

Lung surfactant foams as a model to study alveolar collapse

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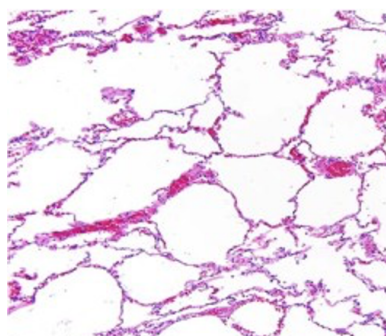
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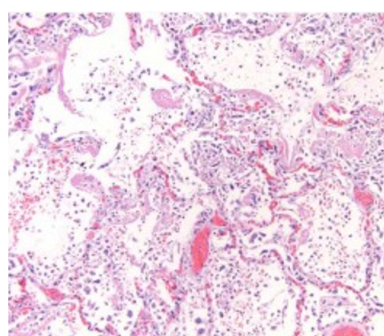
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Introduction

The alveoli are the smallest units of the lung, and their walls are covered with a thin liquid layer. In these layers, lung surfactants are present, and they are extremely important to lung functioning since they will lower the surface tension, decreasing the energy required for breathing. They were also claimed to have a significant impact on preventing alveolar collapse; however, it is still unclear which mechanisms would be involved in this process.

S. Caramaschi *et al.* Modern Pathology, 2021.

Normal alveoli



Collapsed alveoli

The goal of this project is to use lung surfactant foams as a model system for the normal alveoli geometry and to study them with a thin film balance. This technique allows measurement under equilibrium conditions to obtain disjoining pressures, as well as under dynamic conditions to study drainage or, eventually, to even simulate breathing conditions. This would help elucidate the stability of lung surfactant films and the possible mechanisms preventing alveolar collapse.

Methods used in the project

- Thin film balance
- Microscopy

References

- [1] E. Hermans, M. Saad Bhamla, P. Kao, G.G. Fuller, J. Vermant. Lung surfactants and different contributions to thin film stability. *Soft Matter*, 2015.
- [2] E. Chatzigiannakis, N. Jaensson, J. Vermant. Thin liquid films: Where hydrodynamics, capillarity, surface stresses and intermolecular forces meet. *Current Opinion in Colloid & Interface Science*, 2021.