Biophysical characterization of hard/soft nanoparticles for surface activity of pulmonary surfactants in the treatment of infant respiratory distress syndrome

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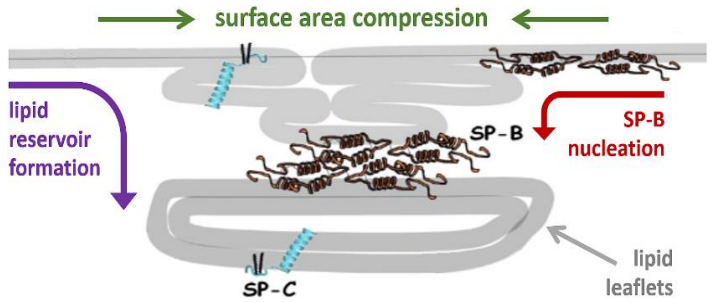
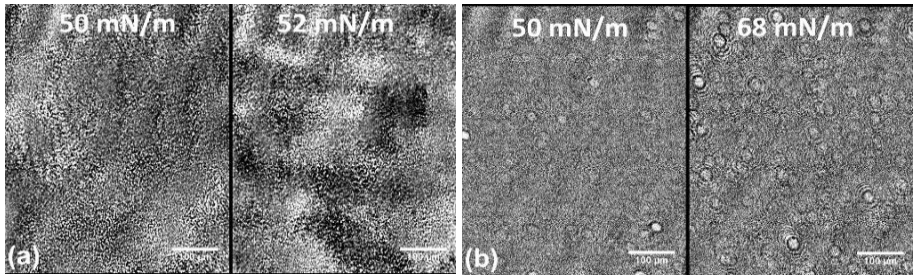
- Pulmonary surfactant (PS) is a lipid-protein film lining the whole alveolar surface of the lungs.
- It plays a key role in lowering the surface tension almost to 0 mN/m, avoiding alveolar collapse and reducing work during the respiration cycles.
- Premature new-borns with infant respiratory distress syndrome (IRDS), animal-sourced exogenous formulations fail to mimic human physiological performance and have severe side effects.
- The quaternary PS model DPPC:POPC:POPG:cholesterol (6:2:1:1 by mol) in a Langmuir trough containing a 150-mM NaCl subphase to mimic better the physiological environment.
- Surface-sensitive techniques to resolve unknown structural and morphological information about hard/soft nanoparticles, NP interactions with model PS systems.
- These techniques did not help in resolving the surface structures; only Neutron reflectivity can help.



Schematic representing the composition and intuitive structure of PS and the formation of a self-assembled lipid reservoir at the air-water interface.



BAM images of the quaternary PS model on 150 mM NaCl subphase: (a) Cationic NPs and (b) Anionic NPs at a mixing ratio of 1:1 by volume at the stated π values. Scale bars: 100 µm.

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