Results from scientific research looking at injecting an altered virus into an MND mouse model to target a and reduce the levels of a specific mutated gene in MND

_Intralingual and Intrapleural AAV Gene Therapy Prolongs Survival in a SOD1 ALS Mouse Model_ (Keeler et al., December 2019, Molecular Therapy: Methods & Clinical Development)


Respiratory insufficiency is normally the cause of death for many diseases, MND/ALS included. Around 10% of MND cases are familial, which means that there is a genetic component. Gene therapy is a method that can be used to correct defective genes and has been used in the treatment of MND. Genes are made up of DNA, a molecule which contains information that alters the characteristics of an individual. Previous research has been conducted using gene therapy to decrease the expression of defective MND-associated genes and increase survival in MND mice. However, these previous gene therapies, did improve survival, but the end result was that the mice died due to respiratory failure.

By using a mouse model of MND, which was engineered to produce a mutant version of SOD1, a common cause of MND, the researchers at the University of Massachusetts Medical School, Massachusetts, in conjunction with those at Duke University in North Carolina, aimed at targeting the respiratory motor neurons and muscles in order to increase survival. They did this by injecting a virus which was altered to recognise mutant SOD1 and alter the levels of its expression, into mice at 60 days of age. They injected into the tongue and the tissue that covers the lungs, hoping that there would be a decrease in the level of mutant SOD1, thus increasing the respiratory function, and extending lifespan.

Injecting the mice with this altered virus reduced the mutant SOD1, in respiratory muscles, as well as the spine and other organs such as the liver, heart and hindlimb. The results also showed that injecting mice significantly increased the survival of SOD1 mice, by around 50 days, along with increasing their weight, by around 15%. Neurological function is an indicator of MND, and this therapy has shown that there is a delay in the decline of their neurological function, such as how the mouse reacted when suspended by its tail, or if the mouse could right itself within 30 seconds of being placed on one side. A deterioration in the muscle strength is also common, and this therapy also shows a less rapid decline in this, when compared to untreated mice.

The study demonstrates a significant increase in survival of MND mice when the respiratory system is targeted. With the death of patients normally being due to respiratory failure, therapy that targets the respiratory system could be essential in aiding survival.