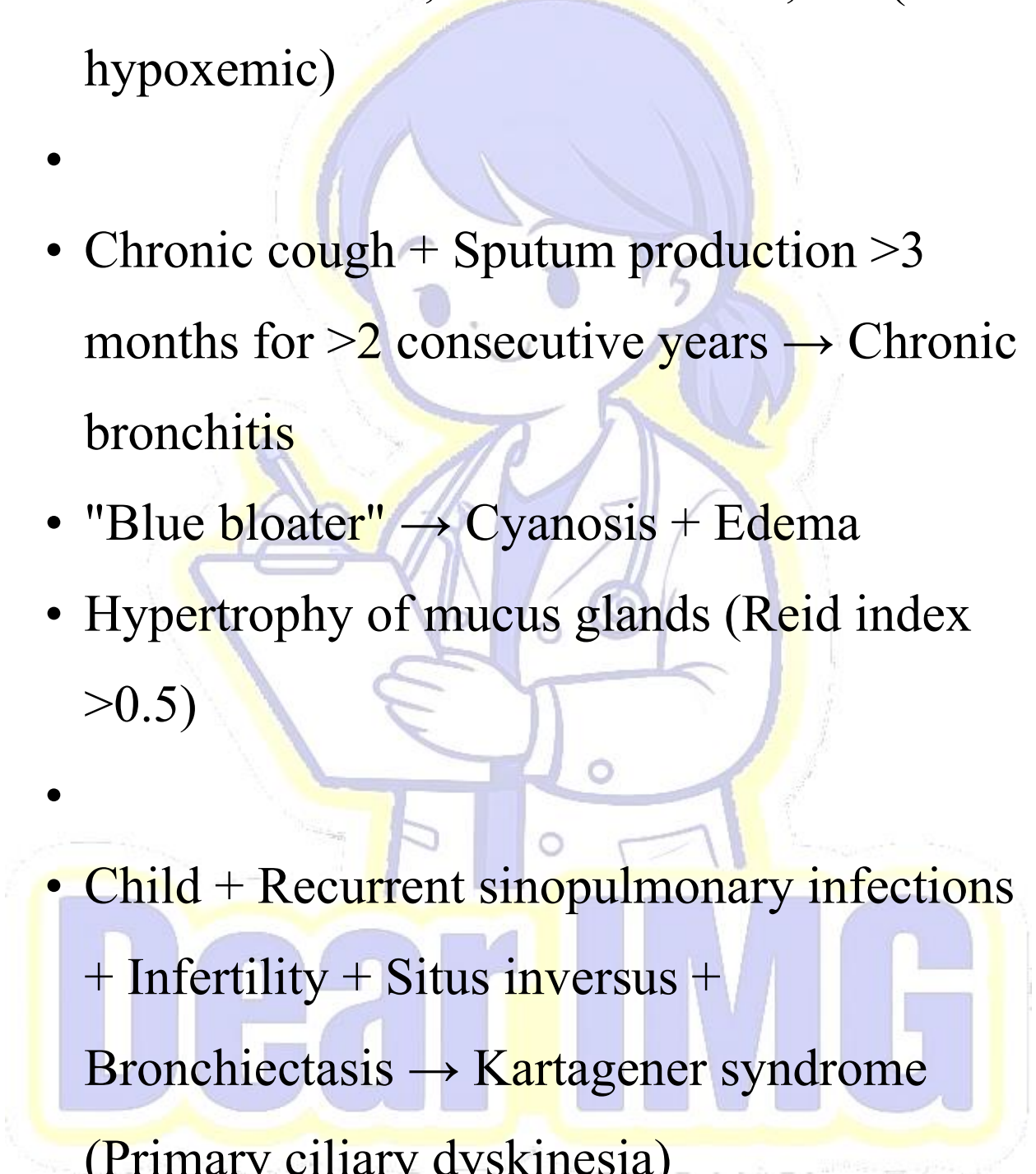
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- Young patient + Episodic wheezing + Shortness of breath + Worse at night + Reversible with bronchodilators → Asthma
- Type I hypersensitivity → IgE-mediated
- Triggers: Exercise, Cold air, Allergens, Aspirin (in aspirin-sensitive asthma)
- Curschmann spirals (mucus plugs) + Charcot-Leyden crystals (eosinophil breakdown)
- Treatment: Inhaled β 2-agonists (albuterol) + Inhaled corticosteroids

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- Elderly smoker + Chronic cough + Dyspnea + Barrel chest + Hyperinflation on CXR → COPD (Emphysema)
- Emphysema → Destruction of alveolar walls → ↓ Elastic recoil → Air trapping
- Centriacinar (centrilobular) → Smoking-related → Upper lobes
- Panacinar → α 1-antitrypsin deficiency → Lower lobes + Early age + Liver cirrhosis
- PiZZ genotype → Severe α 1-antitrypsin deficiency
- CXR: Flattened diaphragm, Hyperinflation, ↑ AP diameter

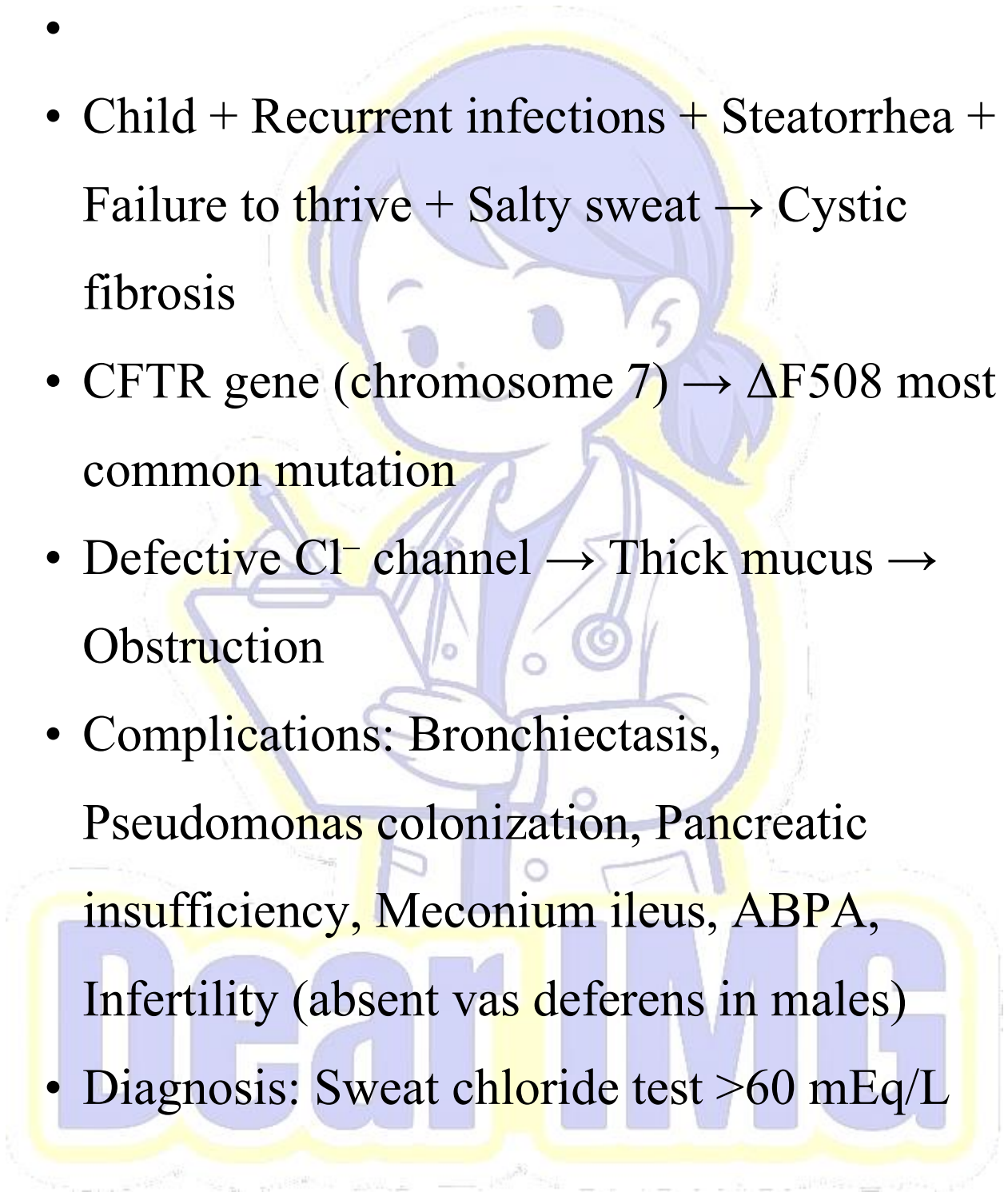
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- Treatment: Smoking cessation, Bronchodilators, Inhaled steroids, O₂ (if hypoxemic)
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- Chronic cough + Sputum production >3 months for >2 consecutive years → Chronic bronchitis
- "Blue bloater" → Cyanosis + Edema
- Hypertrophy of mucus glands (Reid index >0.5)
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- Child + Recurrent sinopulmonary infections + Infertility + Situs inversus + Bronchiectasis → Kartagener syndrome (Primary ciliary dyskinesia)



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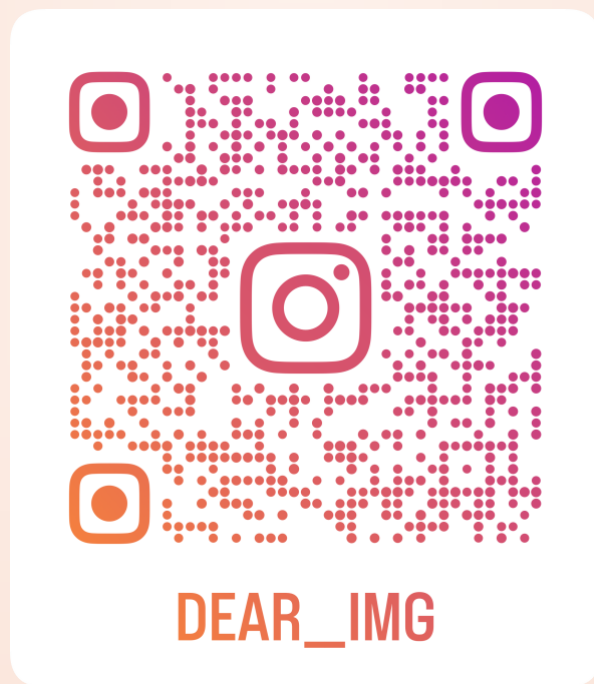
- Dynein arm defect → Immotile cilia
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- Child + Recurrent infections + Steatorrhea + Failure to thrive + Salty sweat → Cystic fibrosis
- CFTR gene (chromosome 7) → $\Delta F508$ most common mutation
- Defective Cl^- channel → Thick mucus → Obstruction
- Complications: Bronchiectasis, Pseudomonas colonization, Pancreatic insufficiency, Meconium ileus, ABPA, Infertility (absent vas deferens in males)
- Diagnosis: Sweat chloride test >60 mEq/L





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