1 Abstract

Histone Deacetylase Inhibition and Mitochondrial Trafficking in Living Neurons

Mitochondrial trafficking is necessary for proper neuronal function and its impairment leads to neurodegeneration. We have found significant differences in mitochondrial movement between cortical and striatal neurons derived from rat brain. In striatum, mitochondria move with lower average speeds and decreased overal mitochondrial dynamics than those in cortex, exhibiting the same mitochondrial fractional occupancy in neuronal processes. How this could contribute to high striatal vulnerability in neurodegeneration is discussed. We used two different methods of trafficking analysis: manual and semi-automatic. These analyses determine average movement speeds of single mitochondria, as well as overal mitochondrial dynamics in particular field. Only neurons with established synaptic connections were analyzed, mitochondria travelling in both directions were found to move with equivalent average speeds, thus not further distinguished. Our preliminary results also reveal that histone deacetylase inhibition with trichostatin A increases mitochondrial trafficking in striatal neurons, independently of mitochondrial fractional occupancy and Ca^{2+} levels in neuronal processes. We suggest that possible mechanism of this effect is the selective inhibition of α-tubulin deacetylation.