

2018 Talent Development Competition Awardees

Title: The Effects of Sex Differences in Brain Codeine Metabolism on Drug Response

Cameron Isaacs-Trepanier

Supervisor: Rachel Tyndale

Abstract: Opioids are a class of drugs commonly used to treat pain. Canadians rank among the highest worldwide for opioid intake. While they are effective pain-relievers for many people, there is substantial variation in response and tolerance to opioids. Further, some individuals are at increased risk of developing a dependence on opioids. For example, those who develop tolerance are at greater risk for developing opioid dependence. Interestingly, males and females show a difference in opioid elicited pain relief and addiction potential. My research focuses on one mechanism for these observed sex differences. Codeine is an opioid used by millions of people in North America to treat their pain. To work, codeine must be converted into morphine by the body. Morphine then acts on receptors in the brain to reduce painful sensations. Therefore, a major determinant of codeine's effectiveness is its conversion into morphine. However, the pathway that converts codeine to morphine is highly genetically variable. The conversion can occur in the liver, but conversion within the brain has been shown to affect codeine-elicited pain relief. My research looks at differences in codeine to morphine conversion between males and females in the brain and liver. Determining mechanisms contributing to differences in opioid response may help to identify those at risk for therapeutic failure and at risk for developing a dependence on opioids. Ultimately, my work aims to contribute towards improving the way we treat pain and lowering the risk for people to develop an opioid addiction.