



Seminar Announcement

Three-dimensional structure of vertebrate muscle basketweave Z-band: fitting the atomic components

Date: 22 October 2019
Time: 4 p.m.
Venue: Seminar Room, Level 1,
Experimental Medicine Building, NTU
Hosted By: Prof. Mike Ferenczi and Asst Prof. Sara Sandin

Striated muscle enables movement in all animals by the contraction of myriads of sarcomeres joined end to end by the Z-bands. The contraction is due to tension generated in each sarcomere between overlapping arrays of actin and myosin filaments. At the Z-band, actin filaments from adjoining sarcomeres overlap and are crosslinked in a regular pattern mainly by the protein α -actinin. The Z-band is dynamic, reflected by the two regular patterns seen in transverse section electron micrographs; the so-called small-square and basketweave forms. Although these forms are attributed respectively to relaxed and actively contracting muscles, the basketweave form occurs in certain relaxed muscles as in the muscle studied here. We used electron tomography and subtomogram averaging to derive the three-dimensional structure of the Z-band in the swimbladder sonic muscle of male Type 1 Plainfin midshipman fish (*Porichthys notatus*), into which we docked the crystallographic structures of actin and α -actinin. The α -actinin links run diagonally between connected pairs of anti-parallel actin filaments and are oriented at an angle of about 25° away from the actin filament axes. The slightly curved and flattened structure of the α -actinin rod has a distinct fit into the map. The Z-band model provides a detailed understanding of the role of α -actinin in transmitting tension between actin filaments in adjoining sarcomeres.



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