Comparing the Expression of PPAR-g Receptor in Adult and Neonatal Mice During Respiratory Viral Infection

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Through some former lab work, there have been findings of high rates of inflammation in adult and low rates of inflammation in neonatal mice. One molecule that may reduce inflammation is Prostagladin D2 (PGD2). This is a type of lipid that was found to be higher in neonatal lungs during viral infection compared to adult lungs. The ligand PGD2 binds to the receptors DP1 (a protein-coupled receptor that is encoded by the PTGDR1 gene), and DP2. PGD2 may also be converted into PGJ2 that binds to receptors DP1, DP2, and PPARg. DP1 is expressed by cells that are involved in mediating allergic and inflammatory reactions. Through the process of cell cycling, an agonist will cause a signal to the receptor ligand which then reduces inflammation. If that signal becomes blocked, then that could be a sign of high rates of inflammation. This study will compare the expression PPARg (peroxisome proliferator-activated receptor-g); a form of transcription factor that is key to regulating the immune response in the lung. This receptor may be expressed on multiple cell types that have specific roles in controlling the development and functions of the lungs in neonatal and adult mice during respiratory viral infections. PPAR-g requires the binding of lipid ligand and dimerization with a retinoid acid receptor. The receptor then binds with a high affinity to a PPAR response element of a targeted gene promotor. Since there are numerous endogenous lipid ligands PPARs, they typically include polyunsaturated fatty acids and conversion products of eicosanoids. Particularly, PPAR-g are activated by oxidized fatty acids that are found in oxidized low-density lipoprotein. Besides binding with targeted genes, PPAR-g has a way of acting as a transcriptional repressor of the pro-inflammatory transcription factor NF-c-B by inducing proteasomal degradation of the NF-c-B subunit p65 directly. We will conduct two methods for this to determine PPAR-g expression in adult and neonatal lungs during viral infection. We will use real time PCR to measure PPARY-g messenger RNA levels in neonatal and adult lungs, tracheas and culture airway epithelial cells. We also determine PPAR-g protein expression in lung sections using immunohistochemistry. By using these two methods, we want to be able to find a comparison between the expression of PPAR-g receptor in adult and neonatal mice during respiratory viral infection.