Positive clinical data at AAN 2019 reinforces Ionis' commitment to delivering life-changing medicines to patients with neurological diseases

May 1, 2019

Twelve presentations highlighting transformational medicines for SMA, hATTR, Huntington's disease, ALS, prion disease and others

Updates on RG6042 (IONIS-HTTRx) and tofersen (IONIS-SOD1Rx), two of at least four antisense medicines entering Phase 3 studies in 2019

Webcast to discuss neurological disease programs scheduled for Tuesday, May 7 at 1:30 pm ET

CARLSBAD, Calif., May 1, 2019 /PRNewswire/ -- Ionis Pharmaceuticals, Inc. (NASDAQ: IONS), the leader in RNA-targeted therapeutics, today announced that Ionis, its collaborators and Ionis' affiliate, Akcea Therapeutics, will present data on SPINRAZA® (nusinersen), TEGSEDI™ (inotersen) and other important Ionis research and development programs for neurological diseases at the 71stAmerican Academy of Neurology (AAN) Annual Meeting in Philadelphia, Pennsylvania, May 4-10, 2019. Ionis' first and best-in-class therapies for neurological diseases reflect the platform's unique ability to address a large number of previously untreatable diseases. The breadth and depth of the data at AAN underscores Ionis' commitment to the discovery and development of transformational antisense medicines for patients with neurological diseases.

Data and topics covered in the platform presentations and posters will include:

- The therapeutic potential of tofersen (also known as IONIS-SOD1$_{Rx}$ and BIIB067) in a single and multiple dose Phase 1/2 study in patients with amyotrophic lateral sclerosis (ALS)
- The strategy for identifying the optimum dose and dosing schedule for the RG6042 pivotal program to potentially maximize clinical benefit for patients with Huntington's Disease (HD)
- The benefits SPINRAZA® (nusinersen) provides for individuals with spinal muscular atrophy (SMA) across a broad range of the disease from infants to older patients, reinforcing SPINRAZA as the trusted standard of care for all patients with SMA
- An update on the long-term efficacy and safety analyses of the NEURO-TTR open-label extension study in patients living with polyneuropathy caused by hereditary transthyretin amyloidosis (hATTR)
- The observed survival benefit associated with prion protein (PrP) reductions in animal models with prion disease following treatment with PrP-targeting antisense oligonucleotides

Following is a schedule of Ionis and collaborator presentations (All times listed are in Eastern Time):

Emerging Science Session:

- Tuesday, May 7, 11:45 a.m.-12:20 p.m. 'Safety, PK, PD, and exploratory efficacy in single and multiple dose study of a SOD1 antisense oligonucleotide (BIIB067) administered to participants with ALS'

Oral Presentations:

- Sunday, May 5, 4:03 p.m.-4:14 p.m. 'Development of antisense oligonucleotides for prion disease'
- Monday, May 6, 1:44 p.m.-1:55 p.m. 'Translational Pharmacokinetic/Pharmacodynamic (PK/PD) Modeling Strategy to Support RG6042 Dose Selection in Huntington's Disease (HD)'
- Tuesday, May 7, 1:00 p.m.-1:11 p.m. 'Nusinersen in Infants Who Initiate Treatment in a Presymptomatic Stage of Spinal Muscular Atrophy (SMA): Interim Efficacy and Safety Results from the Phase 2 NURTURE Study'
- Tuesday, May 7, 1:33 p.m.-1:44 p.m. 'Interim Report on the Safety and Efficacy of Longer-Term Treatment with Nusinersen in Infantile-Onset Spinal Muscular Atrophy (SMA): Updated Results from the SHINE Study'
- Tuesday, May 7, 2:17 p.m.-2:28 p.m. 'Long-Term Efficacy and Safety of Inotersen for Hereditary Transthyretin Amyloidosis: NEURO-TTR Open-Label Extension 2-Year Update'
- Tuesday, May 7, 2:28 p.m.-2:39 p.m. 'Association of Phosphorylated Neurofilament Heavy Chain (pNF-H) Levels with Motor Function Achievement in Individuals with Spinal Muscular Atrophy (SMA) Treated with Nusinersen'

Poster Presentations:

- Sunday, May 5, 11:30 a.m.-6:30 p.m. 'Preliminary Reliability and Validity of a Novel Digital Biomarker Smartphone Application to Assess Cognitive and Motor Symptoms in Huntington's Disease (HD)'
- Sunday, May 5, 11:30 a.m.-6:30 p.m. 'Interim Report on the Safety and Efficacy of Longer-term Treatment with Nusinersen in Later-onset Spinal Muscular Atrophy (SMA): Results from the SHINE Study'
- Tuesday, May 7, 11:30 a.m.-6:30 p.m. 'Responsiveness of Neuropathy Symptom and Change (NSC) Score Components in Inotersen Treatment of Hereditary Transthyretin Amyloidosis Polyneuropathy'
- Tuesday, May 7, 11:30 a.m.-6:30 p.m. 'Quality of Life (QOL) in Patients with Transthyretin Amyloidosis Accompanied by Peripheral Neuropathy (PN)'
- Tuesday, May 7, 11:30 a.m.-6:30 p.m. 'The Impact of Hereditary Transthyretin Amyloidosis (hATTR) on Work: The Patients' Perspectives'

Complete abstracts, details on presentation times and changes to presentation dates can be found on the AAN website. The above listed dates are subject to change. Please check www.aan.com for the latest information.

Ionis Neuro Franchise Webcast
Ionis will hold a webcast in conjunction with the 2019 AAN Annual Meeting on May 7 at 1:30 p.m. ET. Interested parties may listen to the event by dialing 877-443-5662 or access the webcast at www.ionispharma.com. A webcast replay will be available for a limited time at the same address.

About Ionis Pharmaceuticals, Inc.
As the leader in RNA-targeted drug discovery and development, Ionis has created an efficient, broadly applicable, drug discovery platform called antisense technology that can treat diseases where no other therapeutic approaches have proven effective. Our drug discovery platform has served as a springboard for actionable promise and realized hope for patients with unmet needs. We created the first and only approved treatment for children and adults with spinal muscular atrophy as well as the world's first RNA-targeted therapeutic approved for the treatment of polyneuropathy in adults with hereditary transthyretin amyloidosis. Our sights are set on all the patients we have yet to reach with a pipeline of more than 40 novel medicines designed to treat a broad range of diseases including cardiovascular diseases, neurological diseases, infectious diseases, pulmonary diseases and cancer.

To learn more about Ionis follow us on twitter @ionispharma or visit www.ionispharma.com.

Ionis' Forward-looking Statement
This press release includes forward-looking statements regarding Ionis' business, and the therapeutic and commercial potential of SPINRAZA®, TEGSEDI™ (inotersen), WAYLIVRA™ (volanesorsen) and Ionis' technologies and products in development, including the business of Akcea Therapeutics, Inc., Ionis' majority owned affiliate. Any statement describing Ionis' goals, expectations, financial or other projections, intentions or beliefs is a forward-looking statement and should be considered an at-risk statement. Such statements are subject to certain risks and uncertainties, particularly those inherent in the process of discovering, developing and commercializing drugs that are safe and effective for use as human therapeutics, and in the endeavor of building a business around such drugs. Ionis' forward-looking statements also involve assumptions that, if they never materialize or prove correct, could cause its results to differ materially from those expressed or implied by such forward-looking statements. Although Ionis' forward-looking statements reflect the good faith judgment of its management, these statements are based only on facts and factors currently known by Ionis. As a result, you are cautioned not to rely on these forward-looking statements. These and other risks concerning Ionis' programs are described in additional detail in Ionis' annual report on Form 10-K for the year ended December 31, 2018, which is on file with the SEC. Copies of this and other documents are available from the Company.

In this press release, unless the context requires otherwise, "Ionis," "Company," "we," "our," and "us" refers to Ionis Pharmaceuticals and its subsidiaries.

View original content to download multimedia:http://www.prnewswire.com/news-releases/positive-clinical-data-at-aan-2019-reinforces-ionis-commitment-to-delivering-life-changing-medicines-to-patients-with-neurological-diseases-300841532.html

SOURCE Ionis Pharmaceuticals, Inc.

Ionis Pharmaceuticals Investor Contact: D. Wade Walke, Ph.D., Vice President, Investor Relations, 760-603-2741; or Ionis Pharmaceuticals Media Contact: Roslyn Patterson, Vice President, Corporate Communications, 760-603-2681