Az értekezés címe:The effects of the ultraviolet B radiation and other genotoxic agents on the chromatin structure of mammalian cells
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Summary

The aim of our experiments was the visualization of chromatin changes taking place in human erythroleukemia cells during the interphase upon UVB irradiation and other genotoxic agents, to compare the different structures, apoptotic features and to categorize them.

Two different approaches were used to answer the questions, involving biochemical and morphological studies.

We have provided evidence that the reversible permeabilization that allowed the visualization of chromatin structures of interphase nuclei did not reduce significantly the viability of cells and that DNA synthesis taking place in permeable K562 cells is an ATP dependent process. UVB irradiation inhibited replicative DNA synthesis and activated repair synthesis. Our flow cytometry measurements proved that small apoptotic cells did not appear within a few hours after UVB irradiation i.e. apoptosis does not occur within this short period of time. UVB irradiation and reversible permeabilization did not induce the apoptotic shrinking of cells. Based on our measurements in K562 cells UVB irradiation blocked chromatin condensation in the early stage of S phase between 2.2 and 2.4 C values.

In further experiments at lower UVB doses (2, 5, 15 J/m2) chromatin changes were observed only occasioanally, while the weaker UVA irradiation of higher wavelength generated noticable chromatin changes at lower doses. The basic difference between the chromatin structures of exponentially growing K562 cells after gamma and UVB irradiation was that in UVB treated cells there were only a few apoptotic bodies, and chromatin condensation was blocked in its fibrillary stage, preventing the formation of metaphase chromosomes. Examination shed light on similar effects of genotoxic agents such as the local density increase of chromatin or the quite opposite effects involving desintegration, depolarization, exclusion of nuclear material, disruption of nuclear membrane. However, significant differences were also observed, that resulted in a specific chromatin pattern, typical to the agent. Morphological changes generated by genotoxic agents pointed to the possibility that these changes could be categorized. Cellular ethology and viability studies by our long therm scanning (LTS) system after mercuric acetate, led nitrate and nickel chloride confirmed the results of morphological analyses.

These results may contribute to the understanding of the mode of action of genotoxic agents at the chromatin level and contribute to the knowledge of eukaryotic chromatin condensation under normal and pathologic conditions.

kulcsszavak (keywords):
reverzibilis permeabilizálás, kromatin, kondenzálás, sejtciklus, apoptózis elutriálás
(reverzible permeabilisation, chromatin, condensation, cell cycle, apoptosis, elutriation)