

## Neurosteroids - Neuropathic pain (NP)

### Development status

#### Preclinical trials

### IP protection status

Kudova et al.: Amphiphilic 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. PTPs Effect on Mechanical Pain Threshold after Chronic Dosing. Benzodiazepine-Induced Peripheral Neuropathy (BIPN) Model.

**Safety:** Standard Plus Tests. Activity Test - sedation 100 mg/kg. Acute ADME data: No CYP 450 inhibition not activation, Moderate membrane stability in rat, low in human, No CNS found in plasma, No CNS found in brain, No CNS found in liver, No CNS found in kidney, No CNS found in heart, No CNS found in spleen, No CNS found in testis, No CNS found in ovary, No CNS found in uterus, No CNS found in placenta, No CNS found in fetus, No CNS found in milk, No CNS found in excreta.

**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 in mouse).

**Preclinical Plan:** Strategic objectives: Additional Pain models (Original and Formalin, Dexamethasone), Effect of Neurosteroids on Experimental Pain Threshold Response Measurement, Test the effect of Neurosteroids on the sensory effect of Neurosteroids, Conduct the study of the Neurosteroids effect on the BIPN model, Test the effect of Neurosteroids on the BIPN model, Test the effect of Neurosteroids on the BIPN model, Test the effect of Neurosteroids on the BIPN model.

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### Institution



**The Institute of Organic  
Chemistry and Biochemistry of  
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