Semaphorin 7A as a therapeutic target for pulmonary fibrosis

**Description:**

Fibrotic diseases are the result of excessive scarring during the natural healing process of chronically injured tissues, culminating in their loss of function. Such diseases include idiopathic pulmonary fibrosis, asthma, interstitial lung diseases, scleroderma, liver cirrhosis, and renal fibrosis. In particular, about 80,000 cases of Idiopathic pulmonary fibrosis exist in the U.S. with 30,000 new cases predicted each year and an estimated two-thirds of patients expiring within five years of diagnosis. Currently, no FDA approved treatment or cure for pulmonary fibrosis is available presenting a pressing need for such therapeutics.

Semaphorin 7A (SEMA 7A), a membrane-bound protein involved in inflammation and immunity, has recently been identified as a target for the treatment of pulmonary fibrosis. Null mutations of SEMA 7A in mice reduced tissue fibrosis induced by either the over-expression of TFG-b or by administration of the pro-fibrotic agent Bleomycin (Figure 1). The recent discovery of a role for SEMA 7A in fibrosis using mouse models provides a new therapeutic target for the treatment of fibrosis in lung disease and may be suitable for the treatment of other fibrotic diseases.

**Value Proposition:** Currently, pulmonary fibrosis represents a major unmet medical need, with a large potential market. Little success has been achieved through the most common pulmonary fibrosis treatments, including immunosuppressants or anti-inflammatory drugs. Moreover, only one therapeutic drug that directly targets fibrosis has recently become available; while its sales are limited to Japan, sales are estimated at $300 million for the first quarter of 2010 alone. The therapeutic, Pirespa, contains pirfenidone as an active ingredient which acts as a direct inhibitor of TFG-b, thereby inhibiting the progression of fibrosis. Although efforts to market Pirespa in other countries are ongoing and may introduce competition, targeting of SEMA 7A provides a potential finer alternative using an indirect approach to inhibiting the fibrotic effects of TFG-b.

With an increasing number of pulmonary fibrosis cases each year, the dire need for anti-fibrotic drugs creates a substantial market opportunity for this therapeutic target. Additionally, anti-fibrotic drugs could be further exploited for the treatment of other fibrotic diseases such as liver cirrhosis, scleroderma, and renal fibrosis, creating a much larger market potential.
Figure 1. Genetic association analysis of chromosome 10 from 442 AMD cases and 309 controls identified rs11200638 as the most significantly associated SNP for AMD.

Stage of Development: In vivo animal studies have been completed.

Published/Issued Patents: U.S. Patent No. 8,642,357

Licensing Contact: John Puziss
john.puziss@yale.edu