

Abstract

It is well established that DNA lesions trigger cell cycle check-points causing a mitotic delay that is required for their repair before cells enter the mitotic phase. Caffeine, in some cases, can remove this delay and consequently potentiates the yield of induced chromosome aberrations. The objective of this study was to test the effect of a G2 treatment with S-dependent agents (UV light and mitomycin C) on the cell kinetics of a G2 cell population and evaluate whether post-treatments with caffeine could modulate removal of the expected cell cycle delay. Cell kinetics were monitored by analysing the mitotic index (MI) values in combination with the 5-bromo-2'-deoxyuridine (BrdUrd) labelling technique. Chinese hamster fibroblast cultures (AA8) were treated in G2 phase of the cell cycle with 8 and 15 J/m² UV light or 0.1 and 0.6 microgram/ml mitomycin C for 1.5 h. Post-treatments with caffeine were performed at dose levels and recovery times where the mitotic indices were substantially reduced. The results obtained showed that both UV light and mitomycin C induced a G2 arrest, as indicated by MI values and the absence of BrdUrd-labelled metaphases. For UV light the G2 block was observed at lower and higher dose levels after 1.5 h, while for mitomycin C it was observed only at the higher dose level after 1 h. However, in both cases the block lasted approximately 1 h, after which, even though slowed down, the cell population entered mitosis, as indicated by increased MI values. This block was not removed by caffeine post-treatment. In contrast, caffeine G2 post-treatment was able to remove G2 arrest induced by G1-S treatments. Accordingly, our results suggest that both UV light- and mitomycin C-induced damage must be processed during S phase to allow caffeine to remove induced G2 blocks.