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Similarities and differences in the p53-mdm2 and NF-kB feedback loops

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Ultradian oscillations in the p53 and NF-kB signalling systems are produced using similar mechanisms: a negative feedback loop combined with an effective time delay. However, seemingly small differences in the molecular implementation of this mechanism mean that the NF-kB system is in equilibrium in the resting state, while the p53 system is far from equilibrium. I will discuss how this affects the dynamical response of the systems. In particular, I will argue that the nonequilibrium driving makes the p53 system respond much faster to external stimuli than the NF-kB system. The interesting question then is whether this makes sense physiologically, and is consistent with the fact that p53 triggers cell-cycle arrest and apoptosis, while NF-kB triggers the immune response.