

[Poster Board #J25] Shrinkage of Guinea-Pig Isolated Tracheal Epithelial Cells (EC) in Response to Hyperosmolar Challenge, [Publication Page: A425]

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RATIONALE. Airway obstruction in asthmatic patients during exercise may be stimulated by an increase in osmolarity of airway surface liquid. Accordingly, inhalation of hypertonic solutions (HS) provokes obstruction in asthmatics. In normal guinea-pig isolated, perfused trachea (GPIPT) preparations, hyperosmolar challenge of EC causes smooth muscle relaxation mediated via the release of epithelium-derived relaxing factor (EpDRF). Responses of GPIPT to HS are altered in animal models of increased or decreased airway reactivity. We, therefore, studied the effects of HS on isolated tracheal EC to clarify the relationship between EpDRF release and EC shrinkage. **METHODS.** EC in suspension were prepared by protease treatment (1%, 1 h) of tracheas. EC were challenged with osmolytes to raise osmolarity, while measuring cell volume (CV) with a cell sizer. **RESULTS.** EC suspended in modified Krebs-Henseleit solution excluded trypan blue and exhibited cilia beating for at least 2 h. D-mannitol, urea and NaCl elicited decreases in CV (up to 25%) in concentrations that initiate tracheal relaxation (10-120 mosM). CV decreased rapidly: half maximal shrinkage occurred by 30 sec and the peak responses occurred at 1-5 min. Volume recovery did not occur over a period of 1 h. The time-course of EC shrinkage mirrored that for relaxation responses of GPIPT to HS. **CONCLUSIONS.** EC are very sensitive to elevations in osmolarity and respond rapidly with cell shrinkage under conditions in which HS causes EpDRF-mediated relaxation. EC do not exhibit regulatory volume increase. Our results provide insight into the effects of HS in the airways. **DISCLAIMER.** The findings and conclusions in this abstract have not been formally disseminated by the National Institute for Occupational Safety and Health and should not be construed to represent any agency determination of policy.

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