

## **Project Title**

Synthetic joint bio-lubricants for mitigating osteoarthritis and associated chronic pain

## **Project Overview**

Osteoarthritis (OA) is a degenerative joint disease that affects millions of people worldwide, causing pain, stiffness, and loss of mobility. As the condition progresses, the natural lubricating fluid in joints breaks down, leading to increased friction and further damage to the cartilage, ultimately worsening the disease. The research funded by this grant aimed to tackle this problem by developing a new synthetic bio-lubricant. This lubricant, injected into the joint, would potentially restore lubrication, reduce pain, and help prevent further joint damage, offering a potential new treatment for OA.

## **Our Approach**

To do this, we focused on developing synthetic macromolecules called “molecular brushes”. These brushes are designed to mimic the natural lubricating system of the joint and work to reduce pain and improve joint movement. We successfully created a series of molecular brushes that can serve as synthetic lubricants for OA treatment. We demonstrated that these synthetic lubricants work much better in reducing surface friction than the commonly used injectable lubricant, hyaluronic acid. Through a series of tests, we showed that our synthetic lubricant reduced surface friction to a level even lower than that of healthy, natural joint fluid. This is a significant achievement because reduced friction means less wear on the cartilage, potentially slowing the progression of OA and providing longer-lasting relief for patients.

## **Impact on the OA Community**

Our work has also sparked conversations with OA patients and the general public about the potential of synthetic lubricants to treat OA. By presenting our findings at seminars and conferences, we have helped raise awareness of the possibilities for a new treatment that could provide better relief for those living with joint pain.