Evidence of neuromuscular junction remodelling during periods of prolonged muscle inactivity in amphibians

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At mammalian neuromuscular junctions (NMJs), prolonged inactivity leads to severe degeneration, however amphibian NMJs do not show such severe degeneration even though they can remain inactive for many years of drought imposed inactivity. We have previously reported on the extent of functional inhibition in neurotransmission imposed during the dry season, along with the possible involvement of dynorphin-A. In the present study, we compared NMJ morphology of *Bufo marinus* obtained from the wild during the wet (January to April) and dry (August to November) southern hemisphere seasons. Iliofibularis muscles were isolated, and prepared for immuno-staining with anti-SV2, a monoclonal antibody that labels synaptic vesicle glycoprotein SV2. These muscles were also stained for the location of post-synaptic acetylcholine receptors (AChRs) using Alexa555 conjugated α-bungarotoxin. Confocal microscopy and 3D reconstruction were then used to examine and compare the pre- and post-synaptic morphology of *Bufo marinus* NMJs from the dry (inactive) and wet (active) seasons. During the dry season, NMJs with large nerve terminals revealed a greater number of branches and increased fragmentation, while medium nerve terminals had fewer branches, when compared to NMJs from the wet season. Further, we observed a lower pre- and post-synaptic apposition (*i.e.* SV2-AChR overlap) at large NMJs during the dry season, compared to the wet season. Together these observations show that during periods of relative NMJ inactivity (dry season), there exists some NMJ remodelling.