

Effects of DNA damage on the cell cycle through the circadian clock

Most cancer treatment induces DNA damage to eliminate highly proliferative cells. This process, however, also affects healthy cells creating numerous side effects ranging from infertility to heart problems. Cells respond differently to DNA damage depending on where they are in their cell cycle at the time of the treatment. Intriguingly, circadian rhythms provide temporal information to the cell cycle machinery to control the timing of cell divisions.

To understand the impact of DNA damage in altering the timing of cell divisions via circadian rhythms, we built a mathematical model and performed *in-silico* experiments for the proposed system that integrates circadian rhythms, cell cycle, and DNA damage response in *Neurospora crassa*. We composed a unified code for the analysis in the Matlab programming language to simplify examinations. We simulated the perturbation of the circadian clock and the cell cycle upon DNA damage and analysed the consequences of this perturbation on the following cycles using phase-response curves. Our results indicate that DNA damage induces an indirect effect on the timing of cell cycle through the *Neurospora* circadian clock.

Summary

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