Neurocrine Biosciences and Voyager Therapeutics Announce Phase I Results for VY-AADC in Patients with Parkinson's Disease at the American Academy of Neurology Annual Meeting

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- ***Results Confirm the Posterior Trajectory as an Additional Surgical Delivery Route for VY-AADC in Patients with Parkinson's Disease***
- ***Treatment with VY-AADC Improved Good ON Time (ON Time Without Troublesome Dyskinesia) by 1.7 Hours and Reduced OFF Time by 2.2 Hours at 12 Months in Patients with Parkinson's Disease***

SAN DIEGO and CAMBRIDGE, Mass., May 05, 2019 (GLOBE NEWSWIRE) -- Neurocrine Biosciences, Inc. (NASDAQ: NBIX) and Voyager Therapeutics, Inc. (NASDAQ: VYGR) today announced Phase I trial results for VY-AADC from eight patients with Parkinson's disease who participated in the open-label trial to evaluate the safety and efficacy of VY-AADC and to further assess the posterior (i.e., from the back of the head) surgical delivery approach. These Phase I results are being presented today as a poster presentation at the 2019 American Academy of Neurology (AAN) Annual Meeting. Parkinson's disease is a chronic, progressive and debilitating neurodegenerative disorder that affects approximately one million people in the U.S.[1]

Treatment with VY-AADC improved good ON time (ON time without troublesome dyskinesia) by 1.7 hours from baseline and reduced OFF time by 2.2 hours at 12 months from baseline in patients with Parkinson's disease. Exploratory analyses in four of the eight patients with low or no dyskinesia or absence of impulse control disorder (ICD) at baseline demonstrated a greater improvement in motor function including a 3.2-hour improvement in good ON time from baseline to 12 months. Infusions of VY-AADC were well tolerated with no serious adverse events (SAEs) reported. These Phase I results show that the posterior trajectory is an additional surgical delivery route in patients with Parkinson's disease.

"The results from this Phase I trial in patients with Parkinson's disease provide further evidence that VY-AADC administration can allow neurons in the brain to convert levodopa to dopamine and improve motor function," said Eiry Roberts, M.D., Chief Medical Officer at Neurocrine Biosciences. "The results from this trial confirm previous data from a separate, ongoing Phase I study demonstrating that increased coverage of the putamen with VY-AADC leads to an increase in AADC enzyme activity and improvements in motor function and quality of life in patients with Parkinson's disease – with less need for oral levodopa medication."

VY-AADC Motor Function Results from the Phase I (PD-1102) Trial

The PD-1102 trial includes eight patients with advanced Parkinson's disease. On average, patients' baseline characteristics in PD-1102 were consistent with patients' baseline from a separate, ongoing Phase Ib trial (PD-1101) employing a frontal (i.e., from the top of the head) surgical delivery approach. Two patients in PD-1102 were identified as having impulse control disorder while no patients were identified as having impulse control disorder in PD-1101. At baseline, patients' mean good ON time was 9.1 hours and mean OFF time was 6.8 hours.

Administration of VY-AADC with the posterior trajectory resulted in a mean coverage of the putamen of 54% and reduced the infusion time by approximately two hours (from 5.2 hours to 3.1 hours) compared to PD-1101. In PD-1102, treatment with VY-AADC increased AADC enzyme activity in the putamen as measured by positron emission tomography (PET) using [^{18}F] fluorodopa (or ^{18}F-DOPA) by 85%. AADC enzyme activity in the putamen as measured by PET using ^{18}F-DOPA reflects the capacity of neurons in the brain to convert levodopa to dopamine.

Treatment with VY-AADC improved patients' motor function from baseline to twelve months across multiple assessments. These assessments include patient self-reported diary entries of ON and OFF times (including good ON time), Unified Parkinson's Disease Rating Scales, and activities of daily living measures. In addition, patients' reported an ability to maintain motor function with less Parkinson's disease medication, as patients' reported a mean 28% reduction in the dosage of Parkinson's disease medication (measured as levodopa equivalents) at six months and at 12 months from a baseline mean of 1,500 mg/day.

Treatment with VY-AADC improved patients' good ON time by 1.7 hours from baseline and reduced OFF time by 2.2 hours from baseline to 12 months. Exploratory analyses in PD-1101 suggested that patients with high dyskinesia or an ICD at baseline may show different outcomes, especially in patient-reported diary measures. A clinical assessment of the subgroup of patients (n=4) with no or low baseline dyskinesia as measured by the Unified Dyskinesia Rating Scale score (≤ 30) and absence of ICD at baseline as determined by the investigator, indicated that VY-AADC improved good ON time from baseline by 3.2 hours and reduced OFF time by 3.2 hours in patients at 12 months.

In addition to motor function, VY-AADC improved patients' quality of life as measured by the patient-reported 39-item Parkinson's Disease Questionnaire (PDQ-39). For PDQ-39, VY-AADC improved (reduced) patients' score by a mean change from baseline to 12 months of -7.6. Infusions of VY-AADC have been well tolerated in the eight patients treated in PD-1102 with no serious adverse events (SAEs) reported.

About the Phase II RESTORE-1 Clinical Trial
Based on the results from PD-1101 and PD-1102, Voyager initiated RESTORE-1, a Phase II, randomized, placebo-surgery controlled, double-blinded, multi-center, clinical trial to evaluate the safety and efficacy of VY-AADC in patients who have been diagnosed with Parkinson's disease for at least

four years, are not responding adequately to oral medications, and have at least three hours of OFF time during the day as measured by a validated self-reported patient diary.

For more information about the RESTORE-1 clinical trial, including eligibility criteria, please visit restore1study.com.

About Neurocrine Biosciences and Voyager Therapeutics Strategic Collaboration
In the first quarter of 2019, Neurocrine Biosciences and Voyager Therapeutics entered into a strategic collaboration focused on the development and commercialization of gene therapy programs, VY-AADC for Parkinson's disease and VY-FXN01 for Friedreich's ataxia, as well as rights to two programs to be determined. This collaboration combines Neurocrine Biosciences' expertise in neuroscience, drug development and commercialization with Voyager's innovative gene therapy programs targeting severe neurological diseases.

About Parkinson's Disease and VY-AADC
Parkinson's disease is a chronic, progressive and debilitating neurodegenerative disease that affects approximately one million people in the U.S. and six million people worldwide1. Parkinson's disease is characterized by a loss of dopamine and its function. Dopamine is a chemical "messenger" that is produced in the brain and is involved in the control of movement. Dopamine is made in the brain when the enzyme AADC (Aromatic l-amino acid decarboxylase) converts the chemical levodopa to dopamine. Levodopa, AADC, and dopamine are each present at normal levels in healthy people. As Parkinson's disease worsens, there is less AADC enzyme in parts of the brain where it is needed to convert levodopa to dopamine. When this happens, patients' motor function may worsen with a less predictable response to medications.

VY-AADC, an investigational gene therapy, is designed to put the AADC enzyme into brain cells where it can convert levodopa to dopamine. To do this, the *AADC* gene is delivered inside a transporter called "adeno-associated viral vector" (AAV). Interim results from an open-label Phase Ib trial demonstrated that administration of VY-AADC to the putamen using intraoperative monitoring with MRI facilitated targeted delivery of the investigational gene therapy with dose-dependent increases in AADC enzyme expression and improvements in clinical measures and has been well-tolerated to date.

About Neurocrine Biosciences
Neurocrine Biosciences (Nasdaq: NBIX) is a neuroscience-focused, biopharmaceutical company with more than 25 years of experience discovering and developing life-changing treatments for people with serious, challenging and under-addressed neurological, endocrine and psychiatric disorders. The company's diverse portfolio includes FDA-approved treatments for tardive dyskinesia and endometriosis* and clinical development programs in multiple therapeutic areas including Parkinson's disease, congenital adrenal hyperplasia and uterine fibroids*. Headquartered in San Diego, Neurocrine Biosciences specializes in targeting and interrupting disease-causing mechanisms involving the interconnected pathways of the nervous and endocrine systems. For more information, visit neurocrine.com, and follow the company on LinkedIn. *(*in collaboration with AbbVie)*

About Voyager Therapeutics
Voyager Therapeutics is a clinical-stage gene therapy company focused on developing life-changing treatments for severe neurological diseases. Voyager is committed to advancing the field of AAV gene therapy through innovation and investment in vector engineering and optimization, manufacturing, and dosing and delivery techniques. Voyager's wholly-owned and partnered pipeline focuses on severe neurological diseases in need of effective new therapies, including Parkinson's disease, a monogenic form of ALS called SOD1, Huntington's disease, Friedreich's ataxia, Alzheimer's disease, and other neurodegenerative diseases related to defective or excess aggregation of tau and alpha-synuclein proteins in the brain. Voyager has strategic collaborations with Sanofi Genzyme, AbbVie and Neurocrine Biosciences. Founded by scientific and clinical leaders in the fields of AAV gene therapy, expressed RNA interference and neuroscience, Voyager is headquartered in Cambridge, Massachusetts. For more information on Voyager, please visit the company's website at www.voyagertherapeutics.com or follow @VoyagerTx on Twitter and LinkedIn.

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Neurocrine Biosciences Forward-Looking Statements
In addition to historical facts, this press release contains forward-looking statements that involve a number of risks and uncertainties. Among the factors and risks that could cause actual results to differ materially from those indicated in the forward-looking statements are risks that the product candidates licensed from Voyager may not obtain regulatory approval from the FDA or other regulatory agencies, or such approval may be delayed or conditioned; risks that development activities related to the product candidates licensed from Voyager may not be completed on time or at all; risks associated with the Company's dependence on Voyager for research, development and manufacturing activities; risks that ongoing or future clinical trials may not be successful or replicate previous clinical trial results, or may not be predictive of real-world results or of results in subsequent clinical trials; risks and uncertainties relating to competitive products and technological changes that may limit demand for product candidates licensed from Voyager; risks that the product candidates licensed from Voyager may be precluded from commercialization by the proprietary rights of third parties; and other risks that are described in the Company's periodic reports filed with the Securities and Exchange Commission, including without limitation the Company's quarterly report on Form 10-Q for the quarter ended March 31, 2019. Neurocrine disclaims any obligation to update the statements contained in this press release after the date hereof.

Voyager Forward-Looking Statements
This press release contains forward-looking statements for the purposes of the safe harbor provisions under The Private Securities Litigation Reform Act of 1995 and other federal securities laws. The use of words such as "may," "might," "will," "would," "should," "expect," "plan," "anticipate," "believe," "estimate," "undoubtedly," "project," "intend," "future," "potential," or "continue," and other similar expressions are intended to identify forward-looking statements. For example, all statements Voyager makes regarding the initiation, timing, progress, activities, goals and reporting of results of its preclinical programs and clinical trials and its research and development programs, the potential benefits and future operation of the collaboration agreements with Sanofi Genzyme, AbbVie and Neurocrine, including any potential future payments thereunder, its ability to advance its AAV-based gene therapies into, and successfully initiate, enroll and complete, clinical trials, the potential clinical utility of its product candidates, its ability to continue to develop its gene therapy platform, its ability to perform under existing collaborations with, among others, Sanofi Genzyme, AbbVie and Neurocrine and to add new programs to its pipeline, and the regulatory pathway of, and the timing or likelihood of its regulatory filings and approvals for, any of its product candidates, are forward looking. All forward-looking statements are based on estimates and assumptions by Voyager's management that, although Voyager believes such forward looking statements to be reasonable, are inherently uncertain. All forward-looking statements are subject to risks and uncertainties that may cause actual results to differ materially from those that Voyager expected. Such risks and uncertainties include, among others, those related to the initiation and conduct of preclinical studies and clinical trials; the availability of data from clinical trials; the expectations for regulatory communications, submissions and approvals; the continued development of the gene therapy platform; Voyager's scientific approach and general development progress; the sufficiency of cash resources; the possibility or the timing of the exercise of

development, commercialization and license options under collaborations, and the availability or commercial potential of Voyager's product candidates. These statements are also subject to a number of material risks and uncertainties that are described in Voyager's most recent Annual Report on Form 10-K filed with the Securities and Exchange Commission, as updated by its subsequent filings with the Securities and Exchange Commission. Any forward-looking statement speaks only as of the date on which it was made. Voyager undertakes no obligation to publicly update or revise any forward-looking statement, whether as a result of new information, future events or otherwise, except as required by law.

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