

5th Edition of International Conference on
Clinical Oncology and Molecular Diagnostics
&
5th World Congress on **Medical Imaging & Clinical Research**
June 17-18, 2019 Rome, Italy

Applications of the radiation-induced biomarkers for the detection and assessment of absorbed doses by oncology and onco-hematology patients periodically exposed to therapeutic doses of ionizing radiation

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Radiation therapy, some chemotherapies and diagnostic assays such as PET scan use high-energy radiation to affect or mark the tissue or blood tumours for therapy or diagnostic of the disease. X-rays, gamma rays and high-energy particles are types of radiation used for diagnostic and cancer treatment. A machine, outside the body, could deliver the radiation, or ionising radiation may come from a radioactive material placed inside the body nearby the tumour (internal radiation therapy, brachytherapy). About half of all cancers' patients, receive some type of radiation during the course of their treatment and tracking of the disease. The dose assessment of the received accumulative dose is valuable information for the optimization of the future treatment, diagnostic or tracking of the disease. The optimizing received ionizing radiation dose determines a lower risk of relapse of the disease. The analysis of chromosomal aberrations by different techniques is the most developed method of quantifying dose to individuals exposed to ionising radiations. The dicentric chromosomes assay observed in metaphases from peripheral blood lymphocytes is a routine technique used in case of acute exposures to assess radiation doses. The IR-induced cytokinesis-block micronucleus assay for generated micronuclei (MNs) in bi-nucleated cells is another bio dosimetry method, efficient to assess received radiation doses. The aim of current research was to generate ionizing radiation curve for dicentric chromosomes and micronuclei formation from peripheral blood lymphocytes taken from oncology and onco-haematology patients, by using described bio dosimetry methods. A study of radiotherapy-irradiated patients' human peripheral blood lymphocytes conducted to establish a dose-response curve for IR-induced dicentric aberrations and IR-induced generated MN. The dynamic changes of the chromosomal aberrations and the DNA damage are analysed in cancer diseased patients, exposed to therapeutic doses of radiation. The results from both assays give us valuable information about the received radiation doses and DNA damages, because of the received accumulative radiation dose. The research work gave strong results about the efficiency of both methods for dose assessment of the patients, comparison between both methods and correlation among them.

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