

## A Data-Driven Platform for Studying the Liquid Plug Splitting Ratio

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**Abstract :** Respiratory failure secondary to surfactant deficiency resulting from respiratory distress syndrome is considered one major cause of morbidity in preterm infants. Surfactant replacement treatment (SRT) is considered an effective treatment for this disease. Here, we introduce an AI-mediated approach for estimating the distribution of surfactant in the lung airway of a newborn infant during SRT. Our approach implements machine learning to precisely estimate the splitting ratio of a liquid drop during bifurcation at different injection velocities and patient orientations. This technique can be used to calculate the surfactant residue remaining on the airway wall during the surfactant injection process. Our model works by minimizing the pressure drop difference between the two airway branches at each generation, subject to mass and momentum conservation. Our platform can be used to generate feedback for immediately adjusting the velocity of injection and patient orientation during SRT.

**Keywords :** respiratory failure, surfactant deficiency, surfactant replacement, machine learning

**Conference Title :** ICMIBE 2022 : International Conference on Medical Informatics and Biomedical Engineering

**Conference Location :** Istanbul, Türkiye

**Conference Dates :** December 20-21, 2022