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Published in:
Irish Journal of Medical Science

DOI:
10.1007/s11845-018-1898-7

Published: 08/10/2018

Document Version
Peer reviewed version

Link to publication on the UWS Academic Portal

Citation for published version (APA):

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Investigating the matriptase-PAR2-ENaC axis in lung epithelial cells: potential role in COPD pathogenesis

M. Bailo¹, K. McCallum¹, L. Dunning¹, M. Stankovic¹, J. Reihill², S. L. Martin², G. Sergeant³, C. S. Goodyear⁴, G. J. Litherland¹, J. C. Lockhart¹, A. Crilly¹.

¹: Institute of Biomedical and Environmental Health Research, Health and Life Science, University of the West of Scotland, Paisley, PA1 2BE, Scotland. ²: School of Pharmacy, Queen’s University, Belfast, Northern Ireland. ³: Smooth Muscle Research Centre, Dundalk Institute of Technology, Dundalk, Ireland. ⁴: Institute of Infection, Immunity and Inflammation, University of Glasgow, Glasgow, Scotland.

Matriptase, a membrane anchored serine proteinase, has a pivotal role in the development of pulmonary fibrosis and is a known activator of the epithelial sodium channel (ENaC) (1). ENaC is overexpressed in chronic obstructive pulmonary disease (COPD) (2), resulting in airway dehydration and mucus hypersecretion. Protease activated receptor 2 (PAR2) is a regulator of inflammation and activated by matriptase. The potential for a coordinated matriptase / PAR2/ ENaC axis has not been investigated in lung epithelium and COPD. The purpose of this study was to look at expression and regulation of matriptase, ENaC and PAR2 in lung epithelial cells.

Expression of matriptase, PAR2 and ENaC was evaluated in lung epithelial cell lines (A549 and BEAS-2B) by immunofluorescence. Western blot was used to look at regulation of these markers by transforming growth factor β (TGFβ) and hypoxia inducer, dimethyloxalylglycine (DMOG).

A549 cells expressed all three markers with TGFβ increasing matriptase while DMOG decreased ENaC. There was no effect on PAR2. BEAS-2B cells expressed PAR2 and ENaC but not matriptase.

These data provide a basis for future functional studies looking at PAR2/matriptase interaction and regulation of ENaC in lung epithelia, which may give insight into a potential role for this axis in COPD pathogenesis.

1. Vuagniaux G, Vallet V, Jaeger NF, Hummler E, Rossier BC. Synergistic Activation of ENaC by Three Membrane-bound Channel-activating Serine Proteases (mCAP1, mCAP2, and mCAP3) and Serum- and Glucocorticoid-regulated Kinase (Sgk1) in Xenopus Oocytes. J Gen Physiol. 2002;