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## Stochastic switching of NF- $\kappa$ B system

NF- $\kappa$ B is a key transcription factor controlling immune responses such as inflammation, proliferation and apoptosis. Its regulatory system is tightly controlled by the numerous feedback loops. We pursue our earlier studies [1, 2] by considering not only two negative loops mediated by NF- $\kappa$ B inducible inhibitors I $\kappa$ B $\alpha$  and A20, which assures the oscillatory responses of NF- $\kappa$ B, but also a positive feedback loop mediated by the NF- $\kappa$ B inducible cytokine TNF $\alpha$ . This loop is negligible in many cell lines, but may become, as suggested by our study, dominant in immune cells like monocytes or macrophages that have a high level of TNF $\alpha$  expression.

### References

- [1] T. Lipniacki, K. Puszynski, P. Paszek, A. R. Brasier, M. Kimmel, *Single TNF $\alpha$  trimers mediating NF- $\kappa$ B activation: Stochastic robustness of NF- $\kappa$ B signaling*, BMC Bioinformatics 8 (2007), 376.
- [2] S. Tay, J. Hughey, T. Lee, T. Lipniacki, M. Covert, S. Quake, *Single-cell NF- $\kappa$ B dynamics reveal digital activation and analogue information processing*, Nature 466 (2010), 267–271.