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Single cell visualization of DNA repair *in vivo*. AZADEH SAMADANI, Brandeis University, AMY ROWAT, SEAS, Harvard University, JENNIFER MAKRIDAKIS, JAMES HABER, Brandeis University — The creation of a DNA double-strand-break constitutes the most dangerous type of DNA damage. Inefficient response to DNA damage may lead to hypersensitivity to cellular stressors, susceptibility to genomic defects and resistance to apoptosis, which can lead to cancer. Current research on DNA repair has enabled numerous breakthroughs in our understanding of the DNA repair mechanisms at the population level. However, similar understanding at the level of single cells has been lacking mainly because of two reasons: 1) population level measurements do not visualize the repair process and therefore the exact mechanism by which the donor and recipient sequences are brought together is not well understood. 2) they are only sensitive to the mean of a distribution and usually hide the cell-to-cell variability of the repair processes. In my lab we utilize a multidisciplinary approach to address specific aspects of the DNA repair at the single cell level. By tagging several locations on DNA, its dynamic is visualized. furthermore the exact timing of the repair process is measured. In our experiments, individual cells are followed over long periods of time and many cellular generations in a microfluidic device, in which a precise control of the microenvironment of the cells is possible

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