Estructural analysis of SMN granules in motor axons and presynaptic nerve terminals

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Spinal Muscular Atrophy (SMA) is a neurodegenerative disease characterized by the loss of spinal cord α-motoneurons, muscle weakness and progressive paralysis. SMN, the defective protein in the disease, participates in mRNA metabolism through snRNPs and mRNPs assembly. In addition, SMN regulates mRNP axonal localization in motoneurons, and fast axonal transport of SMN granules has been observed in cell culture.

To get a deeper insight into the axonal and presynaptic role of SMN, we investigated the distribution and properties of axonal and presynaptic SMN granules and their association with the cytoskeleton in control and SMA mouse models. Specifically, we are exploring the association of SMN granules with NFs, and MAP1B, a microtubule associated protein involved in neural development.

The study was performed at different stages of postnatal maturation, in FVB mice and two types of SMA mouse models, which express full-length and truncated SMN proteins in different amounts. SMN expression was studied by quantitative confocal microscopy immunofluorescence.

We quantified SMN granules in both motor axons and nerve terminals, and determine their relationship with the cytoskeletal elements. In addition, we found that SMN granules are down-regulated in an age-dependent manner in these two compartment, supporting a role for SMN granules in the NMJ maturation.