Proximity of Two Heads in Smooth Muscle Myosin

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Introduction

It is already established that the interaction between the two heads are involved in the activation process of Smooth Muscle Myosin. Nevertheless, which parts of the interacting heads are involved in the phosphorylation dependent activation is still controversial. Two principal models, also referred to as parallel (MD-MD interaction) [1] and antiparallel (RLC-RLC interaction) [2], are contradictory. The goal of this study is to identify the domains involved in the activation and distinguish which model is correct.

Experimental

We measured six inter RLC residues distances in reconstituted unphosphorylated smooth muscle myosin. For that purpose, site directed spin-label (SDSL) was used with both continuous wave electron paramagnetic resonance (cw-EPR) and double electron electron resonance (DEER).

Results and Discussion

To account for finite size of the SDSL and its mobility we performed a Metropolis Monte Carlo Minimization (MMCM) to find the lowest energy i.e. most probable position of the label. Spin-spin distance comparison from both models, and EPR experimental data obtained for unphosphorylated monomers as well as smooth myosin filament, support the parallel “MD-MD” model.

Conclusions

The use of EPR as an appropriate tool for validating structural models in solution is highlighted.

References