Respiratory System

1. Functional Anatomy
    1. conducting passageways
        1. overview
        2. nose
            1. mucosa
            2. conchae
            3. palate
            4. figure
        3. pharynx (throat)
            1. naso-
            2. oro-
            3. laryngo-
            4. tonsils
                1. pharyngeal
                2. palatine
                3. lingual
        4. larynx
            1. thyroid cartilage
            2. epiglottis
            3. vocal folds (cords)
            4. glottis
            5. larynx as sphincter: Valsalva's maneuver
            6. figure
        5. trachea
            1. cartilaginous rings
            2. ciliated mucosa
            3. figure
        6. bronchi
            1. primary, secondary, tertiary, quaternary, etc., to 23 orders of branching
                1. less than 1 mm diameter = bronchiole
                2. terminal bronchiole less than 0.5 mm diameter
            2. structure
                1. rings, plates, & elastic fibers
                2. epithelium changes
                    1. gets thinner
                    2. at bronchiole level lose cilia, "cleanup" by macrophages
                3. smooth muscle increases
            3. figure
    2. respiratory zone
        1. structure
            1. respiratory bronchioles
            2. alveolar ducts
            3. alveolar sacs
            4. bottom line: high surface area + thin membranes = exchange opportunities
        2. cellular level
            1. type I: squamous epithelia
            2. type II: cuboidal, secrete surfactant
            3. elastic fibers
            4. alveolar pores
            5. alveolar macrophages
    3. figures
    4. Factors affecting ventilation
        1. airway resistance
            1. Flow is a function of pressure differential over resistance: $F = \Delta P / R$
        2. alveolar surface tension
            1. liquids are sticky
            2. attracted to each other, resist force to increase surface area
            3. surfactant: phospholipids, lipids, & protein
                1. reduce cohesiveness of water
        3. lung compliance: $C = \Delta V / \Delta P$
            1. compliance reduced by scarring
            2. blockage with mucus
            3. reduced surfactant
            4. reduced ribcage flexibility (ossification)