X4 Pharmaceuticals Announces Publication of Mavorixafor Phase 2 Clinical Data for Treatment of WHIM Syndrome in 'Blood' - the Official Journal of the American Society of Hematology

September 2, 2020

Manuscript further details positive clinical results and long-term tolerability of mavorixafor in ongoing Phase 2 study

Company continues to advance mavorixafor in Phase 3 pivotal trial in WHIM using optimal dose and key endpoints from Phase 2 trial

CAMBRIDGE, Mass., Sept. 02, 2020 (GLOBE NEWSWIRE) -- **X4 Pharmaceuticals, Inc.** (Nasdaq: XFOR), a leader in the discovery and development of novel therapies targeting diseases resulting from dysfunction of the CXCR4 pathway, today announced the publication of comprehensive safety, tolerability, pharmacokinetics, pharmacodynamics, and preliminary efficacy data of mavorixafor from an ongoing Phase 2, open-label, dose-escalation and extension study in adult patients with genetically confirmed WHIM (warts, hypogammaglobulinemia, infections, and myelokathexis) syndrome. The manuscript, published in *Blood, the official journal of the American Society of Hematology*, expands on previously presented data.

Paula Ragan, Ph.D., President and Chief Executive Officer of X4 Pharmaceuticals commented on the news: "The publication of our positive Phase 2 safety and efficacy data in a prestigious journal like *Blood* not only elevates the visibility of the severely underserved patient population suffering from WHIM syndrome, but also provides key third-party validation of our clinical strategy, including the selection of the dose, biomarkers, and clinical endpoints for our ongoing pivotal Phase 3 clinical trial. The published results continue to reinforce our belief that by down-regulating CXCR4/CXCL12 signaling, mavorixafor has the potential to be the first disease-modifying therapy for the more than 3,500 estimated diagnosed and undiagnosed WHIM patients in the U.S. We are eager to continue exploring mavorixafor's compelling clinical profile and, if approved, bring this promising therapy to patients as expeditiously as possible."

About the Phase 2 Trial. The Phase 2 clinical trial enrolled eight patients with a pathogenic CXCR4 mutation, an absolute neutrophil count (ANC) ≤400/μL and/or absolute lymphocyte count (ALC) ≤650/μL. Patients were given doses escalating from 50 mg up to 400 mg mavorixafor orally once daily based on the threshold-adjusted area under the curve for ANC and ALC over 24-hours (AUC_{ANC} and AUC_{ALC}). Primary objectives evaluated safety, tolerability, and the dose required to achieve a consistent increase in circulating neutrophils and lymphocytes. Exploratory objectives evaluated the efficacy of long-term mavorixafor treatment on infection rate, wart burden, white blood cells counts (WBCs), ANCs, ALCs, and absolute monocyte counts (AMCs). The Time Above Threshold for ANC (TAT_{ANC}) was defined as the time, in hours, during which ANC was maintained above 500 cells/μL and TAT_{ALC} as the time, in hours, during which ALC remained above 1,000 cells/μL. Patients were treated up to a maximum duration of 28.6 months with a median of 16.5 months; as of the date of publication, five patients remain on the extension study.

Key Results. In the study, mavorixafor 400 mg once daily was established as a therapeutically effective

dose, demonstrating dose-dependent increases in patients' WBCs, ANCs, ALCs, and AMCs. The 400 mg dose allowed the largest number of patients to increase their AUC_{ANC} and TAT_{ANC}. Mavorixafor significantly reduced the annualized infection rate, with further reductions observed on extended treatment. Mavorixafor effected a 75% reduction in the number of cutaneous warts. To date, mavorixafor has been well tolerated.

What's New in the Publication? The authors provide a detailed description of the pharmacodynamic response to mavorixafor, including patient-level data regarding the effect on neutrophils and lymphocytes. Also presented for the first time is the effect of increasing doses of mavorixafor on total white blood cell counts and monocytes in this population, adding to the understanding of the pleiotropic effect of mavorixafor on multiple cell types. In addition, the manuscript provides the most up-to-date long-term pharmacokinetic data, and, importantly, presents a detailed analysis of the clinical benefit of extended mavorixafor therapy on infections and warts, further substantiating its durable clinical efficacy compared to current therapeutic options for WHIM syndrome.

"Given these clinical data, the demonstrated therapeutic benefit of long-term mavorixafor treatment on infection rate and wart burden, and the favorable tolerability profile seen to date in this trial, we are optimistic that we will see similar results from the ongoing Phase 3 study of mavorixafor in patients with WHIM syndrome," said David C. Dale, M.D., Professor of Medicine at the University of Washington School of Medicine, Seattle, WA, lead investigator of the Phase 2 and Phase 3 clinical trials, and an author of the publication. "With no approved therapies targeting the molecular mechanism of WHIM, I believe mavorixafor represents a promising new hope for WHIM patients."

The full *Blood* manuscript is available here: https://bit.ly/2EZ82XW.

About Mavorixafor in WHIM Syndrome
WHIM is a rare, inherited, primary immunodeficiency disease caused by gain-of-function mutations in the chemokine receptor CXCR4, resulting in a reduced mobilization and trafficking of white blood cells from the bone marrow. The company estimates there to be more than 3,500 diagnosed and undiagnosed WHIM patients in the U.S. As a first-in-class, small-molecule antagonist of chemokine receptor CXCR4, mavorixafor is designed to address the underlying cause of WHIM directly. The candidate is currently being developed as a once-daily oral therapy in the Phase 3 **4WHIM trial**, a 52-week, randomized, double-blind, placebo-controlled, multicenter study designed to evaluate the safety and efficacy of mavorixafor in genetically confirmed WHIM patients. The trial is anticipated to enroll up to 28 subjects in approximately 20 countries, followed by an open-label extension trial. Phase 3 results are expected in 2022.

About X4 Pharmaceuticals
X4 Pharmaceuticals is a late-stage clinical biopharmaceutical company and a leader in the discovery and development of novel therapies for the treatment of diseases resulting from dysfunction of the CXCR4 pathway, with a focus on rare diseases and those with limited treatment options. The company's lead candidate, mavorixafor, is a first-in-class, small molecule antagonist of chemokine receptor CXCR4 being developed as a once-daily oral therapy. X4 believes that inhibition of the CXCR4 receptor creates the potential for mavorixafor to provide therapeutic benefit across a wide variety of diseases, including primary immunodeficiencies and certain types of cancer. The efficacy and safety of mavorixafor, dosed once daily, is currently being evaluated in a global Phase 3 clinical trial in patients with WHIM syndrome, and in two Phase 1b clinical trials – in combination with ibrutinib in patients with Waldenström's macroglobulinemia, and as monotherapy in patients with severe congenital neutropenia (SCN). X4 is continuing to leverage its insights into CXCR4 biology at its corporate headquarters in Cambridge, Massachusetts and at its research facility in Vienna, Austria, and is developing additional product candidates. For more information, please visit **www.x4pharma.com**.

Forward-Looking Statements
This press release contains forward-looking statements within the meaning of the Private Securities

Litigation Reform Act of 1995, as amended. These statements may be identified by the words “may,” “will,” “could,” “would,” “should,” “expect,” “plan,” “anticipate,” “intend,” “believe,” “estimate,” “predict,” “project,” “potential,” “continue,” “target” or other similar terms or expressions that concern X4's expectations, strategy, plans or intentions. Forward-looking statements include, without limitation, statements regarding X4’s plans for clinical development of mavorixafor, including the timing of completion and results of its global Phase 3 clinical trial in patients with WHIM syndrome. Any forward-looking statements in this press release are based on management's current expectations and beliefs. Actual events or results may differ materially from those expressed or implied by any forward-looking statements contained herein, including, without limitation, the risks and uncertainties described in the section entitled “Risk Factors” in X4’s Quarterly Report on Form 10-Q filed with the Securities and Exchange Commission (SEC) on August 4, 2020, and in other filings X4 makes with the SEC from time to time. X4 undertakes no obligation to update the information contained in this press release to reflect new events or circumstances, except as required by law.

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Source: X4 Pharmaceuticals