

Summary

The present work discusses the following topics based on published data:

- (1) Despite of the advances in neonatology, not all patient with respiratory insufficiency can be treated successfully.
- (2) Therapy is mainly failing in patients with pulmonary diseases that are associated with dystelectatic and thus inhomogeneously ventilated lungs. Conventional respiratory therapy (e.g. surfactant substitution or mechanical ventilation) mainly increase inhomogeneous aeration of the lung.
- (3) Intra-tracheal application of perfluorocarbons (PFC) recruits atelectatic lung areas, improves systemic oxygenation and suppresses pulmonary inflammation.
- (4) The efficacy of PFC-associated therapy of respiratory diseases of the newborn has been proven in animal experiments and clinical studies.
- (5) To improve efficacy and to detect potential side effects of PFC therapy, several questions have to be answered prior to clinical application.

Thereafter, results of studies are presented that show:

- (1) PFC stimulates the secretion of endogenous surfactant, however, inhibits surfactant synthesis *in vitro*;
- (2) PFC-associated therapy does not lead to an exacerbation of bacterial infections;
- (3) PFC application into healthy lungs impairs the cerebral oxygenation and perfusion;
- (4) application rate and particle size of PFC aerosols depend on PFC species, type of nebulizer and ventilatory parameters.

Finally, the relevance of the presented data within the context of a clinical application in neonatology is evaluated and fields that require further research are discussed .