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ABSTRACT FORM

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Abstract title

The FTIR spectroscopy as a method of choice for detecting changes in DNA profiles of the mouse embryonic fibroblasts after the treatment with 5-aza

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Abstract

Double-strand deoxyribonucleic acid (dsDNA) carries the genetic information needed for normal development, growth, survival and reproduction of all living beings (except RNA viruses and other potential DNA-less microorganisms). On top of it, epigenetic processes orchestrate the cell type-specific use of the genetic information essential for normal development and for maintaining the overall integrity of the genome. The alteration of epigenetic marks (e.g. DNA methylation patterns) by hyperglycaemia, oxidative stress and inflammation may have potential epigenetic impacts on gene regulation in diabetic individuals. We used the Fourier transform-infrared (FTIR) spectroscopy (ALBA synchrotron, Cerdanyola del valles, Spain) for qualitative spectral analysis of DNA from mouse fibroblast cells (NIH3T3) and the same cells treated with demetilating agent 5-azacytidine (5-aza). FTIR spectroscopy has the advantage of generating structural information of the entire DNA molecule in a single spectrum, including possible conformational sub-states, present in the sample (methylated/nonmethylated cytosine). The technique is ideal for systematic studies of DNA/RNA sequence variations and covalent modifications, since it is non-destructive and requires only small sample amounts. The FTIR region of interest when studying nucleic acids is 1800–900 cm-1.We obtained the global information regarding the DNA profiles in NIH3T3 with and without 5-aza treatment by FTIR spectroscopy. Some differences in DNA methylation profiles between examined cell lines were qualitatively described by FTIR spectroscopy and compared with restriction analysis method. Using FTIR spectroscopy the most interesting picks were observed approximately at wavelength: 2960-2850 cm-1, 1400-900 cm-1 and 1150 cm-1. These results are in the same time a verification of the proof of principle for synchrotron-based FTIR micro-spectroscopic detection of the differences in the DNA methylation profiles in cells.

* Please do not exceed 2000 characters including introduction, material methods, results and conclusions.