

Abstract Submitted  
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**The broadcasting mechanism of master regulator  $NF\kappa B$  switches.**

DAVIT POTOYAN, Rice University — The transcription factor  $NF\kappa B$  is involved in many cellular responses. Therefore there is a large number of sites in the genome to which  $NF\kappa B$  binds thereby activating myriad of genes as a response to various environmental stimuli. Kinetics becomes an important feature to reckon with in eukaryotic regulatory networks with many targets like the  $NF\kappa B$  system. In particular models based on the classical picture of genetic switches predict slow down regulation of  $NF\kappa B$  which can lead to wasteful over-expression of genes. A way to resolve this difficulty is to evolve faster ways of deactivating  $NF\kappa B$ . There is evidence from experiments and our simulations that this is done by an  $I\kappa B$  induced process of stripping  $NF\kappa B$  off directly from its genetic sites instead of waiting for autonomous dissociation. The broadcasting mechanism proposed in this work solves the time scale problem inherent in the classical picture. Using combination of stochastic and deterministic models we show how such a mechanism results in efficient regulation of  $NF\kappa B$  network.

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