

Ligand Partner Retrophin Announces Positive Top-Line Results from Phase 2 DUET Study of Sparsentan in Patients with Focal Segmental Glomerulosclerosis

Combined sparsentan treatment group experienced 44.8% reduction of proteinuria, more than double the reduction of irbesartan; achieves statistical significance in primary efficacy endpoint

Preliminary safety findings show sparsentan was generally safe and well-tolerated

SAN DIEGO-- **Ligand Pharmaceuticals Incorporated (NASDAQ: LGND)** partner Retrophin, Inc. (NASDAQ: RTRX) today announced positive top-line results from the Phase 2 DUET study of sparsentan for the treatment of focal segmental glomerulosclerosis (FSGS), a rare kidney disorder without an approved pharmacologic treatment that often leads to end-stage renal disease. The study achieved statistical significance in the primary efficacy endpoint for the overall sparsentan treatment group, demonstrating a greater than two-fold reduction of proteinuria compared to irbesartan after the eight-week, double-blind treatment period.

"Retrophin has reported notable top-line results from the Sparsentan DUET trial, and we commend their team for the successful outcome of this study," said John Higgins, CEO of Ligand Pharmaceuticals. "We are proud of our partnership with Retrophin and the early collaborative work we did to help support this program. Sparsentan is one of Ligand's top partnered portfolio assets, and we are very pleased to see this asset progress."

"We are very pleased with the robust top-line results from DUET, which suggest sparsentan could be a significant advancement in the treatment of FSGS," said Stephen Aselage, CEO of Retrophin. "FSGS patients today face poor outcomes with limited medical options; we look forward to working with the FDA to find the most expeditious path forward that would deliver the first approved pharmacologic treatment to the FSGS community."

In the DUET study, according to Retrophin's announcement, the mean reduction of proteinuria from baseline after eight weeks of treatment for all patients treated with 200, 400, and 800 mg/day of sparsentan (n=64) was 44.8%, compared to a mean reduction of proteinuria for all patients receiving 300 mg/day of irbesartan (n=32) of 18.5% (p=0.006). Further, the mean reduction of proteinuria from baseline after eight weeks of treatment for all patients treated with 400 mg and 800 mg doses of sparsentan (n=51) was 47.4%, compared to a mean proteinuria reduction of 19.0% for patients receiving 300 mg of irbesartan (n=25) in these two dose cohorts (p=0.011). The comparison of individual sparsentan dose cohorts to irbesartan showed clear signals of relative improvement, but did not reach statistical

significance.

“The results from DUET serve as proof of concept for sparsentan’s novel approach of combining endothelin receptor type A blockade with angiotensin II inhibition for the treatment of FSGS,” said Alvin Shih, M.D., executive vice president and head of research & development for Retrophin. “Significant reductions in proteinuria, along with a well-tolerated preliminary safety profile have us excited about being one step closer to providing a new treatment option for patients with FSGS.”

According to Retrophin’s announcement, top-line results suggest sparsentan was generally safe and well-tolerated in the DUET study. One serious adverse event, anemia, classified as potentially related to treatment occurred in the sparsentan group but did not result in study discontinuation during the eight-week blinded treatment period. There were no withdrawals due to fluid retention during the eight-week blinded treatment period. All patients who completed the eight-week treatment period entered the ongoing open label extension study, and the vast majority of these patients continue to receive therapy.

Retrophin announced that it plans to present detailed study results, including data from the open label extension, at an upcoming medical meeting or in a peer-reviewed publication.

About the DUET Study

The DUET study is an international, randomized, double-blind, Phase 2 clinical trial assessing the safety and efficacy of sparsentan in 109 patients with focal segmental glomerulosclerosis (FSGS), of which 96 qualified for the evaluable database. The primary endpoint was the reduction of proteinuria, as compared to irbesartan, which is part of a class of drugs used to manage FSGS in the absence of an approved pharmacologic treatment. After a two-week washout period, patients were randomized to receive daily oral doses of 200 mg, 400 mg, and 800 mg of sparsentan or 300 mg of irbesartan. After completing the eight-week treatment period, all patients were eligible to receive sparsentan as part of the study’s open-label extension.

About Focal Segmental Glomerulosclerosis (FSGS)

Focal segmental glomerulosclerosis, or FSGS, is a rare disorder without an approved pharmacologic treatment option that is estimated to affect up to 40,000 patients in the U.S. with similar prevalence in Europe. The disorder is defined by progressive scarring of the kidney and often leads to end-stage renal disease. FSGS is characterized by proteinuria, where protein is found in the urine due to a breakdown of the normal filtration mechanism in the kidney. Other common symptoms include swelling in parts of the body known as edema, as well as low blood albumin levels, abnormal lipid profiles, and hypertension.

Reduction in proteinuria is widely regarded to be beneficial in the treatment of FSGS, and may be associated with a decreased risk of progression to end-stage renal disease. In the absence of an approved pharmacologic treatment, FSGS patients are currently managed with angiotensin receptor blockers, angiotensin converting enzyme inhibitors, calcineurin inhibitors, and steroids.

About Sparsentan

Sparsentan could be the first approved pharmacologic treatment for focal segmental glomerulosclerosis, or FSGS, a rare kidney disorder that often leads to end-stage renal disease. Sparsentan's dual mechanism of action combines angiotensin receptor blockade with endothelin receptor type A blockade. In several forms of chronic kidney disease, endothelin receptor blockade has been shown to have an additive beneficial effect on proteinuria in combination with renin-angiotensin blockade via angiotensin receptor blockade or angiotensin converting enzyme inhibitors.

According to Retrophin's announcement, the Phase 2 DUET study of sparsentan met the primary efficacy endpoint for the overall treatment group, demonstrating a greater than two-fold reduction of proteinuria compared to irbesartan, after the eight-week, double-blind treatment period. Retrophin announced that it plans to engage the FDA to determine the most expeditious path forward to advance the development of sparsentan towards approval. In 2015, the U.S. Food and Drug Administration and European Commission each granted sparsentan orphan drug designation for the treatment of FSGS.

About Retrophin

Retrophin is a fully integrated biopharmaceutical company dedicated to delivering life-changing therapies to people living with rare diseases who have few, if any, treatment options. Retrophin's approach centers on its pipeline featuring clinical-stage assets targeting rare diseases with significant unmet medical needs, including sparsentan for focal segmental glomerulosclerosis (FSGS), a disorder characterized by progressive scarring of the kidney often leading to end-stage renal disease, and RE-024 for pantothenate kinase-associated neurodegeneration (PKAN), a life-threatening neurological disorder that typically begins in early childhood. Research exploring the potential of early-stage assets in several rare diseases is also underway. Retrophin's R&D efforts are supported by revenues from Retrophin's commercial products Thiola[®], Cholbam[®] and Chenodal[®].

Retrophin.com

About Ligand Pharmaceuticals

Ligand is a biopharmaceutical company focused on developing or acquiring technologies that help pharmaceutical companies discover and develop medicines. Our business model creates value for stockholders by providing a diversified portfolio of biotech and pharmaceutical product revenue streams that are supported by an efficient and low corporate cost structure. Our goal is to offer investors an opportunity to participate in the promise of the biotech industry in a profitable, diversified and lower-risk business than a typical biotech company. Our business model is based on doing what we do best: drug discovery, early-stage drug development, product reformulation and partnering. We partner with other pharmaceutical companies to leverage what they do best (late-stage development, regulatory management and commercialization) to ultimately generate our revenue. Ligand's Captisol[®] platform technology is a patent-protected, chemically modified cyclodextrin with a structure designed to optimize the solubility and stability of drugs.

OmniAb[®] is a patent-protected transgenic animal platform used in the discovery of fully human mono- and bispecific therapeutic antibodies. Ligand has established multiple alliances, licenses and other business relationships with the world's leading pharmaceutical companies including Novartis, Amgen, Merck, Pfizer, Celgene, Gilead, Janssen, Baxter

International and Eli Lilly.

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Forward-Looking Statements

This news release contains forward-looking statements by Ligand that involve risks and uncertainties and reflect Ligand's judgment as of the date of this release. These include statements regarding the possible use of sparsentan as a treatment options for FSGS, the timing and results of review by the Food and Drug Administration (FDA) of sparsentan, Retrophin's plans to present the DUET study results at an upcoming medical meeting or in a peer-reviewed publication, and the ability of patients to continue in an open-label study of sparsentan. Actual events or results may differ from our expectations. For example, Retrophin may choose to terminate the open-label study of sparsentan, including due to adverse events reported by patients, there can be no assurance that success in a Phase 2 clinical trial will result in success in future clinical trials; the safety and tolerability data from a new clinical trial in sparsentan may conflict with the results of the Phase 2 DUET clinical trial; and the number of patients diagnoses with FSGS may be more or fewer than Retrophin believes. The failure to meet expectations with respect to any of the foregoing matters may reduce Ligand's stock price. Additional information concerning these and other important risk factors affecting Ligand can be found in Ligand's prior press releases available at www.ligand.com as well as in Ligand's public periodic filings with the Securities and Exchange Commission, available at www.sec.gov. Ligand disclaims any intent or obligation to update these forward-looking statements beyond the date of this press release, except as required by law. This caution is made under the safe harbor provisions of the Private Securities Litigation Reform Act of 1995.

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