

## **Title: Mechanical Stimulation Device for the Treatment of Opioid Use Disorders**

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### **Abstract**

Drug addiction is a destructive relapsing disease that affects more Americans than all forms of cancer combined<sup>1</sup>. An estimated 28 million Americans are in need of addiction treatment with direct cost estimates of \$710 billion/yr<sup>2</sup>. Despite advances in understanding addiction, the success rate of treatment has not substantially changed over the last hundred years<sup>1,3,4</sup>.

Recently, we found that mechanical stimulation applied to the cervical spine at the C7-T1 level (termed “MStim”) in rodents, affects neurotransmitter release in the mesolimbic dopamine (DA) system, an area implicated in reward<sup>5,6</sup> by reducing midbrain neuron firing and enhancing DA release in the nucleus accumbens. The midbrain DA system is a therapeutic target for a myriad of conditions including addiction, depression, ADHD, and Parkinson’s. These findings demonstrate the potential for mechanoreceptor (receptors in our skin and joints) activation through vibration as a treatment for many of these conditions and in particular opioid addiction which is the focus of this proposal.

Our core hypothesis is that therapeutic mechanical stimulation via vibration reduces anxiety and craving associated with opioid withdrawal. We propose three aims that involve pre-clinical and clinical studies to test our hypothesis and provide needed data for external proposals: 1) Evaluate MStim effects on morphine reward and withdrawal in rodents; 2) Develop active vibration control techniques and optimized vibration parameters for mechanoreceptor targeted whole body vibration (WBV) in drug-free human subjects and create a normative database; and 3) Determine with subjective and objective measures, in opioid addicts, if WBV is effective in reducing anxiety/craving.