Ra Pharmaceuticals Announces Positive Top-line Data from Phase 2 Trial of Zilucoplan in Patients with Generalized Myasthenia Gravis

Primary and key secondary endpoints met in a broad spectrum of patients with gMG

Clinically meaningful and statistically significant reductions in both QMG and MG-ADL

Company to host conference call today, December 10, at 8:00 a.m. ET to discuss data

CAMBRIDGE, Mass. – December 10, 2018 – Ra Pharmaceuticals, Inc. (Nasdaq:RARX) today announced positive top-line results from the Company's Phase 2 clinical trial evaluating zilucoplan for the treatment of generalized myasthenia gravis (gMG), achieving clinically meaningful and statistically significant reductions in both the primary and key secondary endpoints for both zilucoplan dose groups tested versus placebo at 12 weeks. Zilucoplan dosed at 0.3 mg/kg subcutaneously (SC) daily achieved a mean reduction from baseline of 6.0 points in the Quantitative Myasthenia Gravis (QMG) score (placebo-corrected change = -2.8; p=0.05) and a mean reduction from baseline of 3.4 points in the MG Activities of Daily Living (MG-ADL) score (placebo-corrected change = -2.3; p=0.04), with no patients treated with the 0.3 mg/kg dose of zilucoplan requiring rescue therapy.

"The rapid, profound, and sustained reductions in QMG and MG-ADL observed in this Phase 2 study confirm that complement inhibition was effective across a wide spectrum of MG patients in this study, whether refractory or non-refractory," said James F. Howard, MD, Distinguished Professor of Neuromuscular Disease and Chief of the Neuromuscular Disorders Section, Department of Neurology, University of North Carolina School of Medicine. "Zilucoplan has the potential to become the first convenient, self-administered, complement inhibitor expanding access for patients living with this chronic, debilitating, neuromuscular disease."

"This represents a potential breakthrough for all patients who are struggling every day with their MG, and seeking more effective and convenient treatment options," said Nancy Law, Chief Executive Officer of the Myasthenia Gravis Foundation of America (MGFA). "This unmet need was highlighted in a recent survey of patients from the MGFA database, where we learned that a majority of patients with MG are not satisfied with their current treatments and are interested in effective, at home, self-injectable treatment options."

Study Design

The Phase 2, multi-center, randomized, double-blind, placebo-controlled trial was designed to evaluate the safety, tolerability, and preliminary efficacy of zilucoplan in patients with gMG, regardless of prior therapies, who had a MGFA Disease Class of II-IVa at screening and a QMG score, a physician-administered assessment of MG-related muscle weakness, of ≥ 12 at screening and randomization. The trial enrolled 44 patients in the U.S. and Canada. At the outset of the 12-week treatment period, patients were randomized in a 1:1:1 ratio to receive daily, SC doses of 0.1 mg/kg of zilucoplan, 0.3 mg/kg of zilucoplan,

or matching placebo. The pre-specified primary efficacy endpoint was the change in QMG score from baseline to week 12. The key secondary efficacy endpoint was the change in MG-ADL score, a patient-reported outcome measure, from baseline to week 12. Significance testing was pre-specified at a 1-sided alpha of 0.1. All 44 patients completed the 12-week study and, of these, 43 (98%) elected to enter a long-term extension to receive active study drug.

Study Results

- The pre-specified primary efficacy endpoint of change from baseline to Week 12 in QMG score was met with zilucoplan dosed at 0.3 mg/kg SC daily, resulting in a clinically meaningful and statistically significant improvement over placebo (QMG reduction from baseline at Week 12 = -6.0; placebo-corrected change in QMG at Week 12 = -2.8; p=0.05).
- The key secondary efficacy endpoint of change from baseline to Week 12 in the MG-ADL score was met with zilucoplan dosed at 0.3 mg/kg SC daily, resulting in a clinically meaningful and statistically significant improvement over placebo (MG-ADL reduction from baseline at Week 12 = -3.4; placebo-corrected change in MG-ADL at Week 12 = -2.3; p=0.04).
- QMG and MG-ADL outcomes for the 0.1 mg/kg SC daily dose were similar to but less pronounced than the 0.3 mg/kg SC daily dose, also achieving pre-specified statistical significance on both endpoints.
- The threshold for statistical significance used in pivotal Phase 3 studies (2-sided $p<0.05$) was achieved in a pre-specified analysis of the pooled active arms versus placebo, which showed a placebo-corrected change in MG-ADL at Week 12 = -2.2 (2-sided p=0.047).
- Rescue therapy with intravenous immunoglobulin or plasma exchange was required by 3/15 (20%) patients in the placebo arm, 1/15 (7%) patients in the 0.1 mg/kg zilucoplan arm, and in zero patients (0%) in the 0.3 mg/kg zilucoplan arm.

Treatment with zilucoplan had a favorable safety and tolerability profile in the study, consistent with previously-completed Phase 1 and Phase 2 studies. The majority of adverse events (AEs) reported were mild and were not considered by the investigators to be related to study drug. There were no serious AEs observed related to treatment with zilucoplan.

Based on these data, Ra Pharma plans to engage with regulatory agencies, including the U.S. Food and Drug Administration (FDA), in the first half of 2019 regarding the design of a Phase 3 clinical trial evaluating the 0.3 mg/kg dose of zilucoplan versus placebo in patients with gMG.

“Since the founding of this Company, our goal has always been to expand patient access to important therapies,” said Doug Treco, Founder and Chief Executive Officer of Ra Pharma. “Designed for subcutaneous self-administration, zilucoplan offers convenience and accessibility, giving it the potential to bring C5 inhibition to the forefront of the treatment paradigm for gMG. We look forward to meeting with regulators to review our Phase 2 data and the design of our planned Phase 3 program with the ultimate goal of transforming the lives of thousands of patients with this disease.”

Ra Pharma plans to present the full data from the trial and additional data from the open-label, long-term extension in association with an upcoming major medical meeting.

Conference Call and Webcast

Date: Monday, December 10, 2018

Time: 8:00 a.m. ET

Telephone Access: Domestic callers, dial (844) 419-1655

International callers, dial (216) 562-0467

Confirmation code: 5059859

Webcast Access: Go to the Investor Relations section of the Ra Pharma website and follow instructions for accessing the live webcast. Please connect to the website at least 15 minutes prior to the start of the conference call to ensure adequate time for any software download that may be necessary.

About gMG

Myasthenia gravis (MG) is a chronic, autoimmune, neuromuscular disease characterized by weakness and fatigue of skeletal muscles. Patients with MG present with muscle weakness that becomes increasingly severe with repeated use and recovers with rest. Weakness can be localized to specific muscles, such as those responsible for eye movements, but often progresses to affect a broader range, including head, limb, and respiratory muscles. This progression is often described as the generalized, or severe, form of the disease. gMG is estimated to affect approximately 60,000 people in the U.S. alone.

About Zilucoplan (formerly RA101495 SC)

Ra Pharma is developing zilucoplan for generalized myasthenia gravis (gMG), paroxysmal nocturnal hemoglobinuria (PNH), and other complement-mediated disorders. The product candidate is designed for convenient, once-daily subcutaneous self-administration. Zilucoplan is a synthetic, macrocyclic peptide discovered using Ra Pharma's powerful proprietary drug discovery technology. The peptide binds complement component 5 (C5) with sub-nanomolar affinity and allosterically inhibits its cleavage into C5a and C5b upon activation of the classical, alternative, or lectin pathways. By binding to a region of C5 corresponding to C5b, zilucoplan is additionally designed to disrupt the interaction between C5b and C6 and prevent assembly of the membrane attack complex. This activity may define an additional, novel mechanism for the inhibition of C5 function.

About Ra Pharmaceuticals

Ra Pharmaceuticals is a clinical stage biopharmaceutical company focusing on the development of next-generation therapeutics for complement-mediated diseases. The Company discovers and develops

peptides and small molecules to target key components of the complement cascade. For more information, please visit: www.rapharma.com.

Forward-Looking Statements

This press release contains "forward-looking statements" within the meaning of the Private Securities Litigation Reform Act of 1995, including, but not limited to, statements regarding our potential to transform treatment paradigms across multiple complement-mediated disorders, the potential safety, efficacy and regulatory and clinical progress of our product candidates, including without limitation zilucoplan, plans to engage with regulatory agencies, beliefs regarding clinical trial data, and plans for the presentation of clinical data. All such forward-looking statements are based on management's current expectations of future events and are subject to a number of risks and uncertainties that could cause actual results to differ materially and adversely from those set forth in or implied by such forward-looking statements. These risks and uncertainties include the risks that Ra Pharma's product candidates, including zilucoplan, will not successfully be developed or commercialized, in the timeframe we expect or at all; the risk that top-line results as of December 10, 2018 from the Company's global Phase 2 clinical program evaluating zilucoplan for the treatment of gMG may not be indicative of final study results; as well as the other factors discussed in the "Risk Factors" section in Ra Pharma's most recently filed Annual Report on Form 10-K, as well as other risks detailed in Ra Pharma's subsequent filings with the Securities and Exchange Commission. There can be no assurance that the actual results or developments anticipated by Ra Pharma will be realized or, even if substantially realized, that they will have the expected consequences to, or effects on, Ra Pharma. All information in this press release is as of the date of the release, and Ra Pharma undertakes no duty to update this information unless required by law.

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