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2. Title
   Development and Application of a Novel Genotoxicity Test With DNA Repair Monitoring

3. Period
   2023-2025

4. Summary

Nucleotide excision repair (NER) plays an important role in the maintenance of genetic stability by removing DNA helix-distorting lesions from our genome. We have recently developed a novel system for detecting core NER factors recruited to damaged DNA sites using a BioID (Proximity-dependent biotin identification) technology. In this study, we have tried to extend this system to the novel genotoxic test with a new concept. We used a XP2OSSV cell line stably expressing TurboID-XPA to monitor the biotinylation of p62 and XPB subunits of TFIIH, one of core NER factors, after the treatment of various types of DNA damaging agents. We reproducibly detected the p62/XPB biotinylation after the treatment of chemicals such as benzo[a]pyrene diolepoxide (BPDE), cisplatin and so on, which induce NER substrates. We also observed that a high concentration of cigarette smoke extract (CSE) itself is able to induce p62/XPB biotinylation, while metabolic activation by S9 mix causes the biotinylation with less concentration of CSE. Taken together, these results strongly suggest that our assay system using a BioID technology would be applicable to a novel genotoxic test for monitoring the chemicals inducing NER substrates.