

Abstract Submitted
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Two-State Model of Allostery With Force YURIY PEREVERZEV, OLEG PREZHDO, Departments of Chemistry University of Washington, EVGENI SOKURENKO, Departments of Microbiology University of Washington — We propose an allosteric model that describes force-induced changes in lifetimes of biological receptor-ligand bonds. Transitions between the two conformations of the allosteric site with applied force lead to changes in the receptor conformation. The ligand bound to the receptor fluctuates between two different potentials formed by the two conformations. The effect of the force on the receptor-ligand interaction potential is described by the Bell mechanism. The probability of detecting the ligand in the bound state is found to depend on two relaxation times of the ligand and allosteric sites. An analytic expression for the bond lifetime is derived as a function force. The model is used to explain the anomalous force and time dependences of integrin-fibronectin bond lifetimes measured by atomic force microscopy (Kong, F. et al J. Cell Biol., 2009, 185, 1275-1284). The analytic expression and model parameters describe very well all anomalous dependences identified in the experiments.

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