Human rhinovirus HRV16 may increase angiogenetic activity of lung vascular endothelial cells – potential contribution to airway remodelling in asthma

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Introduction

In asthmatics, airway remodeling with enhanced vasculature is observed. It is not clear whether repeated rhinoviral asthma exacerbations may contribute to this process.

Aim

To assess long-term effect of rhinovirus HRV16 on the angiogenic activity of the human lung vascular endothelium

Material end methods

Human Lung Microvascular Endothelial Cells (HMVEC-L) were incubated with HRV16 for 3 hours in MOI3 and cultured for 144h. Endothelial integrity and migration were monitored in RTCA-DP system. VEGF, FGF, AREG, VEGFR1 and VEGFR2 mRNA expression was assessed in Real-Time PCR. VEGF and FGF protein concentrations were analyzed in BioPlex, metabolic activity in MTT assay, whereas apoptosis in flow cytometry. All measurements were done in following time-points: T48, T96, T120, and T144h..

Results

Initially, HRV16 decreased HMVEC-L integrity. After 48h, integrity of HRV16-infected endothelium exceeded the one in mock cells, which was accompanied by the increase of adherent and tight junction protein expression (VE-cadherin, claudin-5). Simultaneously, increase mRNA expression and protein release of angiogenic cytokines (VEGF, FGF, AREG) was noted with concomitant up-regulation of VEGF receptors (VEGFR1, VEGFR2). Migratory rate of HMVEC-L infected with HRV initially exceeded the one in mock cells to settle down in subsequent time-points with concomitant settling of angiogenic factors and VEGFRs expression. Similarly, HRV increased

percentage of apoptotic cells in T48 and T96 as compared to mock cells to get equal in further time-points. Initially, HRV-infected HMVEC-L had decreased metabolic activity, which restored in T120 and T144.

Conclusions

Repeated rhinoviral infections in asthmatics may contribute to increased airway vasculature and remodeling.NCN 2017/25/B/NZ5/01575

The authors declare no conflict of interest.