January 31, 2023

Tonix Pharmaceuticals Announces Presentation of Clinical and Non-Clinical TNX-1900 Data at the Annual Headache Cooperative of the Pacific (HCOP) Winter Conference

Preliminary Results from Human PET Study Show that Intranasal Application of a Radioisotope of Magnesium-Potentiated Oxytocin is Delivered to the Trigeminal Ganglia

Preliminary Results on Human Cadaveric Trigeminal Ganglia Show Co-expression of Oxytocin Receptors and CGRP

Preliminary Results Show Sex Differences in Oxytocin Potency in an Animal Model

CHATHAM, N.J., Jan. 31, 2023 (GLOBE NEWSWIRE) -- Tonix Pharmaceuticals Holding Corp. (Nasdaq: TNXP) (Tonix or the Company), a clinical-stage biopharmaceutical company, today announced that David C. Yeomans, Ph.D., presented data from clinical and nonclinical studies in an oral presentation at the 16th Annual Headache Cooperative of the Pacific (HCOP) Winter Conference on January 27, 2023. The oral presentation titled, "***Primary vs Secondary Sex Hormones and Migraine***," includes research sponsored by and licensed to Tonix Pharmaceuticals. Professor Yeomans was a founder of Trigemina, which Tonix acquired, and he remains a consultant to Tonix. A copy of the presentation is available under the Scientific Presentations tab of the Tonix Pharmaceuticals corporate website at www.tonixpharma.com.

"In addition to data showing that magnesium (Mg^{++}) potentiates the analgesic effects of oxytocin, the presentation includes new preliminary data from a Positron Emission Tomography (PET) study in human volunteers dosed with a proprietary nitrogen-13 (^{13}N) radioisotope of oxytocin formulated with Mg^{++}," said Seth Lederman, M.D., Chief Executive Officer of Tonix Pharmaceuticals. "A signal was observed in the trigeminal ganglia, indicating that intranasal oxytocin plus Mg^{++} delivers oxytocin to the trigeminal ganglia which have known roles in migraine headache. These studies were a collaboration with Aarhus University and the principal investigator, Michael Winterdahl, PhD."

In addition to the PET study, the presentation includes data collected from isolated human trigeminal ganglia neurons *in vitro* which show oxytocin receptor co-expressed with calcitonin gene-related peptide (CGRP). The results of these studies, which were performed by postdoctoral fellow Vimala Bharadwaj, PhD, are believed to represent the first observation of oxytocin receptors in human tissue rather than in an animal model. Previously, it has been

shown that oxytocin receptors and CGRP co-localize in rat trigeminal ganglia neurons. The cytokine IL-6 functionally upregulated expression of human trigeminal oxytocin receptors *in vitro*, similar to what has been shown previously in rats, in which oxytocin has been shown to functionally inhibit electrically evoked activity of trigeminal neurons.

Finally, the presentation highlights data which suggest a sex difference in oxytocin potency. “The results indicate that oxytocin is more potent in inhibiting trigeminal ganglion neuronal excitability in female rats compared to males,” said Professor David C. Yeomans. “Moreover, treating male rats with estrogen for four days increased the responsiveness of their isolated trigeminal ganglia to oxytocin *in vitro* such that they show a similar level of responsiveness to oxytocin as female trigeminal ganglia. The Company believes that together, these findings have potential dosing implications in humans who suffer from chronic migraine.”

In late 2021, Tonix received Investigational New Drug clearance from the U.S. Food and Drug Administration to support the initiation of a Phase 2 study of TNX-1900 (intranasal magnesium potentiated oxytocin) for the prevention of migraine headache in chronic migraineurs. The Company expects to begin enrollment in the Phase 2 study during the first quarter of 2023.

Tonix Pharmaceuticals Holding Corp.*

Tonix is a clinical-stage biopharmaceutical company focused on discovering, licensing, acquiring and developing therapeutics to treat and prevent human disease and alleviate suffering. Tonix’s portfolio is composed of central nervous system (CNS), rare disease, immunology and infectious disease product candidates. Tonix’s CNS portfolio includes both small molecules and biologics to treat pain, neurologic, psychiatric and addiction conditions. Tonix’s lead CNS candidate, TNX-102 SL (cyclobenzaprine HCl sublingual tablet), is in mid-Phase 3 development for the management of fibromyalgia with a new Phase 3 study launched in the second quarter of 2022 and interim data expected in the second quarter of 2023. TNX-102 SL is also being developed to treat Long COVID, a chronic post-acute COVID-19 condition. Tonix initiated a Phase 2 study in Long COVID in the third quarter of 2022 and expects interim data in the third quarter of 2023. TNX-1300 (cocaine esterase) is a biologic designed to treat cocaine intoxication and has been granted Breakthrough Therapy designation by the FDA. A Phase 2 study of TNX-1300 is expected to be initiated in the first quarter of 2023. TNX-1900 (intranasal potentiated oxytocin), a small molecule in development for chronic migraine, is expected to enter the clinic with a Phase 2 study in the first quarter of 2023. TNX-601 ER (tianeptine hemioxalate extended-release tablets) is a once-daily formulation of tianeptine being developed as a potential treatment for major depressive disorder (MDD) with a Phase 2 study expected to be initiated in the first quarter of 2023. Tonix’s rare disease portfolio includes TNX-2900 (intranasal potentiated oxytocin) for the treatment of Prader-Willi syndrome. TNX-2900 has been granted Orphan Drug designation by the FDA. Tonix’s immunology portfolio includes biologics to address organ transplant rejection, autoimmunity and cancer, including TNX-1500, which is a humanized monoclonal antibody targeting CD40-ligand (CD40L or CD154) being developed for the prevention of allograft and xenograft rejection and for the treatment of autoimmune diseases. A Phase 1 study of TNX-1500 is expected to be initiated in the first half of 2023. Tonix’s infectious disease pipeline includes a vaccine in development to prevent smallpox and monkeypox, TNX-801, a next-generation vaccine to prevent COVID-19, TNX-1850, a platform to make fully human monoclonal antibodies to treat COVID-19, TNX-3600, and

humanized anti-SARS-CoV-2 monoclonal antibodies, TNX-3800, recently licensed from Curia. TNX-801, Tonix's vaccine in development to prevent smallpox and monkeypox, also serves as the live virus vaccine platform or recombinant pox vaccine (RPV) platform for other infectious diseases. A Phase 1 study of TNX-801 is expected to be initiated in Kenya in the second half of 2023.

[*]*All of Tonix's product candidates are investigational new drugs or biologics and have not been approved for any indication.*

This press release and further information about Tonix can be found at www.tonixpharma.com.

Forward Looking Statements

Certain statements in this press release are forward-looking within the meaning of the Private Securities Litigation Reform Act of 1995. These statements may be identified by the use of forward-looking words such as "anticipate," "believe," "forecast," "estimate," "expect," and "intend," among others. These forward-looking statements are based on Tonix's current expectations and actual results could differ materially. There are a number of factors that could cause actual events to differ materially from those indicated by such forward-looking statements. These factors include, but are not limited to, risks related to the failure to obtain FDA clearances or approvals and noncompliance with FDA regulations; delays and uncertainties caused by the global COVID-19 pandemic; risks related to the timing and progress of clinical development of our product candidates; our need for additional financing; uncertainties of patent protection and litigation; uncertainties of government or third party payor reimbursement; limited research and development efforts and dependence upon third parties; and substantial competition. As with any pharmaceutical under development, there are significant risks in the development, regulatory approval and commercialization of new products. Tonix does not undertake an obligation to update or revise any forward-looking statement. Investors should read the risk factors set forth in the Annual Report on Form 10-K for the year ended December 31, 2021, as filed with the Securities and Exchange Commission (the "SEC") on March 14, 2022, and periodic reports filed with the SEC on or after the date thereof. All of Tonix's forward-looking statements are expressly qualified by all such risk factors and other cautionary statements. The information set forth herein speaks only as of the date thereof.

Contacts

Jessica Morris (corporate)
Tonix Pharmaceuticals
investor.relations@tonixpharma.com
(862) 904-8182

Olipriya Das, Ph.D. (media)
Russo Partners
Olipriya.Das@russopartnersllc.com
(646) 942-5588

Peter Vozzo (investors)
ICR Westwicke

peter.vozzo@westwicke.com
(443) 213-0505

Source: Tonix Pharmaceuticals Holding Corp.