The repair of oxidative DNA damage in the Chinese hamster cell line deficient in nucleotide excision repair

Abstract

The aim of our work was to specify DNA oxidative damage repair in the Chinese hamster ovary cell line.

Comet assay was used to detect the damage consequences – DNA breaks. We were capable of achieving high method sensitivity due to application of specific endonucleases and specific inhibitors of excision repair – inhibitor of poly(ADP—ribose)polymerase PARP 3-aminobenzamide (3-AB) and cytosine arabinoside with hydroxyurea (AraC/HU).

PARP-1 is an important factor in the base excision repair (BER) process. PARP-1 deficient cells show recovery impairment both in LP-BER and SP-BER way. AraC/HU is known as the long-patch excision repair inhibitor.

The results of our experiments showed the inhibiting effect of 3-AB on the repair of hydrogen peroxide-induced DNA damage. But in the same setting the AraC/HU effect on repair was not observed. To make the value of experimental results more significant and clear, we decided for additional experiments with monofunctional alkylating agent methyl methanesulfonate (MMS). Damage caused by MMS showed slower repair both when 3-AB or AraC/HU were present during the repair period.

Based on all available results we suppose that the MMS and also hydrogen peroxide damage repair in the Chinese hamster ovary cell line is the BER origin. MMS experiments helped us to distinguish between the subtypes of BER. They indicate that in case of the MMS damage LP-BER mechanism of repair plays a crucial role while in case of the hydrogen peroxide-induced damage SP-BER becomes the corner stone of repair.

Keywords: Base excision repair, PARP, XRCC1, hydrogen peroxide, MMS