

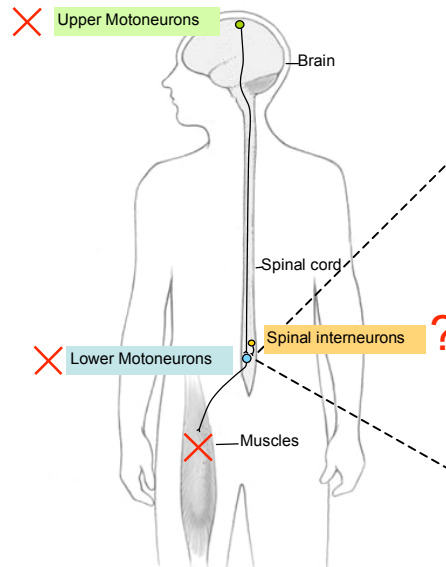
Introduction:

Motor Neuron Disease (MND) is a fatal neurodegenerative disease with which more than 130 people are newly diagnosed in Scotland each year. MND damages and kills neurons in the spinal cord called **motor neurons** which send signals directly to **muscles** to make them contract. Loss of motor neurons therefore leads to paralysis and death within 3-4 years of diagnosis. There is neither a cure nor any effective treatments for MND.

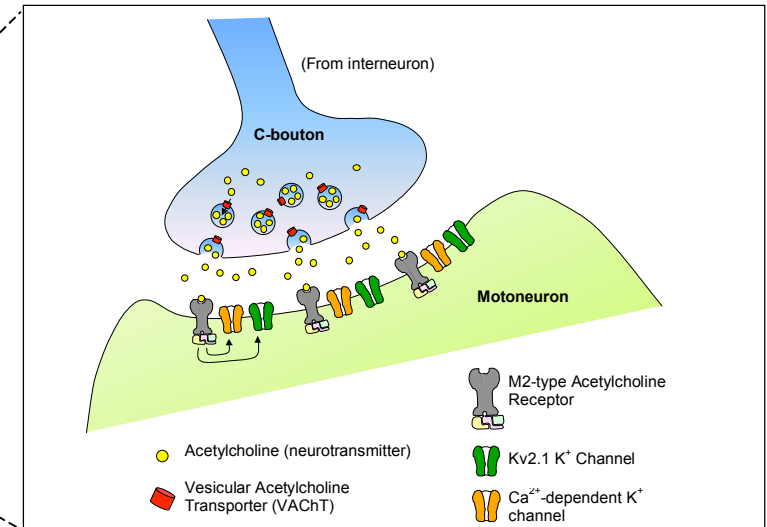
We are therefore trying to learn more about the disease so that new treatment strategies can be designed. We are specifically interested in the potential involvement of other neurons in the spinal cord called **interneurons** which form direct connections (**synapses**) with motor neurons.

We are currently investigating the potential role of a group of **interneurons** and their synapses on motoneurons (called **C-boutons**) which we have recently discovered act like a 'volume dial' to control the strength of the signals that motor neurons send to muscles.

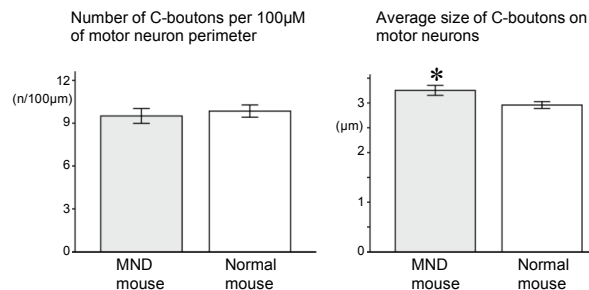
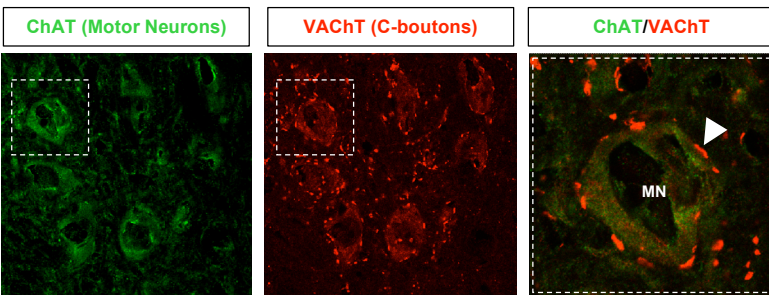
What goes wrong in MND?



'Volume dial' synapse on motor neurons



Labelling and measuring 'volume dial' synapses on motor neurons in MND mice



We use a technique (immunohistochemistry) involving antibodies which bind to specific proteins of interest to label motor neurons and C-boutons in preserved (fixed) spinal cord tissue obtained from MND mice. Because the antibodies have fluorescent molecules attached to them we can use a laser microscope (confocal) to visualise motor neurons (MN) and C-boutons (arrowhead).

Graphs above show our analysis of C-boutons on motor neurons from MND and normal mice. The number of C-boutons does not change in MND mice when corrected for cell size but the C-boutons are on average larger in MND mice. (* indicates significant difference)

Summary:

The **number of C-bouton synapses on motor neurons is unchanged in MND mice** when corrected for the fact that surviving motoneurons are smaller in symptomatic MND mice.

C-boutons are larger in MND mice - perhaps reflecting an attempt to compensate for reduced motor neuron output by turning up this 'volume dial' synapse.

Who are we?

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