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Atara Biotherapeutics Presents Data Demonstrating Safety & Sustained Disability Improvement at 12 Months with ATA188 in Patients with Progressive Multiple Sclerosis in Late-Breaking e-Poster at the 2020 European Academy of Neurology Virtual Congress

Sustained Disability Improvements Seen at Six Months Were Maintained at 12 Months with ATA188

Potential Therapeutic Response with ATA188 Supports Role of Epstein-Barr Virus (EBV) in Pathogenesis of MS

Conference Call and Webcast Today, May 26, 2020 at 8:00 a.m. EDT/2:00 p.m. CEST

SOUTH SAN FRANCISCO, Calif.--(BUSINESS WIRE)-- Atara Biotherapeutics, Inc. (Nasdaq: ATRA), a pioneer in T-cell immunotherapy leveraging its novel allogeneic EBV T-cell platform to develop treatments for patients with severe diseases, including solid tumors, hematologic cancers and autoimmune disease, today announced the presentation of additional safety and efficacy data from its ongoing Phase 1 study of ATA188 for the treatment of progressive forms of multiple sclerosis (MS). ATA188 is an off-the-shelf, allogeneic EBV-specific T-cell immunotherapy. These data demonstrate that ATA188 was well-tolerated across all four dose cohorts; there was a higher proportion of patients showing sustained disability improvements with increasing dose, and sustained disability improvements seen at six months were maintained at 12 months in all three cohorts that have reached the 12-month time point in the study. The results are featured in a late-breaking e-poster at the 6th Congress of the European Academy of Neurology (EAN) virtual meeting, held on May 23-26, 2020.

Though the development of MS likely requires more than a single causative factor, EBV is the only risk factor identified to date that appears to be necessary for MS.[4] Evidence demonstrates that 100 percent of patients with MS have been exposed to EBV.[1-4,7] EBV-infected cells, particularly B memory cells which have become immortalized with EBV infection, are thought to play an important role in the immune cascade responsible for both relapsing and progressive forms of MS. The success of interventions that deplete all peripheral B cells underscores the importance of these cells in MS pathophysiology. ATA188 offers a unique approach with the advantage of selectively targeting EBV-infected B cells and plasma cells in the circulation and in the central nervous system (CNS).

“The approach of targeting EBV-infected B cells has led to very encouraging preliminary results, as ATA188 proved to be safe and well-tolerated across all four dose cohorts in this Phase 1a study,” said Lawrence Steinman, MD, Professor of Neurology and Neurological Sciences, Pediatrics and Genetics, Stanford University. “These results, along with the observed trend in sustained disability improvements seen at six months and maintained at 12 months, highlight the opportunity to advance into the randomized placebo-controlled study of ATA188 for the treatment of patients with progressive MS.”

This Phase 1a multicenter, open-label study of ATA188 in patients with progressive forms of MS was designed to establish safety and tolerability, to select the recommended dose for the randomized placebo-controlled Phase 1b study, and to assess potential efficacy. Patients were treated across four dose-escalating cohorts (5×10^6, 1×10^7, 2×10^7 and 4×10^7 cells), with six patients each in cohorts 1-3 and seven patients in cohort 4.

The study found that across the four dose cohorts, ATA188 was well-tolerated in patients with progressive forms of MS. No dose-limiting toxicities and no fatal adverse events (AEs) have been reported. Rhinorrhea (runny nose) is the only treatment-related event that occurred in more than one subject. No dose-related safety trends were identified across cohorts. Additionally, ATA188 infusion shows no clinically meaningful effect on cytokine levels post-infusion.

Patients in the study were assessed on MS-focused clinical measures at three-, six- and 12-month time points. Composite scales of clinical outcome and of sustained disability improvement (SDI) were evaluated in patients receiving all six doses of ATA188, which includes cohorts 1-4 at six months (n=24) and cohorts 1-3 at 12 months (n=17). Sustained Disability Improvement is defined as clinically significant improvement in Expanded Disability Status Scale (EDSS) or timed 25-foot walk (T25FW) observed on two consecutive time points.

All patients in cohorts 1-3 of this Phase 1 study showing SDI at six months, maintained improvement through 12 months. For a patient to achieve SDI, it was required that they have sustained improvement on a composite of clinically significant improvement in EDSS or T25FW, confirmed at consecutive time points. This means that to achieve SDI at six months, there had to be disability improvement at three months that was confirmed at six months, and to achieve SDI at 12 months, there had to be disability improvement at six months that was confirmed at 12 months. Additionally, a dose-related increase in the number of patients with SDI was observed.

Cohorts 1 and 2 each had one patient with SDI at 6 months while Cohorts 3 and 4 each had two patients with SDI at 6 months. All patients in Cohorts 1-3 with SDI at six months, maintained SDI at 12 months (Cohort 4 patients have not yet reached the 12-month time point). Of note, in Cohort 3, a third patient had SDI at 12 months. EDSS was the main driver of SDI.

A dose-related trend of a higher proportion of patients showing favorable clinical improvement through a second composite scale, designed to detect early signals of efficacy, was also observed. The second composite scale is an a priori classification of patient outcomes incorporating seven clinically recognized scales for MS symptoms, function, and disability. Both composite scales suggest a potential therapeutic response of ATA188 in the

treatment of progressive forms of MS. Based on these results, the cohort 3 dose was selected for the randomized, placebo-controlled Phase 1b study.

“Although some treatments may delay disability progression in progressive MS, there are currently no treatment options in progressive MS that halt or reverse the progression of disease. Therapies that either halt disability progression or improve disability could be very meaningful for MS patients,” said Dr. Steinman. “If these data are confirmed in a double-blind, placebo-controlled, randomized study, we could see an evolution in the treatment paradigm for progressive MS and other forms of this debilitating disease.”

Atara has now advanced into the Phase 1b double-blind randomized placebo-controlled study, which has resumed enrollment activities after a brief COVID-19-related pause. In addition to measuring disability progression, the study will also evaluate many facets of the disease, including: cognition and outpatient ambulatory activity; fatigue, and biological end points in blood and cerebrospinal fluid/CSF (IgG, synthesis and index, OCBs, product kinetics); and MRI imaging.

In addition to the clinical data reported at EAN, preclinical translational data published online at the 2020 Academy of Neurology (AAN) 72nd Annual Meeting further support the proposed mechanism of action of ATA188 targeting EBV-infected B cells. These combined analyses of T cells comprising ATA188 are consistent with its proposed mechanism of targeting EBV-infected B cells by recognizing MS-relevant EBV antigens on these cells via defined T-cell receptors (TCRs).

“The body of evidence supporting the important role of EBV-infected B cells in the chronic autoimmune pathology of MS continues to grow, including these encouraging late-breaking Phase 1 data at EAN showing sustained disability improvements in progressive MS patients treated with ATA188,” said AJ Joshi, MD, Senior Vice President and Chief Medical Officer of Atara Biotherapeutics. “We look forward to the continued study of ATA188 in progressive MS, and believe our novel therapeutic approach targeting the EBV-infected B cell as a propagator of autoimmunity may help patients with other forms of MS and potentially other autoimmune conditions where EBV has been implicated, including lupus, rheumatoid arthritis, and Sjögren’s syndrome.**”**

Atara Conference Call and Webcast Information

Atara will hold a conference call at 8:00 a.m. EDT/2:00 p.m. CEST for analysts and investors to review the data, current disease and treatment landscape, and Atara’s continued plans for the ATA188 program. The call will include:

- Lawrence Steinman, MD, Professor of Neurology and Neurological Sciences, Pediatrics and Genetics, Stanford University
- Pascal Touchon, President and Chief Executive Officer, Atara Biotherapeutics
- Jakob Dupont, MD, Executive Vice President, Global Head of Research and Development, Atara Biotherapeutics
- AJ Joshi, MD, Senior Vice President and Chief Medical Officer, Atara Biotherapeutics

Analysts and investors can participate in the conference call by dialing (888) 540-6216 for domestic callers and (734) 385-2715 for international callers, using the conference ID 3665248. A live audio webcast can be accessed by visiting the Investors & Media – News &

Events section of atarabio.com. An archived replay will be available on the Company's website for 30 days following the live webcast.

Details of the 2020 EAN Virtual Congress Late-Breaking Presentation
Title: Phase 1 study of the safety and efficacy of ATA188, an off-the-shelf, allogeneic Epstein-Barr virus-targeted T-cell immunotherapy to treat progressive forms of multiple sclerosis
Poster #: LB130
Poster
Session: EPO400

About Multiple Sclerosis (MS)

MS is a chronic neurological autoimmune disease that affects an estimated 2.3 million people around the world. Relapsing-remitting MS (RRMS) is the most common form of MS and is characterized by episodes of new or worsening signs or symptoms (relapses) followed by periods of recovery. Despite available disease-modifying treatments, most individuals with RRMS continue to experience disease activity and disability progression.

Progressive MS (PMS) is a severe form of the disease with few therapeutic options. PMS comprises two conditions, both characterized by persistent progression and worsening of MS symptoms and physical disability over time. Primary progressive MS (PPMS) occurs when continuous progressive disease is present at diagnosis and occurs in approximately 15% of newly diagnosed cases. Secondary progressive MS (SPMS) initially begins as RRMS and develops into a progressive form. Up to 80 percent of people with RRMS will eventually develop SPMS. There is substantial unmet medical need for new and effective therapies for patients with PPMS and SPMS. Most treatment options that work well in reducing flares in RRMS have not been shown to be effective in slowing or reversing disability in PMS.

About EBV in MS

Two decades of converging epidemiological, histological, and molecular evidence strongly support the role of EBV infection as a prerequisite for MS—MS likely does not develop in the absence of EBV infection.[5] While several hypotheses have been proposed to explain the pathophysiology of EBV in MS, the autoreactive B cell hypothesis provides unifying principles based on the concept that defective elimination of EBV-infected autoreactive B cells by CD8+ T cells results in their accumulation in lymphoid structures and target organs implicated in MS, including the central nervous system leading to inflammation.[6] This aberrant inflammation eventually leads to demyelination and axon destruction. For progressive MS, there is a significant unmet need for high-efficacy neuroprotective therapies that work directly in the central nervous system, and have the potential to delay, stop, or reverse disease progression, as well as the accumulation of permanent disability. It is hypothesized that the depletion of autoreactive EBV-infected B cells and plasma cells in the central nervous system may address a key factor involved in the development of progressive MS and result in clinically meaningful results for patients.

About ATA188

Epstein-Barr Virus (EBV) is associated with a wide range of hematologic malignancies and solid tumors, as well as certain autoimmune conditions such as multiple sclerosis (MS). T

cells are a critical component of the body's immune system and can selectively target EBV believed to be important in the pathogenesis of MS.

Off-the-shelf, investigational ATA188, has the potential to target EBV-infected B cells and plasma cells in the central nervous system that may catalyze autoimmune responses and MS pathophysiology.

Atara is advancing a Phase 1 ATA188 clinical study in patients with progressive MS across clinical sites in the U.S. and Australia.

For more information about the ATA188 Phase 1 study, please visit ClinicalTrials.gov (NCT03283826).

About Atara Biotherapeutics, Inc.

Atara Biotherapeutics, Inc. (@Atarabio) is a pioneer in T-cell immunotherapy leveraging its novel allogeneic EBV T-cell platform to develop transformative therapies for patients with severe diseases including solid tumors, hematologic cancers and autoimmune disease. With our lead program in Phase 3 clinical development, Atara is the most advanced allogeneic T-cell immunotherapy company and intends to rapidly deliver off-the-shelf treatments to patients with high unmet medical need. Our platform leverages the unique biology of EBV T cells and has the capability to treat a wide range of EBV-associated diseases, or other severe diseases through incorporation of engineered CARs (chimeric antigen receptors) or TCRs (T-cell receptors). Atara is applying this one platform to create a robust pipeline including: tab-cel® (tabelecleucel) in Phase 3 development for Epstein-Barr virus-driven post-transplant lymphoproliferative disease (EBV+ PTLD); ATA188, a T-cell immunotherapy targeting EBV antigens as a potential treatment for multiple sclerosis; and multiple next-generation chimeric antigen receptor T-cell (CAR-T) immunotherapies for both solid tumors and hematologic malignancies. Improving patients' lives is our mission and we will never stop working to bring transformative therapies to those in need. Atara is headquartered in South San Francisco and our leading-edge research, development and manufacturing facility is based in Thousand Oaks, California. For additional information about the company, please visit atarabio.com and follow us on Twitter and LinkedIn.

References

[1]Dobson R, et al. Epstein-Barr-negative MS: a true phenomenon?*Neurol Neuroimmunol Neuroinflamm*. 2017;4:1-4.

[2]Pakpoor J, et al. The risk of developing multiple sclerosis in individuals seronegative for Epstein-Barr virus: a meta-analysis. *Mult Scler*. 2012;19:162-166.

[3]Ruprecht K. Absence of Epstein-Barr virus seronegativity in a large cohort of patients with early multiple sclerosis. Presented at: ECTRIMS; October 10-12, 2018; Berlin, Germany. Abstract 320.

[4]Abrahamyan S, et al. Complete Epstein-Barr virus seropositivity in a large cohort of patients with early multiple sclerosis. *J Neurol Neurosurg Psychiatry.* 2020 May 5. [Epub ahead of print]

[5] Bar-Or A, et al. Epstein-Barr Virus in Multiple Sclerosis: Theory and Emerging Immunotherapies. *Trends Mol Med*. 2020;26:296-310.

[6] Pender MP. Infection of autoreactive B lymphocytes with EBV, causing chronic autoimmune diseases. *Trends Immunol*. 2003;24:584-588.

[7] Bar-Or A, et al. Phase 1 Study of the Safety and Efficacy of ATA188, an Off-the-shelf, Allogeneic Epstein-Barr Virus-targeted T-cell Immunotherapy to Treat Progressive Forms of Multiple Sclerosis. Presented at: EAN; May 23-26, 2020; Virtual from Vienna, Austria. EPO130.

Forward-Looking Statements

This press release contains or may imply "forward-looking statements" within the meaning of Section 27A of the Securities Act of 1933 and Section 21E of the Securities Exchange Act of 1934. For example, forward-looking statements include statements regarding: the potential safety and efficacy of ATA188; the resumption of screening and enrollment of patients in Atara's Phase 1b study of ATA188; Atara's ability to successfully advance the development of ATA188; and the potential for Atara's therapeutic approach to treat various specified conditions. Because such statements deal with future events and are based on Atara Biotherapeutics' current expectations, they are subject to various risks and uncertainties and actual results, performance or achievements of Atara Biotherapeutics could differ materially from those described in or implied by the statements in this press release. These forward-looking statements are subject to risks and uncertainties, including those discussed in Atara Biotherapeutics' filings with the Securities and Exchange Commission (SEC), including in the "Risk Factors" and "Management's Discussion and Analysis of Financial Condition and Results of Operations" sections of the Company's most recently filed periodic reports on Form 10-K and Form 10-Q and subsequent filings and in the documents incorporated by reference therein. Except as otherwise required by law, Atara Biotherapeutics disclaims any intention or obligation to update or revise any forward-looking statements, which speak only as of the date hereof, whether as a result of new information, future events or circumstances or otherwise.

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