

Portion	Organs	Lining epithelium	Function	General features
Conducting	From a nasal cavity till tertiary Bronchi & terminal bronchiole	Begin pseudo-stratified ciliated Columnar epithelium with goblet cells and then <u>terminal bronchiole</u> it becomes <u>simple</u> columnar then simple cuboidal -ciliated or non- ciliated	Passes of air	<ul style="list-style-type: none"> • A C shape hyaline cartilage, posteriorly there is Trachealis muscle smooth muscle. • Numerous mucous and serous glands in <u>lamia</u> • a rich <u>superficial</u> vascular network in the <u>lamina propria</u>.
Respiratory	Respiratory Bronchiole & Alveolar duct& alveolar sac & alveoli	Simple squamous with <u>decreasing</u> in goblet cells & ciliated cells & in diameter <u>more</u> smooth muscle & elastic & reticular fibers help in inflation of lung.	Exchanges gases Passive diffusion	- Alveoli contains type 1 & type 2 cells.
Transitional zone	Terminal bronchiole & respiratory bronchiole			Terminal: rounded closed lumen Respiratory: open at alveolar duct

Cells	Function	Features / notes	Numerous in portion
Type 1	Gas exchange Pinocytotic: for turn over of surfactants	Simple squamous epithelial cells <u>Organelles</u> grouped around the nucleus, <u>cytoplasm</u> is abundant pinocytotic vesicle, <u>occluding junction</u> .	Alveoli wall 97% Alveoli septum 8%
Type 2	-Surfactant-secreting. -Decreasing the alveoli's surface tension allowing their inflation. -Begin in 8 th or 9 th of gestation.	-Simple cuboidal -respiratory distress syndrome with 🤔 - rounded cells -are part of the epithelium - mitosis In <u>septal</u> especially: Foamy cytoplasm, Lamellar bodies produce surfactant	Alveoli wall 3% Alveoli septum 16%
Clara cells	protect the bronchiolar lining against oxidative pollutants and inflammation	Cuboidal cells Non ciliated Have secretory granules at the apical Produce surfactants	Terminal bronchiole & respiratory
Dust cells	Phagocytosis debris then they go to type 1 cells (pinocytotic)	Appears as black dots Macrophages scavenger ! more than type 1 cells in numbers	interior of the inter-alveolar septum & on the surface of the alveolus, lungs & pleura

The Below cells in whole respiratory system

- All of them resting on basement membrane, but not all of them reach the surface.
- most common cells under **LM**: pseudo-striated cells ciliated & goblet cells.
- تختلف نسبتها من مكان لآخر

Ciliated columnar cells	outward movement to expel foreign bodies.	1)Most abundant 2)300 cilia in apical surface 3)many apical <u>mitochondria</u> 4) need ATP 5) Dynein protein 6) Immotile cilia syndrome (Kartagener Syndrome): caused by nicotine: infertility & RS infection	Conducting portion
Goblet cells	mucin which traps the foreign bodies	1)apical mucous 2) glycoprotein	Conducting portion Less in 2 nd & 3 rd bronchus Disappear in bronchioles
Brush cells	Sensory receptors	1)Microvilli on apical 2) (afferent nerve Endings on the base)	
Diffuse neuroendocrine system cells. DNES	Regulates locally the <u>Excretions</u> or <u>secretions</u> of Mucous and serous <u>glands</u> .	Kulchitsky Cells.	
seromucous		Decreases in intrapulmonary bronchus	In lamina propria mucosa
Basal or stem cells	Generating cells Mitosis	1)Small rounded 2) reserve cells مدخر او مخزن 3)Don't reach the apical, only the basement membrane	

Portion	Epithelium & cells	Located	Features
Vestibule (nasal cavity)	-Modified (keratinized first then non) -More non keratinized -Vibrissae -Sebaceous gland	Most anterior and dilated.	
Respiratory region (nasal)	pseudo-stratified columnar and goblet cells.		Subepithilium : seromucos
Olfactory area (nasal)	pseudo-stratified columnar Bowman's gland: odor (watery secretions) Olfactory epithelium: 1)Bipolar cells non motile cilia for odor 2) sustentacular supporting columner cells : microvilli 3)Basal cells: mitosis	roof and Upper parts of the nasal Cavity	Corium (lamina propria) that contains bowman's gland.
Nasal sinuses	thinner respiratory Epithelium Pseudo stratified columnar with few goblet cells.		
Trachea	Pseudo-stratified..... with goblet & cilia 1) Supportive: c shape cartilage & fibroelastic ligament. & bundle of Trachealis posteriorly 2) Longitudinal muscle in submucosa	Extra-pulmonary	Contain all 5 cells. Mostly after epithelium=goblet cells Prominent basement membrane (extra pulmonary)
Bronchus	1 st : cartilage rings not c shape 2 nd & 3 rd : intra pulmonary, cartilage plate , complete muscular layer, less goblet cells	<u>1ry</u> : Extra-pulmonary <u>2ry</u> : 3 in the right & 2 in left <u>3ry</u> : 10 in each side	-narrow lumen -irregular cartilage -spirals arrange of smooth muscle -lamina : rich in elastic -Numerous Lymphocytes and Lymphatic Nodules (BALT)
Bronchioles	1) Simple Ciliated columnar to simple ciliated Cuboidal 2) Clara cells 3) relatively Heavier smooth muscle 4) Longitudinal elastic fibers 5) neuroepithelial bodies area : 80-100 cell have chemoreceptors (gas sensor) & receive cholinergic ends to secret granules	Each terminal bronchiole divided for 2 respiratory bronchioles.	1mm in diameter -No cartilage -no lymphatic nodule - no glands in mucosa ⚠️⚠️ Terminal one: Folds of mucosa
Alveolar Ducts	1) squamous alveolar cells. 2) Sphincter knobs of smooth muscle 3) Rich in elastic & reticular fibers		-2 alveolar ducts it's called atria.
Alveoli	Septum : thin squamous epithelial, mostly type 2 cells, pores , CT (fibroblasts & mast cells & macrophages), capillaries Wall : mostly type 1 cells		-saclike evaginations -200 um in diameter -spongy structure of Lungs - 140~ m2 surface area!