



All Class II Myosin are not Created Equal

by
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Abstract:

The role of Class II myosins in contraction of smooth, skeletal and cardiac muscle has been studied for more than 50 years, but class II myosins also play important roles in the life of every cell. There are three nonmuscle myosin II heavy chain genes, termed NM2A, NM2B and NM2C. We and others have previously shown that these myosins have very different kinetic properties from the skeletal muscle isoforms and these adaptations make the nonmuscle isoforms well suited for their functions in cells. I will describe the kinetics and single molecule mechanical properties of these nonmuscle isoforms and show how they differ amongst themselves and, more dramatically, from skeletal muscle isoforms. I will show that NMIIB is a particularly “unconventional” conventional myosin in that it has an intermediate duty ratio and a very strong affinity for ADP. We have also examined the filaments formed by these myosins and, again, see very distinctive differences between their structures and that of skeletal muscle myosin filaments. Finally I will describe recent studies on a class XVIII myosin which show that it is structurally related to class II myosins in that it has two “motor” domains tethered together by a long coiled-coil tail segment. However, myosin 18 does not hydrolyze ATP at a significant rate, binds weakly to actin in the both the presence and absence of ATP and does not translocate actin filament. Interestingly myosin 18 can self associate with NM2B filaments at low ratios of myosin 18: NM2B and at high ratios, myosin 18 disrupts the filament formation on NM2B.

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