

Most cancer treatment induces DNA damage to eliminate highly proliferative cells. This process also affects healthy cells creating side effects. Cells respond differently to DNA damage depending on where they are in their cell cycle at the time of the treatment. Intriguingly, circadian rhythms control the timing of cell divisions. Personalized chronotherapy based on this: the time of the treatment is fitted to the patient's natural daily rhythm. We built a mathematical model containing the circadian rhythm, cell cycle, and DNA damage response in *Neurospora crassa* and performed in-silico experiments. We simulated the perturbation of the circadian clock and the cell cycle upon DNA damage and analysed the consequences using phase-response curves. We can observe, in the subjective night the phase shift is near to 0, but in the subjective day, high phase advance appears. We analysed the behaviour of the cell cycle, where the cell cycle time and the strength of coupling between the circadian rhythm and cell cycle was noisy. We observed, depending on the timing of the induction of DNA-damage, the healthy cells react differently: they can continue their normal division or they can be perturbed as the side-effect of the treatment.