Removal of heat-released DSB

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Every year a lot of cancer patients benefit from radiation therapy. Although radiation treatment is used for long periods of time, all effects caused by ionizing radiation and recovery mechanisms of healthy and cancer cells after such treatment are not fully understood. As ionizing radiation induce complex damage, several repair mechanisms are activated in response to ionizing radiation. Understanding the regulation and connection between these repair mechanisms could possibly provide increased efficiency of radiation therapy in future.

DNA double-strand breaks are one type of lesions that are induced by ionizing radiation. This type of lesion is extremely toxic and even one failure to repair DNA double-strand break can lead to cell death. The main repair mechanism of DNA double-strand breaks in human cells is non-homologous end joining.

Another type of lesion induced by ionizing radiation is DNA heat-labile sites. This type of lesion is not observed *in vivo*. The kinetics of DNA double-strand break repair is determined by pulsed-field gel electrophoresis. and heat-labile sites are detected if a sample is heated during preparation for analysis. DNA heat-labile sites are also induced by chemical agents, for example, methylmethane sulfonate. As there is no evidence that methylmethane sulfonate induces DNA double-strand breaks, this agent was used in study to reduce the complexity of induced lesions.

Several years ago evidence that the DNA double-strand break repair process is independent from radiation-induced DNA heat-labile sites was provided. It was proven using two different protocols for the same sample treatment – lysis in decreased and increased temperature. Lysis in decreased temperature does not allow DNA heat-labile sites transform into DNA double-strand breaks. Still it is possible to find studies that use an increased temperature protocol during sample preparation that allows DNA heat-labile sites transform in DNA double-strand breaks. Therefore these scientists indirectly claim that DNA double-strand break repair is connected with removal of DNA heat-labile sites.

Thus the aim set for the study was to investigate if DNA double-strand break repair mechanism is involved in chemically induced DNA heat-labile site removal.

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