Awakening the Body's Backup Protein to Treat Duchenne Muscular Dystrophy

Duchenne Muscular Dystrophy (DMD) is a severe condition that affects about 1 in 5,000 newborn boys. It is caused by changes in the gene that produces dystrophin, a protein essential for keeping muscles healthy and stable. Without dystrophin, muscles become inflamed, gradually weaken, and are replaced by scar tissue. As the disease progresses, most children with DMD lose the ability to walk around the age of 12, and many sadly face life-threatening heart or breathing problems before the age of 30.

Despite years of research, current treatments remain limited: they only work for certain genetic changes and sometimes trigger immune reactions, meaning the body's defense system thinks the treatment is dangerous and tries to fight it off. This project takes a different approach by boosting utrophin, a natural "backup" protein that closely resembles dystrophin and can perform many of the same protective functions. Because utrophin is present in everyone, increasing its levels could help all individuals with DMD, regardless of their specific gene change.

To activate this protein, we use CRISPR technology as a molecular switch that binds to the utrophin gene and increases its activity. This encourages the cell to make more of the utrophin protein without altering the genetic code itself. This makes the strategy potentially safer and applicable to more people living with DMD.

So far, we have shown that the CRISPR technology increases utrophin levels in muscle cells grown in a dish. We will next test it in 3D 'mini-muscles', that look and behave more like real muscle, to gather more evidence that this approach could work in people living with DMD. If successful, with further research, this work could open the door to a new, universal treatment option for people living with DMD.