Chromatin dynamics during DNA damage-consequences for repair and nuclear integrity

Phillip Oberdoerffer*, National Cancer Institute

Abstract
DNA double-strand breaks (DSBs) occur in the context of a highly organized chromatin environment and are, thus, a significant threat to the epigenomic integrity of eukaryotic cells. Changes in break-proximal chromatin structure are thought to be a prerequisite for efficient DNA repair and may help protect the structural integrity of the nucleus. Unlike most bona fide DNA repair factors, chromatin influences the repair process at several levels: the existing chromatin context at the site of damage directly affects the access and kinetics of the repair machinery; DSB induced chromatin modifications influence the choice of repair factors, thereby modulating repair outcome; lastly, DNA damage can have a significant impact on chromatin beyond the site of damage. Our lab has recently identified DSB-induced chromatin condensation as an unexpected yet critical modulator of repair outcome and efficiency. These findings will be discussed in the context of known break-proximal chromatin alterations to highlight the complexity and importance of dynamic and tightly orchestrated chromatin reorganization during DSB repair.

Keywords: DNA double-strand breaks (DSBs), Chromatin structure, DNA damage and repair.

* Presenting author