

Neurosteroids - Neuropathic pain (NP)

Development status

Preclinical trials

IP protection status

Kudova et al.: Amphipilic Compounds with Neuroprotective Properties. EP3260462 A, EP3260462 A, CA 2957906 A, JP 2017-511948, US 15/506318, AU 2015309371

Partnering strategy

Collaboration, licensing, spin-off

Challenge

The NP market is rife with unmet needs. The main classes of drugs used in the treatment of NP have traditionally consisted of antidepressants, anticonvulsants, opioid analgesics, and topical analgesics. Although many of the available drugs offer some degree of efficacy in terms of pain relief, there still remains vast room for improvement in efficacy, safety, drug delivery, and dosing convenience. Market size 2017 is about 3 bil. USD, CAGR 3%

Description

Neurosteroids act as multi-target allosteric modulators of various neuro-receptors. Among others, the NMDA receptor modulators influence the ion flow in synapses. Allosteric NMDAr modulators do not reveal typical adverse effects (in animal models) like dizziness, nausea, somnolence or cognitive difficulties as the current therapeutics often acting as Ca or Na channel blockers. MS-225 shows inhibitory effect at micromolar concentrations. However, there are other receptor families involved in the pain perception. MS-225 modulates their function at nanomolar concentrations. This might be the dominant mode of action and as such is a subject of further research and a new application for extended patent protection. Besides the NP, some steroidal analogues has proven its efficacy in epilepsy or neuroprotection models.

Commercial opportunity

If the clinical trials confirm its efficacy and low adverse effects, the molecule can easily acquire 10-30% of the market counting from 300 mil. to 1 bil. USD.

STEROIDS for Neuropathic Pain Treatment

The Pain Pathway: Glutamate and its receptors represent a major neurotransmitter system at the first spinal synapse. NMDA antagonists are conceivable analgesics, clinically proven as quite efficacious, however, due to the presence of NMDA receptors in the whole CNS, systemic administration of NMDA antagonists brings a number of adverse side effects like memory impairment, psychomotoric changes, ataxia, disturbance of motor coordination, sedation etc. Our proprietary, specifically designed steroidal molecules act as ALLOSTERIC MODULATORS of NMDA receptor with no observed side effects at the therapeutic dosing level.

Efficacy: Post-tetanic Potentiation (PTP) Model. PTP Effect on Mechanical Pain Threshold after Chronic Dosing. Mechanism-Independent Peripheral Neuroactivity (MIPN) Inhibitor.

Safety: Elevated Plus Maze. Activity Test - sedation 100 mg/kg. Acute ADME data: No CYP 450 inhibition not activation, Moderate pharmacological stability in rat, low in human, No CNS toxicity observed, No significant changes in body weight, No significant changes in food intake, No significant changes in water intake, No significant changes in fecal output, No significant changes in urine output, No significant changes in organ weights, No significant changes in histology, No significant changes in clinical chemistry, No significant changes in hematology, No significant changes in clinical pathology, No significant changes in clinical toxicology, No significant changes in clinical immunology, No significant changes in clinical microbiology, No significant changes in clinical parasitology, No significant changes in clinical virology, No significant changes in clinical mycology, No significant changes in clinical entomology, No significant changes in clinical botany, No significant changes in clinical zoology, No significant changes in clinical geology, No significant changes in clinical astronomy, No significant changes in clinical meteorology, No significant changes in clinical climatology, No significant changes in clinical oceanography, No significant changes in clinical atmospheric science, No significant changes in clinical earth and planetary science, No significant changes in clinical space science, No significant changes in clinical environmental science, No significant changes in clinical engineering, No significant changes in clinical technology, No significant changes in clinical applied science, No significant changes in clinical arts and humanities, No significant changes in clinical social science, No significant changes in clinical behavioral science, No significant changes in clinical life and physical science, No significant changes in clinical earth and space science, No significant changes in clinical interdisciplinary science, No significant changes in clinical transdisciplinary science, No significant changes in clinical integrative science, No significant changes in clinical holistic science, No significant changes in clinical systems science, No significant changes in clinical complexity science, No significant changes in clinical network science, No significant changes in clinical information science, No significant changes in clinical cognitive science, No significant changes in clinical decision science, No significant changes in clinical management science, No significant changes in clinical business science, No significant changes in clinical economics, No significant changes in clinical law, No significant changes in clinical medicine, No significant changes in clinical dentistry, No significant changes in clinical pharmacy, No significant changes in clinical nursing, No significant changes in clinical health care, No significant changes in clinical public health, No significant changes in clinical population science, No significant changes in clinical global health, No significant changes in clinical international health, No significant changes in clinical cross-cultural health, No significant changes in clinical comparative health, No significant changes in clinical health equity, No significant changes in clinical health justice, No significant changes in clinical health rights, No significant changes in clinical health governance, No significant changes in clinical health systems, No significant changes in clinical health services, No significant changes in clinical health financing, No significant changes in clinical health workforce, No significant changes in clinical health leadership, No significant changes in clinical health innovation, No significant changes in clinical health research, No significant changes in clinical health evidence, No significant changes in clinical health policy, No significant changes in clinical health strategy, No significant changes in clinical health planning, No significant changes in clinical health implementation, No significant changes in clinical health evaluation, No significant changes in clinical health monitoring, No significant changes in clinical health assessment, No significant changes in clinical health surveillance, No significant changes in clinical health research, No significant changes in clinical health evidence, No significant changes in clinical health policy, No significant changes in clinical health strategy, No significant changes in clinical health planning, No significant changes in clinical health implementation, No significant changes in clinical health evaluation, No significant changes in clinical health monitoring, No significant changes in clinical health assessment, No significant changes in clinical health surveillance.

Pharmacokinetics: PK Study after single i.p. dosing of 1, 3 and 10 mg/kg MS-225 in mice. Comparative Pilot PK study (i.p. dosing of MS-225 in rat and dog).

Preclinical Plan: Strategic objectives, Efficacy studies, Safety studies, Toxicology studies, Clinical development, Regulatory affairs, Commercialization.

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Institution



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