SD 1# 2318831 SD 2# 2253935 SD 3# 2301397 SD 4# 2203721 SD 5# 2306519

Structure

Lungs consist of a branching network of air passages, starting with the trachea, which splits into bronchi, which further subdivide bronchioles. into bronchioles terminate in clusters of tiny air sacs called alveoli. The entire lung structure is enveloped by a doublelayered membrane called the pleura. The diaphragm is a dome-shaped muscle located beneath the lungs that, contracts and flattens during expiration and inspiration respectively. Additionally, each lung is divided into lobes, with the right lung having three lobes and the left lung having two, to accommodate the heart (Hunt, 2007).

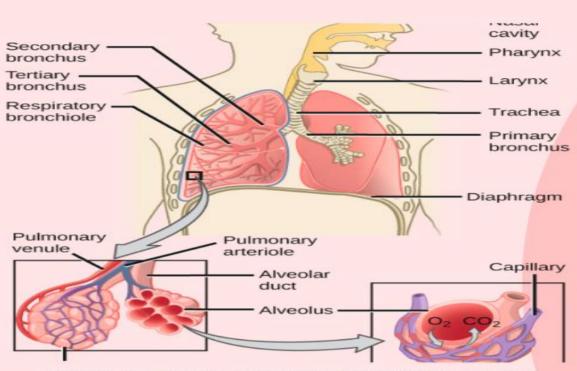


Figure 1: Air enters the respiratory system through the nasal cavity and pharynx, and then passes through the trachea and into the bronchi, which bring air into the lungs (Molnar and Gair, 2015).

Specialised Cells (Micro-Scale)

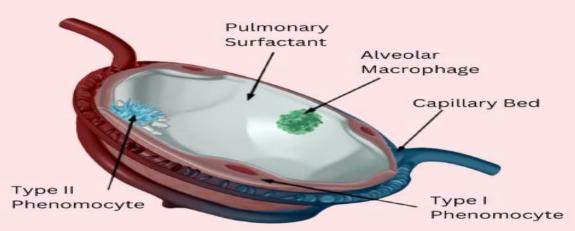


Figure 4: Diagram of an alveolus showing alveolar cells (Smith, 2013)

Type 1 Alveoli

Function:

 Gas exchange ion and fluid balance maintenance

Structure:

- Thin squamous epithelium
- Shares basement membrane with pulmonary capillary endothelium
- Forms the air-blood barrier

Location:

 Covers 70% of alveolar internal surface

Type 2 Alveoli

Function:

- Surfactant synthesis
- Water movement

Structure:

- Cuboidal
- Connected by intracellular and tight junctions

Location:

- Alveolar septum
- Covers 7% of alveolar internal surface

Enythrocytes Type 1 pneumocytes

Figure 5: Microscopic image of an alveolus showing alveolar cells (Uhlén et al., 2015)

Alveolar Macrophage

Function:

- · Engulf bacteria
- Secrete mediators

Structure:

- 10-30 μm in diameter
- Contains actin filament

Location:

Inside alveoli

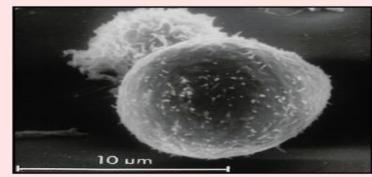


Figure 6: SEM picture of Alveolar Macrophages in lung lavage of a rat (Borm, Cassee, and Oberdörster; 2015)

Function

The primary function of the lungs is to absorb oxygen from the air you breathe into your bloodstream so that it can spread around the body via the cardiovascular system.

As depicted, Oxygen goes through multiple types of tubes to get into the bloodstream. The bronchi are the two large tubes that carry air from the **trachea** to the lungs. The two main bronchi branch out into smaller tubes called **bronchioles**, at the ends of which are small air sacs where the **exchange** of oxygen and carbon dioxide takes place.

Blood passes through the capillaries, entering through the pulmonary artery. In the capillaries, the blood gives off carbon dioxide through the capillary wall into the alveoli and instead exchanges it for oxygen (Comroe and Julius, 1966).

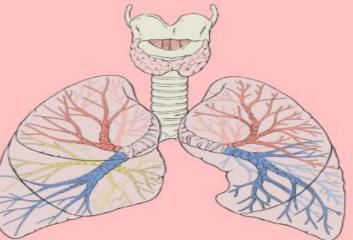


Figure 2: Tree-like branching of the passages of the lower respiratory tract within the lungs (Miller, n.d).



Figure 3: An illustration of alveoli found within the lungs (Oto, 2023).

Disease: Emphysema

An irreversible enlargement of the alveoli. The alveoli lose their ability to relax and contract, which lets air in and out of the lungs. This disease is Emphysema and it causes about 5% of deaths globally (Martini and Frauenfelder, 2020).

Main Causes

Smoking: Stimulates alveolar neutrophils to produce tissue-damaging elastase (Martini and Frauenfelder, 2020)

 α -1- Antitrypsin Deficiency: α -1-antitrypsin inhibits elastase. Emphysema progress quickly in smokers with α -1-antitrypsin deficiency (Martini and Frauenfelder, 2020)

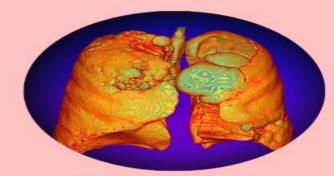


Figure 7: Smokers's Lung's emphysema (Fung, 2020)

Figure 8: Types of emphysema. Centrilobular emphysema (A, D), paraseptal emphysema (B, E) and panlobular emphysema (C, F) (Martini and Frauenfelder, 2020).

Diagnosis

Imaging with chest X-ray and CT (computerised tomography)

Treatment

In the early stages; therapeutic methods such as oxygen therapy and rehabilitators, bronchodilators, and glucocorticosteroids.

If severe; surgical techniques, such as a lung transplant or lung volume reduction surgery (Martini and Frauenfelder, 2020).

References

Brandt, J.P. and Mandiga, P. (2020). Histology, Alveolar Cells. [online] PubMed. Available at: https://www.ncbi.nlm.nih.gov/books/NBK557542/.

Borm, P., Cassee, F. R. and Oberdörster, G. (2015) 'lung particle overload: old school –new insights?', Particle and Fibre Toxicology, 12(1). doi: https://doi.org/10.1186/s12989-015-0086-4.

Castranova, V., Rabovsky, J., Tucker, J.H. and Milas, P.R. (1988). The alveolar type II epithelial cell: a multifunctional pneumocyte. Toxicology and Applied Pharmacology, [online] 93(3), pp.472-483.

doi:https://doi.org/10.1016/0041-008x(88)90051-8.

Dictionary - Normal: Lung - The Human Protein Atlas (2014b) Proteinatlas.org. Available at: https://v15.proteinatlas.org/learn/dictionary/normal/lung/detail+1/magnification+1.

Fung, H. (2018) Somkers' Lung's emphysema. Available at: https://fineartamerica.com/featured/smokers-lungs-and-emphysema-k-h-fungscience-photo-library.html (Accessed: 16 November 2023).

Hirayama, D., Lida, T. and Nakase, H. (2017). The Phagocytic Function of Macrophage-Enforcing Innate Immunity and Tissue Homeostasis. International Journal of Molecular Sciences, [online] 19(1), p.92.

Hirayama, D., Lida, T. and Nakase, H. (2017). The Phagocytic Function of Macrophage-Enforcing Innate Immunity and Tissue Homeostasis. International Journal of Molecular Science doi:https://doi.org/10.3390/ijms19010092.

Martini, K. and Frauenfelder, T. (2020). Advances in imaging for lung emphysema. Annals of Translational Medicine, 8(21), pp.1467–1467. doi:https://doi.org/10.21037/atm.2020.04.4

Martini, K. and Frauenfelder, T. (2020). Advances in imaging for lung emphysema. Annals of Translational Medicine, 8(21), pp.1467–1467. doi:https://doi.org/10.21037/atm.2020.04.44.
Molnar, C. and Gair, J. (2015). Concepts of Biology – 1st Canadian Edition. 1st Canadian Edition ed. BCcampus.
Morgenroth, K. and Ebsen, M. (2008) 'Anatomy', Mechanical Ventilation, pp. 69–85. Available at: https://doi.org/10.1016/b978-0-7216-0186-1.50012-0.

Naeem, A., Rai, S.N. and Pierre, L. (2020). Histology, Alveolar Macrophages. [online] PubMed. Available at: https://www.ncbi.nlm.nih.gov/books/NBK513313/. Sapkota, A. (2021). Macrophages-Definition, Structure, Immunity, Types, Functions. [online] Microbe Notes. Available at: https://microbenotes.com/macrophages/. Smith, C. (2013) Anatomy and Physiology: Gas Exchange, https://www.visiblebody.com/blog/anatomy-and-physiology-gas-exchange. Staff, R. (2016). Introductory Biology: Laboratory Manual. Third Edition ed. Kendall Hunt Publishing Company. Uhlen, M. et al. (2015) 'Tissue-based map of the human proteome', Science, 347(6220), pp. 1260419–1260419. doi: https://doi.org/10.1126/science.1260419. Van Putte, C., Regan, J. and Russo, A. (2022) Seeley's Anatomy and Physiology. 13th Edition. McGraw & Hill. Miller, C. '13.2 Structure and function of the

respiratory system' Available at: https://humanbiology.pressbooks.tru.ca/chapter/15-2-structure-and-function-of-the-respiratory-system/ Oto, E. 'Alveoli, Illustration' Available at:

https://www.sciencesource.com/1999115-alveoli-illustration.html Comroe, Jr. and Julius, H. (1966) 'The Lung' Available at: https://www.jstor.org/stable/24931268?seq=4

SID	Peer Assessment
1. 2318831	He demonstrated commendable engagement throughout the group poster project active listening skills were evident, and he proved proficient in proofreading, in-tercitation, and referencing. Additionally, He excels in summarising text effectively. He only completed his tasks but also contributed to the success of others. His consist attendance at all meetings and his punctual work submission further underscored commitment to the project. He displayed exemplary leadership skills.
2. 2203721	As the initial leader, she played a crucial role in setting the group on a path to such With a keen sense of leadership, she actively listened, completed assigned tasks, a assisted others in the group. Her consistent attendance at all meetings and timely submissions of work demonstrated reliability and dedication to the project. She suggested the use of the model template, which is resourceful
3. 2301397 (me)	I missed one meeting due to a schedule change in my learning timetable, I contribusing significantly by taking clear and detailed minutes during meetings. I Recognised minutations in artistic abilities and sought help when needed, showing a proactive approach to problem-solving. Timely submission of work and a willingness to take new tasks during member shortages highlighted a solid commitment to the group