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## Aerosol Drug Deposition Level of Inhaled Salbutamol by Mesh Nebulizer on Endotracheal Tube and Heat and Moisture Exchangers with and without an In Vitro Model of *Acinetobacter baumannii* Biofilm

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**Objectives:** Inhaler salbutamol treatment is given for bronchodilation to patients with respiratory failure due to COPD and asthma in intensive care units. It has been shown that aerosol drugs are stored in circuits and intermediates in in vitro studies. It was also reported that biofilm layer is formed by 95% in the endotracheal tubes, in intubated patients. In an in vitro study, it is shown that salbutamol increases the killing effect of antibiotics by stimulating neuroaminidase activity, but provides a moderate reduction in the mass on the biofilm layer. There is no study on the effect of biofilm layer on aerosol deposition. Primary aim was to evaluate the effect of in vitro developed *Acinetobacter Baumannii* biofilm layer on inhaled salbutamol accumulation. Secondary aim was to determine the amount of drug accumulation in the neck of the endotracheal tube, the tube heat and moisture exchangers.

**Methods:** A biofilm layer was formed on the endotracheal tubes by using *A. baumannii* strain provided from clinical microbiology department. A close system was installed by using an invasive mechanical ventilator, dual circuit and heat dehumidifier filter connected with an endotracheal tube to balloon lung. Two vials of salbutamol was given through the tubes with biofilm layer after performing the same with the tubes without biofilm layer using mesh nebulizer connected to Y connector to the inspiratory circuit. After the samples were stored at -80°C aerosol was measured. The amount of the accumulated aerosol was evaluated using T-test. Average and standart errors have been shown.

**Results:** 300 µg (6%) of the given 5000 µg salbutamol was adsorbed on the endotracheal tube and filter surface. 63.07±16.30 µg aerosol was accumulated on the neck of the endotracheal tube, 23.63±8 µg on the endotracheal tube without biofilm layer and 219.56±74.53 µg on the filter. 18.4%±4.64% µg aerosol accumulation was found in the tubes with biofilm. There was no significant statistical difference on aerosol accumulation between the tubes with biofilm and non-biofilm (p=0.59).

**Conclusion:** The rates of accumulation of aerosol treatment used for bronchodilation in the endotracheal tube and filter are clinically tolerably low. The biofilm layer has no effect on drug deposition.

**Keywords:** Aerosol therapy, mechanical ventilation, drug deposition