

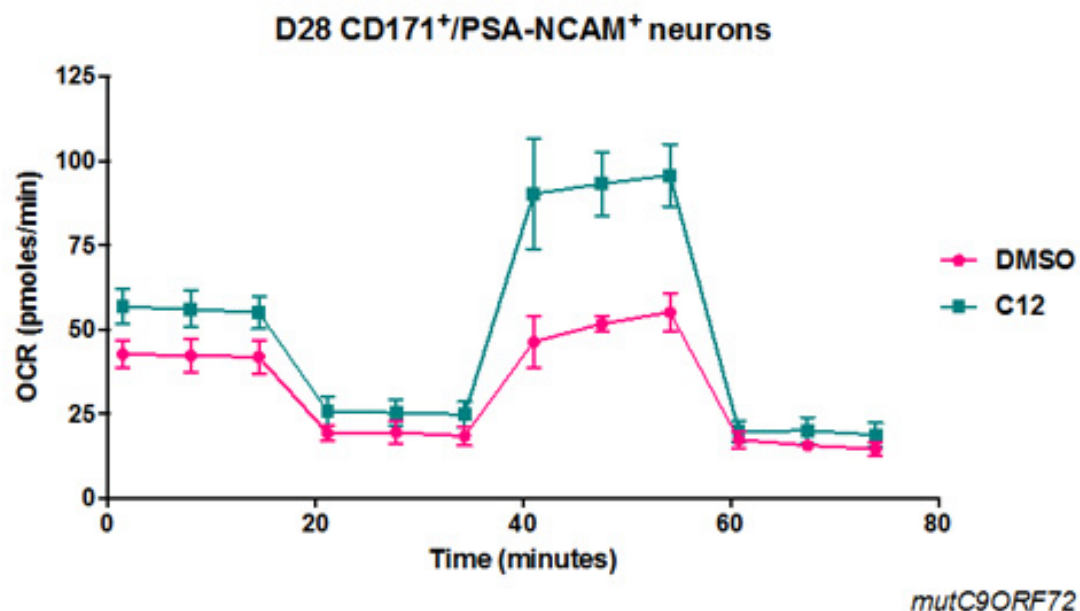
# Research

## Neurotherapeutics Laboratory

Our team is interested in dissecting mechanisms of neurodegeneration and neural dysfunctions using human induced pluripotent stem cells.

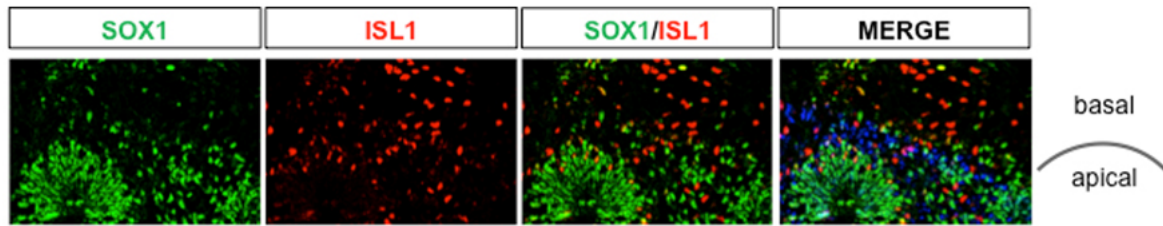
### 1. Altered metabolism in neurodegeneration

Neurons rely on oxidative phosphorylation for their energetic requirements, and motor neurons are particularly active cells that synapse with skeletal muscles to control voluntary movement. In Amyotrop



### 2. Spinal organoid models of motor neuron diseases

Using our unique spinal organoid cultures, we are starting to understand molecular differences between the conventional 2D and 3D organoid cultures. In vivo, spinal cords are patterned from rostral (head) to caudal (tail). Our 2D protocols primarily generate motor neurons of a rostral identity while the organoid cultures produce motor neurons of a caudal identity. Using single cell RNA-seq, we aim to understand the molecular basis of organization that defines organoid cultures.



### 3. Astrocytes in neurodegeneration

Astrocytes are the most abundant cell type in the central nervous system, and support normal neuronal health and function by providing metabolic support, modulating synaptic transmission, and their involvement in uptake and release of factors. There is strong evidence for astrocyte (non-cell autonomous) toxicity in many neurodegenerative diseases including ALS. Our ultimate goal is to be able to decipher the basis of astrocyte toxicity and to discover therapeutics that may counter neuronal death caused by diseased astrocytes.