

Obstacle Effects on One-Dimensional Translocation of ATPase

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Abstract: We apply a general random walk model to the study of the ATPase's one-dimensional translocation along obstacle biological environment, and show the effects of random obstacles on the ATPase translocation along single-stranded DNA. We find that the obstacle environment can reduce the lifetime of ATPase lattice-bound state which results in the inhibition of ATPase activity. We also carry out the ranges of rate constant of ATPase unidirectional translocation and bidirectional translocation. Our results are consistent with the experiments and relevant theoretical consideration, and can be used to explain some physiological phenomena.

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Key words: random walk, average statistical time, obstacle

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