Human Carbohydrate Binding Protein for Modulation of Immune Responses

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Technology description

We have identified a putative receptor of the human innate immune system (expressed on lung epithelial cells and macrophages thus far) that binds to carbohydrate ligands such as chitin and potentially cellulose. We have shown that knocking down the gene for this receptor with siRNAs in lung epithelial cells in vitro results in dampening of the innate immune response to pure chitin or pathogenic fungi (invasive and allergenic fungi causing diseases of humans). Recent data by several research groups suggests that chitin drives Th2 or allergic types of inflammation. Thus, by "blocking" this receptor, patients that have allergies to fungi or other chitin containing organisms may exhibit reduced airway inflammation. In contrast, Th2 immunity is important for defense against chitin containing parasites, so by activating this gene one may enhance clearance of parasitic organisms in lung or possibly GI tract. Finally, cellulose is a component of gram negative bacterial biofilms. In lung diseases such as cystic fibrosis, bacteria such as Pseudomonas aeruginosa contribute to disease pathology due to undesirable levels of inflammation. By blocking this receptor one hypothesis that remains to be tested is that this will result in reduced inflammation in response to the presence of microbial biofilms. Lastly, RNA seq data generated in our lab suggests that this receptor may be involved in modulating not only specific immune responses but also remodeling of airway epithelium and thus may have potential for reducing airway remodeling aspects of airway diseases such as asthma and chronic rhinosinusitus. The validity of these hypotheses have not been tested in animal models of disease at this point in time but in vitro data collected thus far, especially with living fungi as the stimulus, do suggest potential pathological relevance of this receptor. Thus this receptor represents a putative "drug target". The other aspect of this discovery is that pending the establishment of pathological relevance in animal models, one can foresee the creation of a line of reagents related to this protein/gene (KO mice, specific antibodies, recombinant proteins, ELISAs, etc.).

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