Effects of halothane and isoflurane on stimulated airway transepithelial ion transport

Tomasz Tyrakowski¹, Piotr Smuszkiewicz², Leon Drobnik², Małgorzata Marzeć¹, Natalia Młodzik-Danilewicz¹, Agnieszka Lelińska¹, Piotr Kaczorowski¹

¹Department of Pathobiocchemistry and Clinical Chemistry, Nicolaus Copernicus University, Collegium Medicum, M. Skłodowskiej-Curie 9, PL 85-094 Bydgoszcz, Poland

²Clinical Department of Anesthesiology, Intensive Therapy and Pain Treatment, T. Marcinowski Medical University, Przybyszewskiego 49, PL 60-355 Poznań, Poland

Correspondence: Tomasz Tyrakowski, e-mail: tomyr@cm.umk.pl

Abstract:
Volatile anesthetics are suggested to elicit depression of airway clearance. The involvement of changes in transepithelial ion transport in this inhibition has already been observed. The Ussing method was used to study the changes in mechanical stimulation evoked electrogenic ion transport in isolated rabbit tracheal wall in the presence of halothane and isoflurane. The drugs dissolved in Ringer solution were directed as a flux from peristaltic pump to mucosal surface of trachea. In experimental settings without or with amiloride, the anesthetics elicited reversible inhibition of stimulated ion transport and depolarization of transepithelial potential difference. Participation of chloride ion transport in observed changes is suggested. In the light of this study with application of anesthetics at higher concentrations than clinically relevant, the possibility of disturbances of airway transepithelial ion transport by clinically relevant concentration should be checked.

Key words:
volatile anesthetics, halothane, isoflurane, transepithelial potential difference, airways