Minerva Neurosciences Announces New Patent Application for MIN-117 Related to Broad Effect on Pain

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WALTHAM, Mass., Nov. 28, 2018 (GLOBE NEWSWIRE) -- Minerva Neurosciences, Inc. (NASDAQ: NERV), a clinical-stage biopharmaceutical company focused on the development of therapies to treat central nervous system (CNS) disorders, today announced the filing of a U.S. patent application for use of its investigational proprietary compound, MIN-117, to treat pain. MIN-117 is currently in Phase 2b clinical development as a treatment for major depressive disorder (MDD).

"In addition to providing further significant intellectual property protection for MIN-117, the pre-clinical data supporting the application suggest that this compound should be investigated beyond mood and anxiety disorders to include chronic pain, which is often a symptom of several neuro-psychiatric disorders," said Dr. Remy Luthringer, Executive Chairman and Chief Executive Officer of Minerva.

"Chronic pain is also one of the main reasons cited by patients with MDD who seek medical help," said Dr. Luthringer. "In fact, there is a strong connection between chronic pain and mood disorders, which is exacerbated if mood and anxiety disorders are both present."[1,2]

Pre-clinical rat models submitted in the patent application included peripheral motoneuropathy, inflammatory pain and chemotherapy-induced peripheral neuropathic pain. Findings in these models showed that MIN-117 restored approximately 60 percent of the nociceptive pain threshold after peripheral motoneuropathy or inflammatory pain and significantly reduced, in a dose-dependent manner, chemotherapy-induced peripheral neuropathic pain.

The results obtained in these models suggest that MIN-117 may be a candidate for study in the treatment of diseases with chronic pain symptoms and may have the potential to address the urgent need for non-opioid therapeutic options for the treatment of pain. Furthermore, the currently available treatments for chronic pain are often not satisfactory and may be associated with adverse reactions, tolerance, dependence and reductions in the quality of life for patients.

The pharmacological effects of MIN-117 are thought to be largely mediated via serotonin and dopamine, two key neurotransmitters involved in several CNS disorders. With respect to serotonin, the molecule is believed to antagonize a specific subtype receptor called 5-HT_{1A} and prevents the reuptake of serotonin. Both of these activities are known to have effects on mood and anxiety. Furthermore, the effect of MIN-117 on the pre-synaptic 5-HT_{1A} receptors may help achieve an early reversal of depressed mood.[3]

In addition, MIN-117 is believed to prevent the reuptake of dopamine, thus increasing the availability of this neurotransmitter in the synaptic cleft. Dopamine levels are known to be reduced in patients suffering from mood disorders.[4] Therefore, an increase of dopamine in the synaptic cleft may potentially benefit patients who do not respond to existing therapies.[5] Additionally, the molecule modulates the levels of the adrenergic receptors alpha-1a and -1b, which further modulate catecholamine levels in the brain.

This pharmacological profile of MIN-117 has been observed in the reversal of anhedonia in preclinical models, including the mild chronic stress-induced model. Anhedonia is among the remaining residual symptoms after treatment of a major depressive episode with currently available treatments.[6]

MIN-117 is currently in a Phase 2b clinical trial to evaluate its efficacy in patients with a diagnosis of moderate to severe MDD with anxious distress and without psychotic features. In addition to the primary endpoint of reducing the symptoms of MDD, investigators in this trial are assessing anxiety, cognition, sexual function, sleep, validated depression biomarkers and onset of action to further define the product profile of MIN-117 as an agent that can potentially address the shortcomings of existing therapies for MDD, including slow onset of action, cognitive impairment, sexual dysfunction and anhedonia. Top-line data from this trial are expected to be available in the first half of 2019.

About Minerva Neurosciences:
Minerva Neurosciences, Inc. is a clinical-stage biopharmaceutical company focused on the development and commercialization of a portfolio of product candidates to treat CNS diseases. Minerva's proprietary compounds include: roluperidone (MIN-101), in clinical development for schizophrenia; MIN-117, in clinical development for major depressive disorder (MDD); seltorexant (MIN-202 or JNJ-42847922), in clinical development for insomnia and MDD; and MIN-301, in pre-clinical development for Parkinson's disease. Minerva's common stock is listed on the NASDAQ Global Market under the symbol "NERV." For more information, please visit www.minervaneurosciences.com.

Forward-Looking Safe Harbor Statement
This press release contains forward-looking statements which are subject to the safe harbor provisions of the Private Securities Litigation Reform Act of 1995, as amended. Forward-looking statements are statements that are not historical facts, reflect management's expectations as of the date of this press release, and involve certain risks and uncertainties. Forward-looking statements include statements herein with respect to the timing and scope of current clinical trials and results of clinical trials with MIN-117; the timing and scope of future clinical trials and results of clinical trials with MIN-117; the clinical and therapeutic potential of MIN-117; our ability to successfully develop and commercialize our therapeutic products; the sufficiency of our current cash position to fund our operations; and management's ability to successfully achieve its goals. These forward-looking statements are based on our current expectations and may differ materially from actual results due to a variety of factors including, without limitation, whether MIN-117 will advance further in the clinical trials process and whether and when, if at all, it will receive final approval from the U.S. Food and Drug Administration or equivalent foreign regulatory agencies and for which indications; whether any of our therapeutic products will be successfully marketed if approved; whether any of our therapeutic product discovery and development efforts will be successful; management's ability to successfully achieve its goals; our ability to raise additional capital to fund our operations on terms acceptable to us; and general economic

conditions. These and other potential risks and uncertainties that could cause actual results to differ from the results predicted are more fully detailed under the caption "Risk Factors" in our filings with the Securities and Exchange Commission, including our Quarterly Report on Form 10-Q for the quarter ended September 30, 2018, filed with the Securities and Exchange Commission on November 5, 2018. Copies of reports filed with the SEC are posted on our website at www.minervaneurosciences.com. The forward-looking statements in this press release are based on information available to us as of the date hereof, and we disclaim any obligation to update any forward-looking statements, except as required by law.

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[2] Depression-anxiety relationships with chronic physical conditions: results from World Mental Health Surveys, KM Scott et al., 103 (2007) 113-120

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