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Article title: **Effects of nocodazole and ionizing radiation on cell proliferation and delayed luminescence**

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Abstract

We investigated the relation between cell proliferation, delayed luminescence (DL), microtubule integrity and DNA damage in Hansen wild-type *Saccharomyces cerevisiae* yeast cells. We used the antimitotic drug nocodazole (4 μg/ml) to dissolve microtubules, and proton- and γ-radiation (dose 200 Gy) to induce substantial DNA damage. We assessed cell proliferation, clonogenic survival and delayed luminescence. We inferred that microtubules contribute with at least 15% to DL emission at two specific wavelengths, 460 nm and 509 nm. At 200 Gy, γ-irradiated but not proton-irradiated cells are able to activate the G_2/M checkpoint. We estimated that the number of DNA double-strand breaks (dsbs) produced by protons is at least 1.42 higher than that produced by γ rays. However, the relative yield of lethal DNA lesions is virtually identical (about 63%) for both radiation types. We propose that radiation induced cell death could be determined quantitatively by the number of ionization clusters produced in DNA rather than by the total number of dsbs. Both radiations induced specifically a consistent increase in DL emission of red (645 nm) light. DL might be correlated with activation of molecular species involved in cellular repair after irradiation, but not to radiation-induced damage of the DNA or the microtubules.