

プロセッシブミオシンモーターの X線小角散乱 Solution Scattering Studies of Processive Myosin Motor

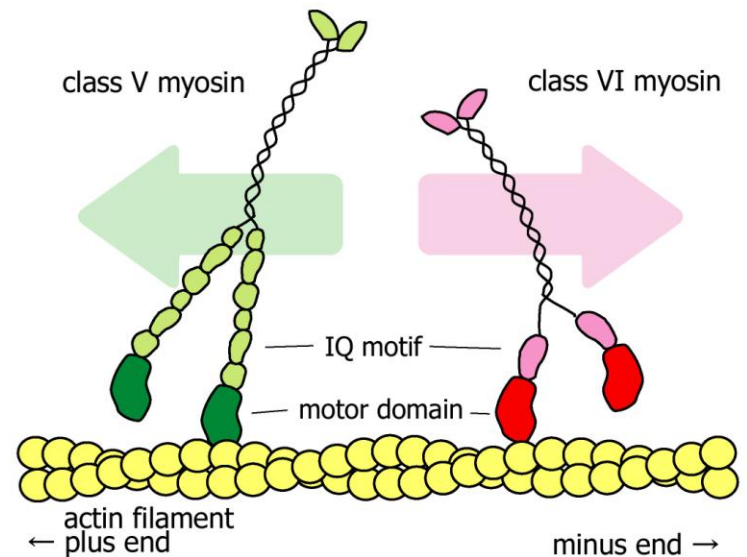
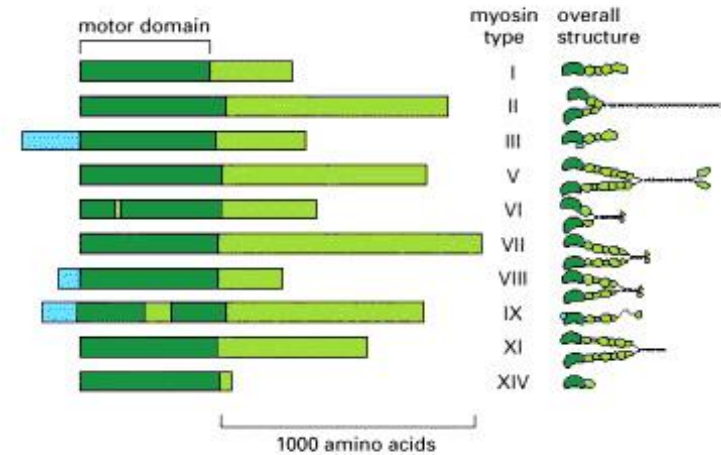
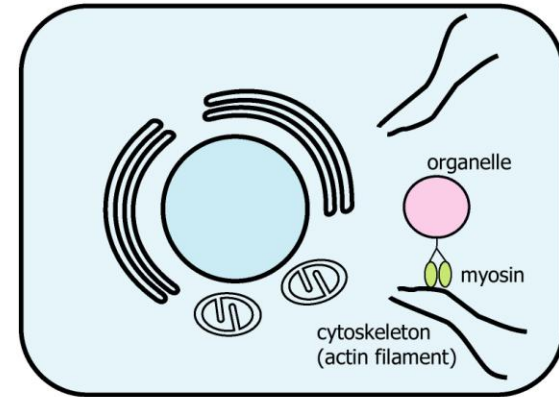
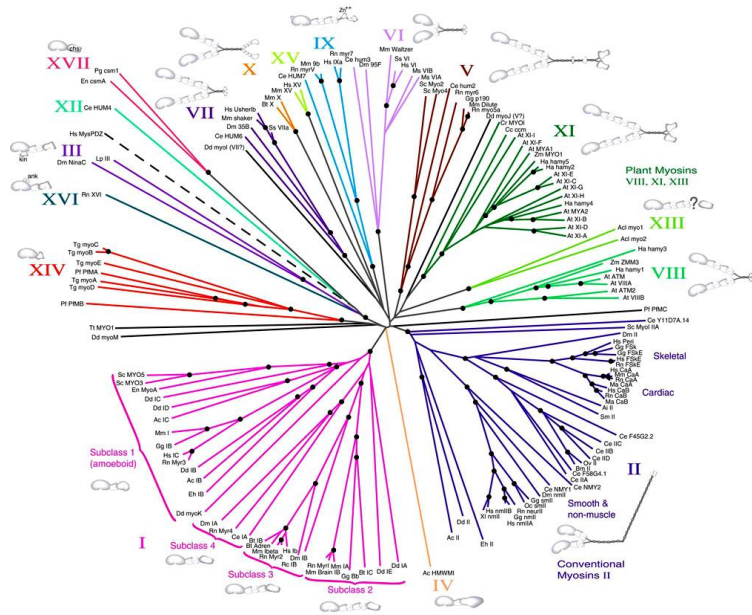
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1) 大阪大学基礎工学研究科

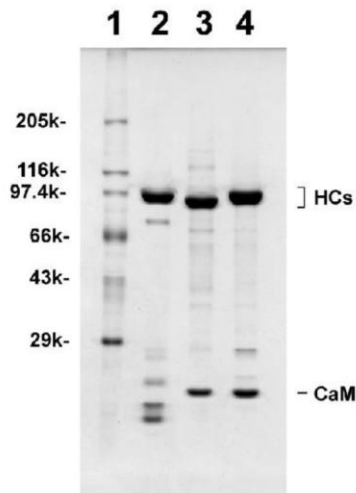
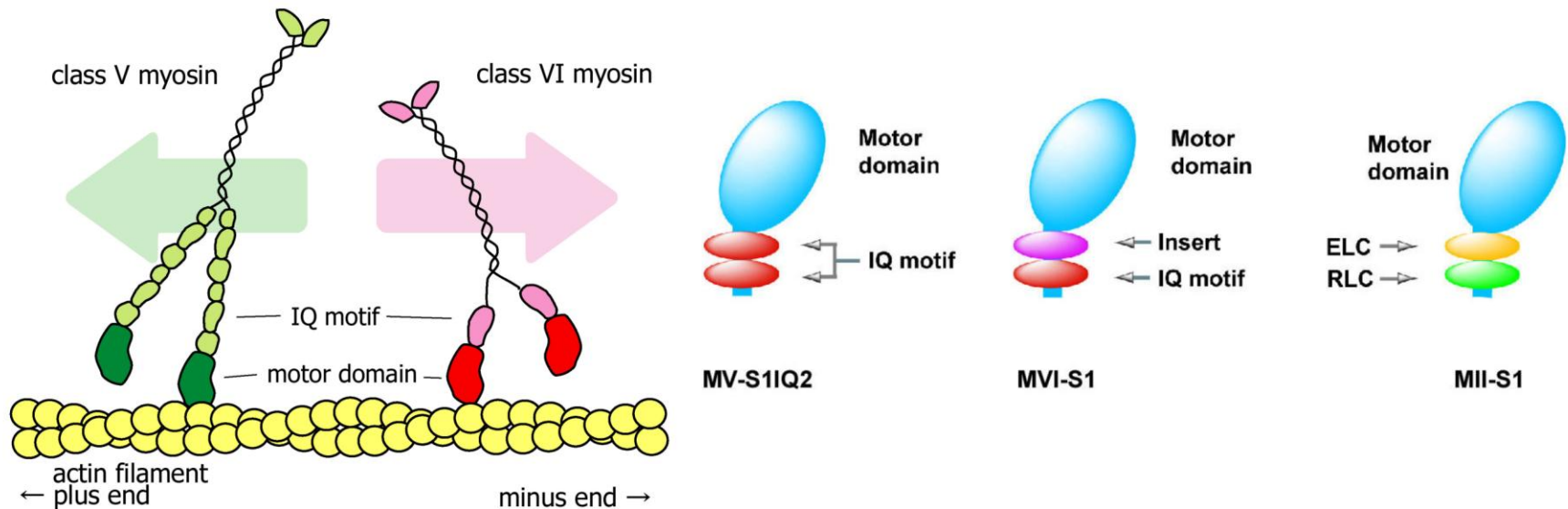
2) University of Massachusetts Medical School

Yasunobu Sugimoto, Osamu Sato, Shinya Watanabe,
Mitsuo Ikebe, Katsuzo Wakabayashi

Processive myosin motor



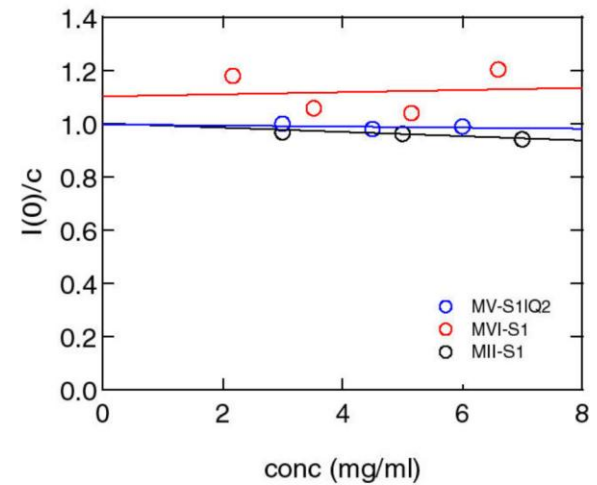
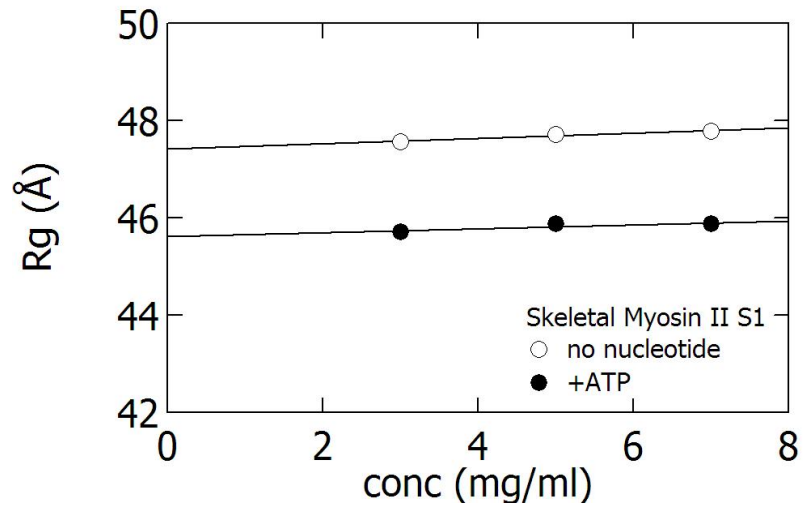
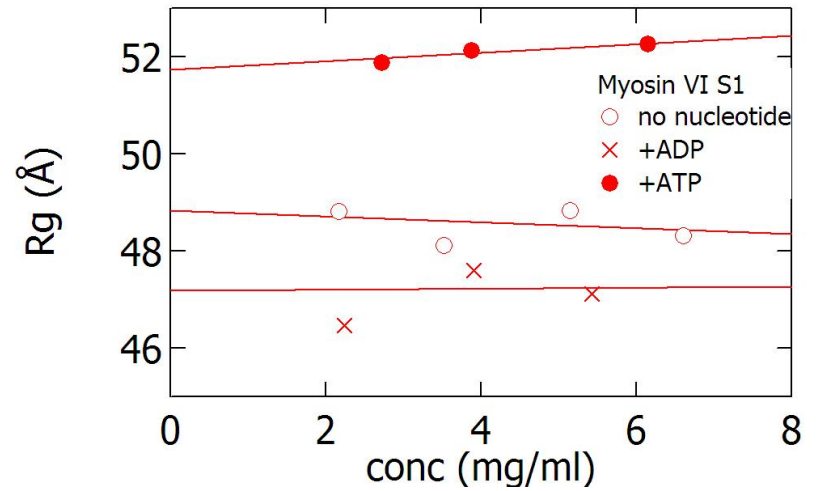
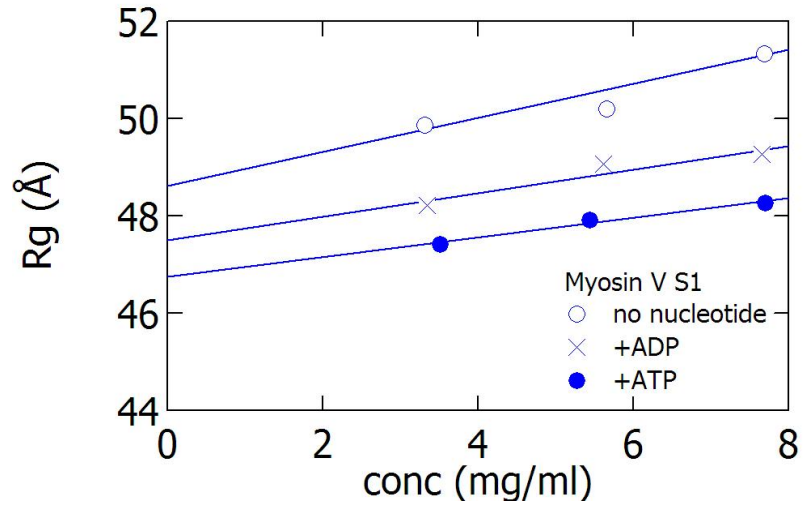
Myosin V and Myosin VI



Small-Angle X-ray Scattering Experiments

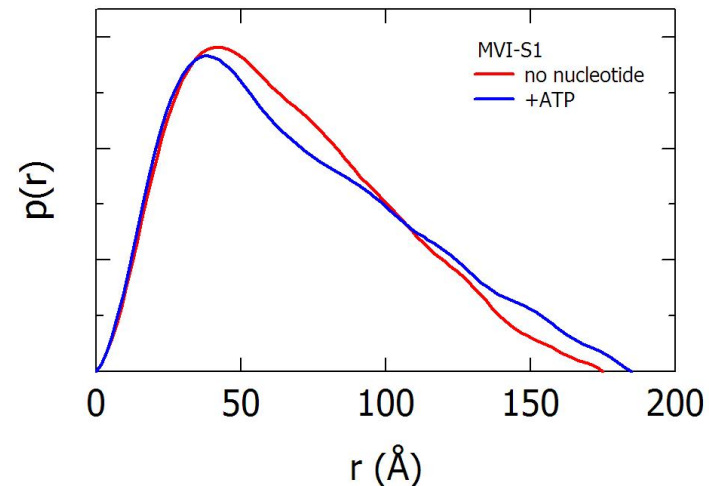
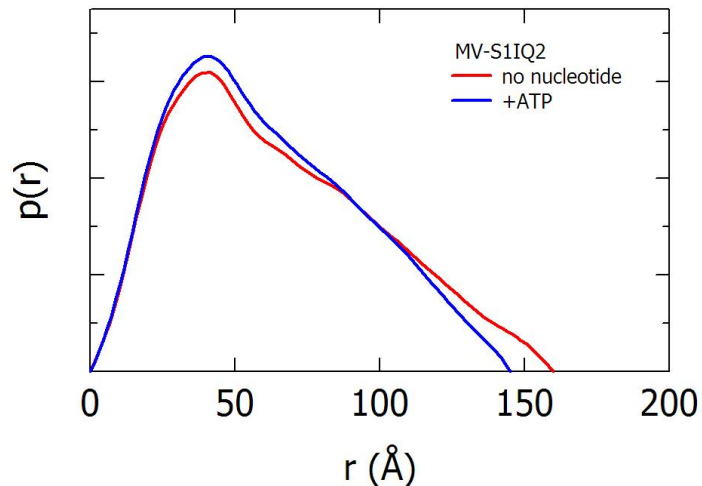
camera length : 2400mm/ 1200mm
 wave length : 1.5Å
 temperature : 20° C
 exposure time : 90sec
 station: BL15A1

Radius of gyration



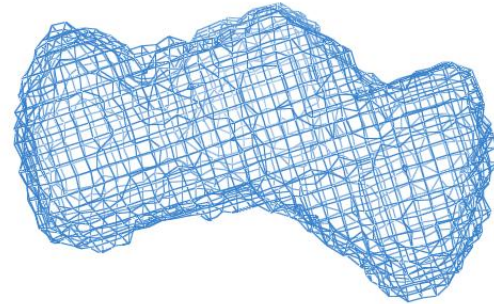
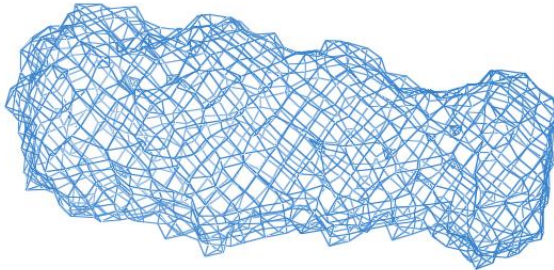
Results of X-ray scattering

sample		R _g (Å)	D _{max} (Å)	MW (kDa)
MII-S1	no nucleotide	47.8±0.05	160	130
	+ATP	45.6±0.04	150	
MV-S1IQ2	no nucleotide	48.6±0.26	160	130±7
	+ATP	46.8±0.20	145	
	+ADP	47.5±0.46		
MVI-S1	no nucleotide	48.8±0.06	175	144±18
	+ATP	51.7±0.09	185	
	+ADP	47.2±0.01		

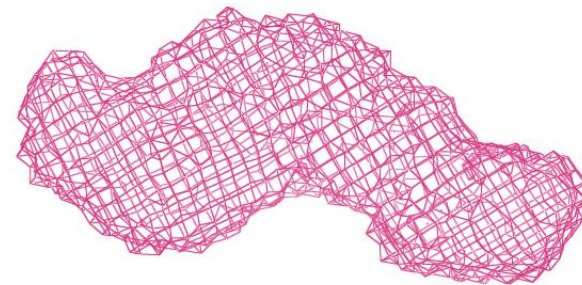
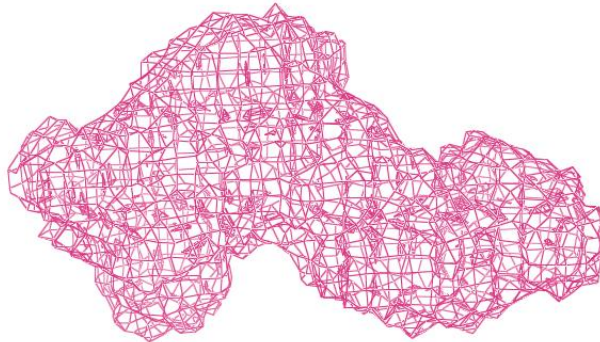


ab initio model

MV-S1IQ2



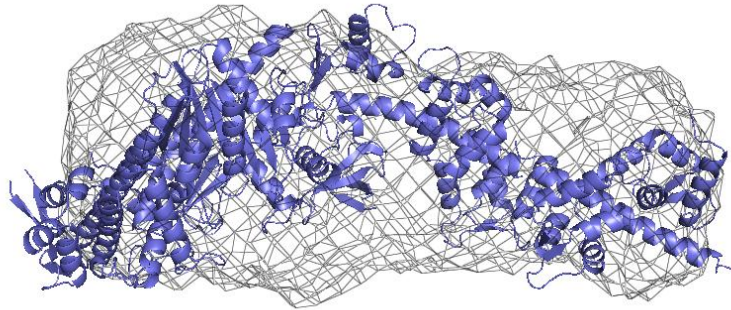
MVI-S1



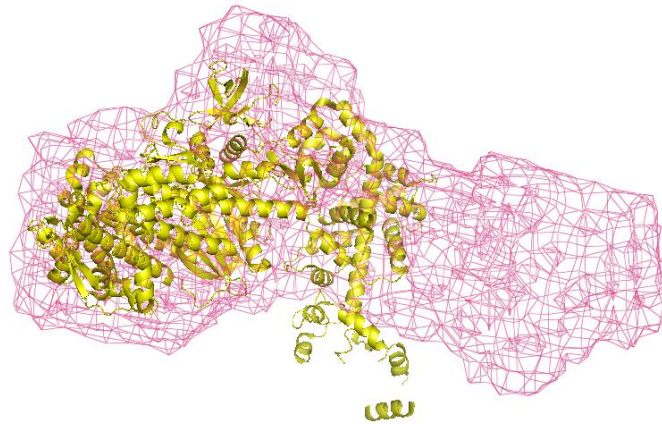
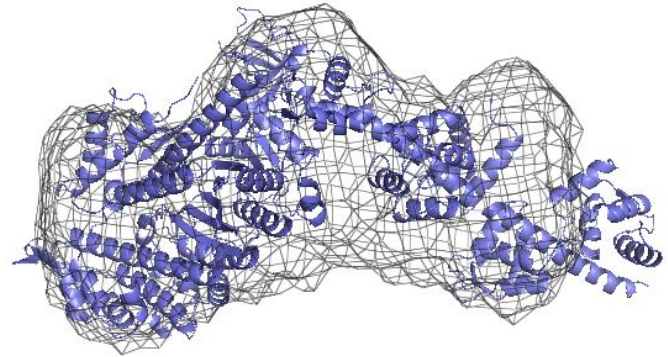
(no nucleotide)

(+ATP)

Comparison to crystal structures

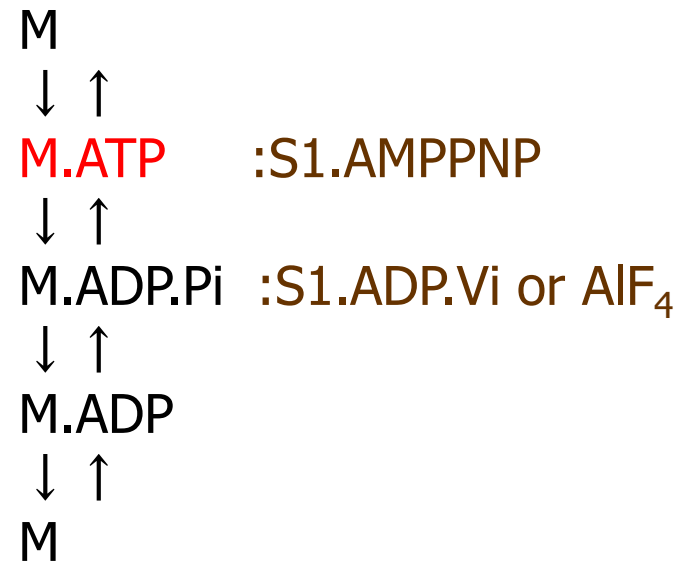
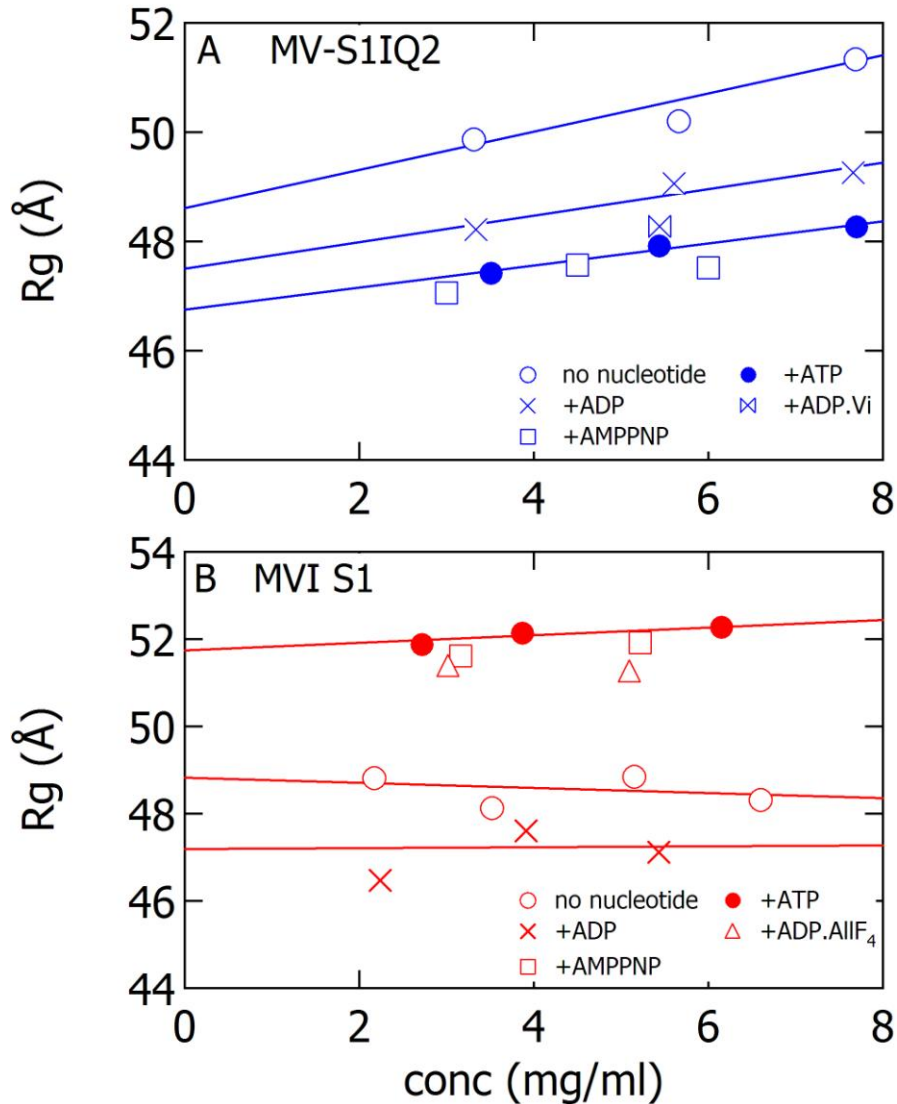


MV-S1IQ2 / 1OE9+2IX7



MVI-S1 / 2BKI

Nucleotide analogues



Nucleotide-dependent conformational changes

	MII-S1	MV-S1	MVI-S1
M	47.8	48.6	48.8
↓ ↑	↓ ↑	↓ ↑	↓ ↑
M.ATP	48.4	46.3	51.6
↓ ↑	↓ ↑	↓ ↑	↓ ↑
M.ADP.Pi	45.6	46.8	51.7
↓ ↑	↓ ↑	↓ ↑	↓ ↑
M.ADP	46.7	47.5	47.2
↓ ↑	↓ ↑	↓ ↑	↓ ↑
M	47.8	48.6	48.8

Conclusion

ミオシン class V、ミオシン class VIについてX線小角散乱によりATP加水分解中の構造変化を明らかにすることができた

- MV-S1IQ2の反応中間体(pre-power stroke)における構造変化は骨格筋ミオシンと似ているが、一方でMVI-S1は反対の構造変化を示す
- プロセッシブミオシンはATP結合直後に構造変化を生じ、ATP加水分解後に構造変化を生じる骨格筋と異なる性質を持つ
- MVI-S1の結晶構造解析による構造との比較では差異が見られる

