

An elastic shield coupled to rigid interface provides structural integrity to myonuclei

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Muscle nuclei are exposed to variable cytoplasmic strain produced by muscle contraction and release, but their morphology does not change. The mechanism responsible for maintaining myonuclear architecture is currently elusive. We uncover a unique myonuclear scaffold in *Drosophila*, exhibiting both elastic features, contributed by the stretching capacity of the KASH domain protein MSP-300, and rigidity provided by a perinuclear network of microtubules and their associated proteins the spectraplakins Shot and EB1. Together, they form a perinuclear flexible shield essential for protecting myonuclei from intrinsic or extrinsic forces. The loss of this scaffold resulted in significantly aberrant nuclear morphology and subsequent abnormal levels of essential nuclear factors. Overall, we propose a novel mechanism for protecting myonuclear morphology and reveal its critical link to correct distribution of nuclear factors in differentiated muscle fibres. These findings may shed light on the underlying mechanism of various muscular dystrophies.