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DNA end resection is required for the repair of complex lesions in human G1 cells

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We study DNA double strand break (DSB) repair with heavy ion radiation. As densely ionizing radiation it generates strictly localized DSBs within the nucleus and thus, represents an excellent tool for investigating the recruitment of repair factors to DSBs by immunofluorescence. Applying this technique we were able to show that with increasing lesion complexity DSBs induced in the G1 cell cycle phase require resection since RPA is located at DSBs in G1. This was surprising as DSB resection is mostly known as a prerequisite of homologous recombination in the S and G2 cell cycle phase. We further revealed that the nucleases CTIP, MRE11, and EXO1, which are already known for resection in G2 are also crucial for the observed resection in G1. Their concomitant down regulation by RNA interference completely prevents resection in G1. Further, our data reveal that resection of ionizing radiation induced DSBs is important for their repair and thus cell survival. In our presentation we will further discuss the regulation of DSB resection in G1 upon heavy ion irradiation.

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