

Serdaxin™ CNS Drug Candidate to Treat Depression and Neurodegenerative Diseases

- Potential market leading therapeutic for treating depression, anxiety and related mood disorders, neurodegenerative disorders such as Parkinson's and Alzheimer's disease
- Demonstrated neuroprotective effect in animal models for Parkinson's and neurotoxin-induced seizure
- Non-transporter mechanism that works as a dual enhancer of serotonin and dopamine levels in the brain
- Excellent safety in humans, with no cognitive or motor impairment, nausea or weight gain of some current drugs

Background

Worldwide the market opportunity for central nervous system (CNS) drugs in the neurology, psychiatry, and pain sectors, exceeds \$96 billion. High unmet needs remain for treating neurodegenerative disorders, depression, and Parkinson's- therapeutic areas where Serdaxin™ has demonstrated preclinical efficacy, and significant potential. The adaptability of drugs to expand into multiple CNS indications, as proposed for Serdaxin's target profile, will bolster commercial opportunities and competitive advantage in growing CNS markets.

Commercial Opportunity

Serdaxin™ may realize significant market potential as a neuroprotective agent to treat neurodegenerative disorders such as Parkinson's disease (PD) and morbidity of depression and mood disorders. The prevalence of PD is 600,000 cases in the U.S. and 6 million globally. Leading PD drug classes are dopaminergics and dopamine agonists, and offer only symptomatic treatment - eventually symptoms return and worsen. There are serious unmet needs in PD including neuroprotective agents that would halt or slow disease progression, and allow PD patients to retain quality of life and control of movements, walking, talking, etc.

Depression affects 45 million in the U.S., and tens of millions more worldwide, and is also a major co-morbidity of some neurodegenerative disorders such as Parkinson's disease. There are high unmet needs in treating depression, including limited efficacy of reuptake inhibitors with ~50% response rate; high relapse rates of 30%; and high non-compliance and side effects such as insomnia, sexual dysfunction, and weight gain. Of the highest unmet needs, Serdaxin™ may possess broader and greater therapeutic effects than current antidepressants by treating negative mood state, loss of positive mood state, or mixture of both.

Clinical Development

Multiple clinical programs are planned for Serdaxin™, including Parkinson's disease, neuroprotection, depression and anxiety. Phase IIa clinical trials are ongoing for a lead indication, Major Depressive Disorder (MDD). The safety profile of Serdaxin™ is potentially superior to current antidepressants, which may lead to greater medication compliance and reduced relapse. Mechanism of action studies have shown that Serdaxin™ is a dual enhancer of serotonin and dopamine levels, and significantly increased activities in brain regions important for their actions.

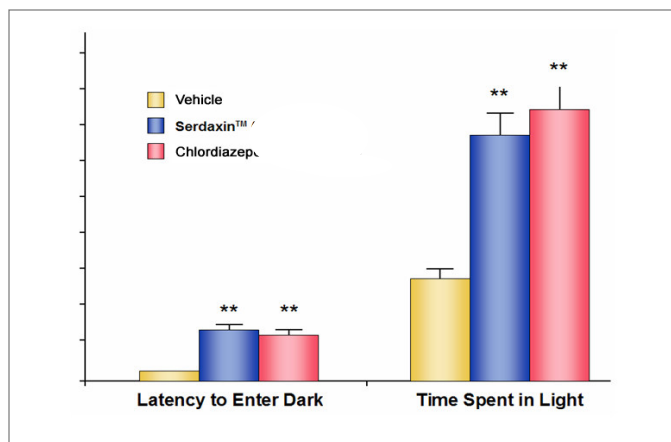


Fig 1. Elevated Plus-Maze Model of Serdaxin™ Anxiolytic Activity in Rats. Serdaxin™, at less than 1/10,000th dose of chlordiazepoxide, demonstrated equipotency in the elevated plus-maze model. Serdaxin™ attenuated animals' fear of open spaces and increased the time spent there.

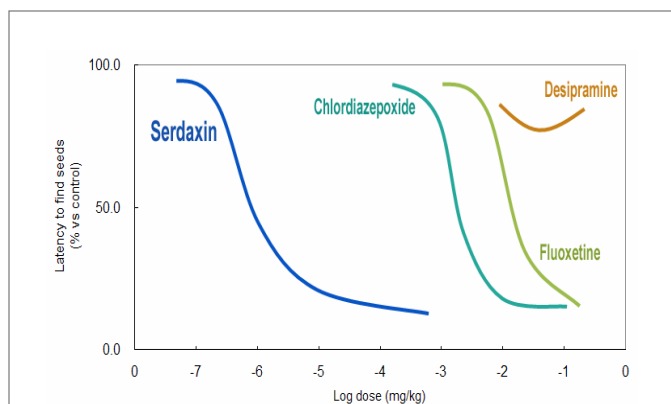


Fig 2. Seed Finding Model in Hamsters Show Greater Potency of Serdaxin™ In Vivo. Serdaxin™ was 1000-10,000 times more potent than comparator drugs fluoxetine and chlordiazepoxide on a mg/kg basis, and showed dose-dependent anxiolytic activities. Findings indicate that Serdaxin™ has no motor impairment and cognition deficit of benzodiazepines, and no insomnia, weight gain, nausea or sexual dysfunction of reuptake inhibitors (SSRIs, SNRIs).