**Charvi Malholtra**

**Flow cytometry analysis of inflammatory cells isolated from the sciatic nerve and DRG after chronic constriction injury in mice**

This project focused on the effect of stem mesenchymal cells(MSCs) on morphine tolerance and opioid-induced hyperalgesia, an over-sensitivity to pain stimuli as a result of opioid usage. The hypothesis of the project was that the use of MSCs would reduce both opioid tolerance and the corresponding hyperalgesia in rats and mice, due to the known anti-inflammatory effects of MSCs. Neural inflammation in the spinal cord is associated with chronic pain and opioid tolerance, due to which we predicted the efficacy of MSCs to diminish opioid tolerance and resolve chronic pain.

We were able to conclude that the MSC transplantation had a powerful reversal effect on both opioid tolerance and opioid-induced hyperalgesia in rats and mice. The transplanted cells demonstrated long-term viability and stability in their effects, with no observable side effects. As hypothesized, the MSCs' inhibitory impact on microglia and astrocytes was related to the anti-inflammatory properties, leading to anti-hyperalgesia and anti-tolerance in the rats and mice.

The effectivity of the MSC transplantation as a viable, safe, and low-cost treatment for opioid tolerance and hyperalgesia presents the possibility of pursuing this method to target related neuro-inflammatory conditions. Additionally, the tested therapy has the potential for clinical treatment of chronic pain conditions, effectively treating patients while eliminating the impact of opioid tolerance as well as opioid-related side effects in the body.