A record number of Canadians have died as a result of opioid drug overdoses, with over 1,500 deaths occurring in Ontario just last year, a staggering amount that represents a 200% increase from only a decade ago, putting opioid drug overdoses into the top ten leading causes of death for the very first time. It is thus clear that in order to resolve the opioid crisis in Canada, the development of therapeutic alternatives to opioid drugs is crucially needed.

*Mitragyna speciosa* (aka ‘Kratom’) is a plant native to Thailand and Southeast Asia that has been used by individuals for centuries, both recreationally and medicinally, to treat several medical ailments, and importantly, as a therapeutic remedy to treat opioid addiction and withdrawal. Unfortunately, the abuse and addiction potential of kratom among users remains ambiguous as there is no clear consensus in the literature. Therefore, this study will aim to characterize any rewarding and psychostimulant-like effects of kratom in rodents using the conditioned place preference (CPP) paradigm and the locomotor sensitization test, respectively. Subsequent molecular analyses will be conducted to elucidate the cellular signaling profiles of kratom compared to morphine to determine the molecular correlates of the disparate drug effects. Furthermore, neural oscillatory activity following intracranial electrode implantation surgery will be used to assess commonalities between kratom and morphine that may contribute to the manifestation of addiction-like behaviour. In addition, the acute and chronic analgesic effects of kratom compared to the commonly prescribed opioid morphine will be evaluated through both the tail-flick and the hot-plate test. We hypothesize that kratom will possess analgesic activity without the addiction risk of morphine due its properties as a biased signaling agonist at the μ-opioid receptor. This research could thus help to elucidate the potential use of kratom as a non-addictive therapeutic alternative to the analgesic morphine in the treatment of pain.