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Introduction/Objectives: Niacin is a ligand for the G-protein-coupled receptor PUMA-G (rodents) and GPR109A (humans). GPR109A/PUMA-G is expressed in adipocytes where niacin elicits its lipid-lowering effects. GPR109A mRNA is expressed in the lung but its physiologic role is unknown. Here we studied the expression/localization of GPR109A/PUMA-G in the respiratory tract and investigated whether the receptor functions as a blocker of inflammation in this tissue.

Methods: RT-PCR and immunodetection methods were used to study the expression of GPR109A in human bronchial epithelial (16HBE14o-) cells, human small alveolar epithelial cells (HSAECs), human microvascular endothelial cells (HMVECs), human pulmonary arteriole endothelial cells (HPAECs), and mouse lung. The effects of bacterial lipopolysaccharide (LPS) were studied with 16HBE14o- cells using NF- κ B-luciferase as a reporter. The ability of GPR109A to block LPS action was evaluated by monitoring the effects of niacin.

Results: GPR109A mRNA was expressed in all cells studied, with highest expression in HSAEC cells. GPR109B mRNA was only expressed in 16HBE14o- cells and HSAECs. GPR109A protein expression was greater in 16HBE14o- cells than in HLMVECs and HPAECs. GPR109B protein was present only in 16HBE14o- cells. PUMA-G and CD31 co-localized in blood vessels in the lung. Bronchiolar epithelial cells also displayed high positive signals for PUMA-G. TLR4 was expressed in 16HBE14o- cells. However, we were unable to demonstrate LPS-dependent induction of NF- κ B-luciferase in these cells.

Summary/Discussion: GPR109A is expressed in bronchiolar epithelial cells, small alveolar epithelial cells, and vascular endothelial cells in the lung. Although GPR109A and TLR4 are expressed in the 16HBE14o- cells, we failed to demonstrate LPS-dependent induction of NF- κ B in these cells. This could be due to problems with transfection efficiency because the technique involved transfection of the reporter plasmid. We need to optimize the transfection technique before the ability of GPR109A to block the effects of LPS can be evaluated.