DETERMINATION OF GENOTOXIC EFFECT OF CAPSAICIN ON HUMAN PERIPHERAL BLOOD MONONUCLEAR CELLS WITH COMET ASSAY

Milev, M., Maksimova, V., Ruskovska, T.
University "Goce Delcev" Stip, Republic of North Macedonia
misko.milev@ugd.edu.mk

Introduction

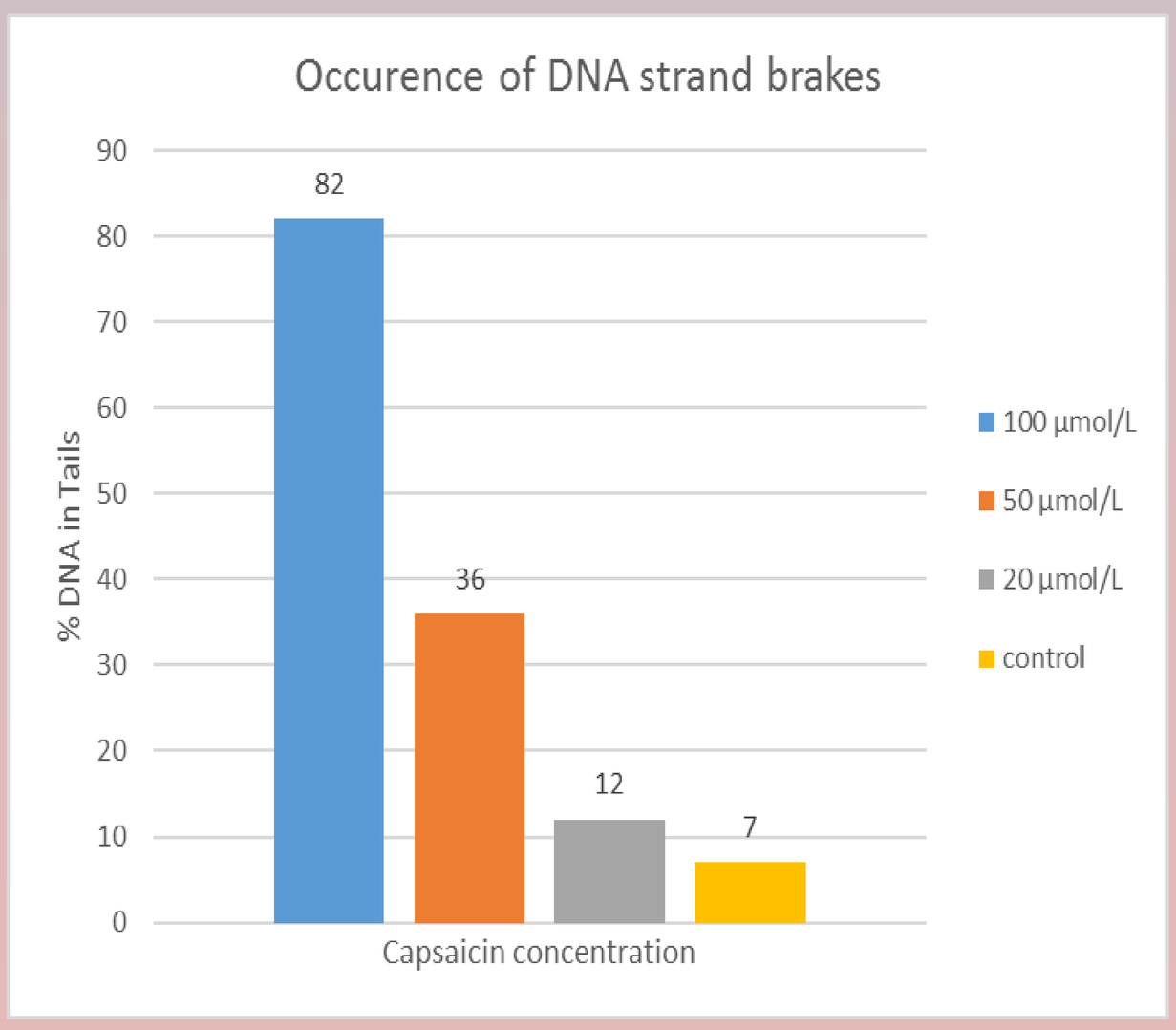
Capsaicin is the major representative of the group of proto-alkaloids called capsaicinoids, isolated from hot peppers. Despite the positive health effects of capsaicin seen previously, there are also studies that suggest that capsaicin may act as cytotoxic and genotoxic agent on some human cells.
A considerable number of assays exist for detection of different genotoxic effects. The Comet assay is widely used because it is technically simple, sensitive, relatively fast, and cost-effective, and DNA damage can be detected and quantified in different cell types without requirement for cell culture.

Materials and methods

The cells are embedded in agarose and lysed, generating nucleus-like structures in the gel – nucleoids. Following alkaline electrophoresis, the DNA strands migrate towards the anode and the extent of migration correlates with the number of strand breaks (SB) in the nucleoid. The migration is visualized and scored with a light microscope after silver staining.

Results

Thirty minutes of treatment with capsaicin concentrations in the range of 100 - 200 µmol/L resulted in high occurrence of single and double SB. Concentration of 50 µmol/L caused moderate DNA damage, and lower concentrations (20 µmol/L) provoked only minor changes in the genome without DNA lesions.



Conclusion

High concentrations of capsaicin results in high DNA damage, however physiologically normal concentrations do not cause any changes in DNA structure.
Although not all types of genotoxic exposures should be expected to result in DNA damage in mononuclear blood cells, the Comet assay seems to be a valuable tool for detection of genotoxic exposure in humans.

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