

AVI BioPharma Phase 1 Proof of Concept and Safety Data for AVI-4658 in Duchenne Muscular Dystrophy Featured in Lancet Neurology

AVI-4658 Demonstrates Compelling Proof of Concept and Safety Profile for Pediatric Patients with DMD; Findings Support Progression to Current Systemic Use Trial

For Immediate Release

BOTHELL, WA — Aug. 25, 2009 — AVI BioPharma, Inc. (Nasdaq: AVII), a developer of RNA-based drugs, today announced that the results and scientific findings of its Phase 1 clinical trial assessing the "proof of concept" and safety of AVI-4658 in patients with Duchenne Muscular Dystrophy (DMD) have been published online in the journal, *Lancet Neurology*. DMD is an incurable muscle-wasting disease associated with errors in the gene that makes dystrophin. These findings, which show that treatment with AVI-4658 was safe and effective in inducing dystrophin expression, suggest that AVI-4658 could have promise as a drug for the treatment of DMD. The paper will be published in the October print issue of the journal.

The paper, "Local restoration of dystrophin expression with the morpholino oligomer AVI-4658 in Duchenne muscular dystrophy: a single-blind, placebo-controlled, dose-escalation, proof-of-concept study," was authored by AVI and a group of preeminent DMD researchers including Professor Francesco Muntoni, the principal investigator of the UK MDEX Consortium. The publication was featured in the journal along with commentary and review from scientists at the Leiden University Medical Center. This external review explored AVI's data in comparison to similar recent antisense technology findings, with an alternative chemistry, and ultimately underscored the overall therapeutic potential of antisense technology in this indication and, importantly, the need for a safe antisense therapy that could be dosed at effective levels for lifelong use in pediatric patients living with DMD.

"We are extremely excited by these promising data for AVI-4658 in patients with DMD, which further validate the excellent safety of our extensively studied core chemistry around phosphorodiamidate morpholino oligomers, or PMOs," said Dr. Stephen B. Shrewsbury, Chief Medical Officer and Senior Vice President of Preclinical, Clinical and Regulatory Affairs of AVI. "We believe that these data and our additional findings to be presented at the upcoming 14th Annual International Congress of the World Muscle Society will provide the DMD community with the opportunity to fully understand the promising safety and efficacy of the PMO therapies being developed for chronic, lifelong use in children living with DMD."

The *Lancet Neurology* publication details AVI's Phase 1 study, in which Professor Muntoni and his team conducted a single blind, placebo-controlled, dose escalation study in DMD patients to assess the safety and proof of concept of a single intramuscular administration of AVI-4658 into a small foot muscle - the extensor digitorum brevis (EDB). Biopsies of placebo and drug-treated muscles from each patient were conducted approximately three to four weeks following this intramuscular injection. The primary endpoint of the trial was to determine safety and tolerability,

especially in terms of the potential for an immune response to newly expressed dystrophin induced by the ability of AVI-4658 to skip exon 51 and so enable protein expression. The findings of the study show that there were no drug related serious adverse events in the study, no adverse event signal related to the administration of study drug AVI-4658 and no observed immune response to the newly expressed dystrophin. This PMO therapy induced detectable exon skipping at a very low drug dose of 0.09 mg and at the 0.9 mg dose the skipping of exon 51 led to high levels of dystrophin expression, compared to the placebo-treated muscle on the other foot. It is important to note that the dystrophin levels achieved per cell - up to 42 percent of those found in healthy muscle - exceeded the levels reported from a recent 2'O-Methyl-oligonucleotide (2'O-Me) DMD clinical trial referenced in the external review by the Leiden University Medical College researchers.

"The growing body of promising data for potential treatments for DMD is a significant milestone in and of itself and one that we are extremely encouraged to see realized," said Nick Catlin, Chief Executive Officer of Action Duchenne, a leading UK charity dedicated to increasing awareness, engendering action and raising funds to find a cure for DMD. "Action Duchenne believes that these results from AVI are promising and we are excited to be working with the company and supporting its research through Action Duchenne funding. We are pleased that DMD patients and their families are beginning to see long-awaited movement toward a potential safe, well tolerated and effective therapy for this devastating disease."

AVI also announced today that it will present these Phase 1 data at the 14th International Congress of the World Muscle Society, along with late-breaking, preliminary data from its currently ongoing Phase 1b/2 clinical trial evaluating the systemic administration of AVI-4658 in boys with DMD. These preliminary findings from the ongoing trial continue to confirm the excellent safety record of PMO therapy, validate AVI's novel approach to treating DMD with this PMO class and show that AVI-4658 has been very well tolerated by DMD patients in the first two completed dosing cohorts in the trial. There have been no serious adverse events or drug-related adverse events identified and the independent Data Safety Monitoring Board has approved each of the AVI trial's dose escalations. Dosing at 4mg/kg is ongoing. In the coming weeks, AVI expects to escalate to two higher doses - 10 and 20 mg/kg - which, at 12 weeks duration, will exceed both the dose levels and the duration of dosing previously studied elsewhere with the alternative 2'O-Me approach. AVI believes that this encouraging and growing safety profile, duration of exposure and approved dose escalations are extremely important clinical advances for its PMO chemistry approach as any dose-limiting toxicity, especially after only short-term exposure, could severely limit the effectiveness of a DMD therapy in this chronic condition where treatment must continue for life.

"These data are both important and timely and we at AVI believe that we could be at a critical juncture in the treatment of this debilitating and fatal disease," said Dr. Leslie Hudson, President and Chief Executive Officer of AVI. "We are pleased to have the support of Action Duchenne and other research and patient organizations that are committed to accelerating the development of safe and effective drugs for DMD patients. Further, we are eager to continue our work with our clinical collaborators and the U.S. and European regulatory authorities as we work to develop AVI-4658 - which has both orphan drug and fast track status - as safely and expeditiously as possible."

The currently ongoing Phase 1b/2 dose-finding clinical trial is evaluating the systemic delivery of AVI-4658. This is an open label, 12-week safety trial, which includes measures of drug efficacy and pharmacokinetics and is being conducted in London, UK at the UCL Institute of Child Health

/ Great Ormond Street Hospital NHS Trust facilities and at the Royal Victoria Infirmary, Newcastle-Upon-Tyne, UK which is the coordinating center for the European Treat Neuromuscular Diseases (Treat-NMD) initiative. The clinical costs for the trial are provided, in part, by the UK Medical Research Council.

About Duchenne Muscular Dystrophy (DMD)

DMD is one of the most common fatal genetic disorders to affect children around the world. Approximately one in every 3,500 boys worldwide is afflicted with Duchenne Muscular Dystrophy with 20,000 new cases reported each year. It is a devastating and incurable muscle-wasting disease associated with specific inborn errors in the gene that codes for dystrophin, a protein that plays a key structural role in muscle fiber function. Symptoms usually appear in male children by age three. Progressive muscle weakness of the legs and pelvis eventually spreads to the arms, neck, and other areas. By age 10, braces may be required for walking, and most patients are confined to a wheelchair by age 12. Eventually, this progresses to complete paralysis and increasing difficulty in breathing, requiring ventilatory support. The condition is terminal and death usually occurs before the age of 30. The outpatient cost of care for a non-ambulatory DMD boy is among the highest of any disease. There is currently no cure for DMD, but for the first time ever, there are promising therapies in or moving into clinical development.

About the MDEX Consortium

The MDEX consortium led by Professor Francesco Muntoni, is a multidisciplinary enterprise to promote translational research into muscular dystrophies, and is formed by the clinical groups of Professor Francesco Muntoni (UCL Institute of Child Health) and Professor Kate Bushby and Professor Volker Straub (Newcastle University), and scientists from Imperial College London (Professor Dominic Wells), UCL Institute of Child Health (Dr. Jennifer Morgan), Royal Holloway University of London (Professor George Dickson), Oxford University (Dr. Matthew Wood) and University of Western Australia (Professor Steve Wilton). In addition, the charities Muscular Dystrophy Campaign (MDC), Action Duchenne and Duchenne Family Support Group also participate in the Consortium. For more information, visit www.mdex.org.uk.

About AVI BioPharma

AVI BioPharma is focused on the discovery and development of RNA-based drugs utilizing proprietary derivatives of its antisense chemistry (morpholino-modified phosphorodiamidate oligomers or PMOs) that can be applied to a wide range of diseases and genetic disorders through several distinct mechanisms of action. Unlike other RNA therapeutic approaches, AVI's antisense technology has been used to directly target both messenger RNA (mRNA) and its precursor (pre-mRNA), allowing for both up- and down-regulation of targeted genes and proteins. AVI's RNA-based drug programs are being evaluated for the treatment of Duchenne muscular dystrophy as well as for the treatment of cardiovascular restenosis through our partner Global Therapeutics, a Cook Group Company. AVI's antiviral programs have demonstrated promising outcomes in Ebola Zaire and Marburg Musoke virus infections and may prove applicable to other viral targets such as HCV or Dengue viruses. For more information, visit www.avibio.com