

COMPARATIVE STUDY OF CYTOGENETIC EFFECTS OF ^{153}Sm -EDTMP IN BLOOD LYMPHOCYTES OF PATIENTS WITH METASTASIS IN VIVO AND IN VITRO

M.A. Silva¹, M.F. Suzuki¹, D. Murakami¹, M.I.C.C. Guimarães² and K. Okazaki¹

¹Divisão de Metrologia das Radiações – IPEN – CNEN/SP, ²Centro de Medicina Nuclear – FMUSP – SP – Brazil

The ^{153}Sm -EDTMP is a radiopharmaceutical used in nuclear medicine for relief of metastatic bone pain with promising results. Therefore, there are a few studies about the effects of ^{153}Sm -EDTMP in human cells. This study was conducted for the evaluation of the cytogenetic effects of ^{153}Sm -EDTMP in blood lymphocytes from patients with bone metastasis (without previous radio or chemotherapy), using the chromosome aberration technique. The degree of cytologic damage found in 'in vivo' blood cells of patients was compared with those found in 'in vitro' in an adjusted dose-response curve. Blood samples were collected before and one hour after the administration of ^{153}Sm -EDTMP (about 42 MBq/kg). The frequency of structural chromosome aberration per cell observed in one hour samples (0.054 ± 0.035) was higher than basal ones (0.031 ± 0.026), although this difference was not statistically significant ($p = 0.101$). For 'in vitro' assay, blood samples were exposed to different concentrations of ^{153}Sm -EDTMP, during one hour ($0.37 - 1.11$ MBq/mL). There was an increase in the frequency of chromosome aberration per cell in function of the radioactive concentration. The data were adjusted by linear regression model ($Y = 0.03522 \pm 0.02241 + 0.1115 \pm 0.03460.D$). The frequency of aberration/cell found in vivo was 0.054 and for the same activity in vitro was 0.101, this difference being statistically significant ($p = 0.02$). This result may be related to urine excretion rate, blood clearance, osteoblastic activity and individual variability. For a more accurate analysis the analysis of more donors is necessary.

INDUCTION OF MICRONUCLEI BY ^{153}Sm -EDTMP IN PERIPHERAL BLOOD LYMPHOCYTES OF PATIENTS WITH BONE METASTASIS

M.F. Suzuki¹, M.A. Silva¹, D. Murakami¹, M.I.C.C. Guimarães² and K. Okazaki¹

¹Divisão de Metrologia das Radiações – IPEN – CNEN/SP

²Centro de Medicina Nuclear – FM – USP/SP

The purpose of this study was to evaluate the degree of cytologic radiation damage to peripheral blood lymphocytes induced by ^{153}Sm -EDTMP applied for relief of metastatic bone pain. Blood samples from 16 patients (32 – 82 years old) were collected before and one hour after the administration of a mean activity of 40.5 (± 5.5) MBq/kg of ^{153}Sm -EDTMP. Then the lymphocytes were cultured for cytokinesis block micronucleus (MN) assay. The number of MN per binucleated cells (CB) before the treatment was 0.07 (± 0.06) and after one hour 0.08 (± 0.06). There was interindividual differences and the spontaneous values of MN/CB of the patients without previous radiotherapy (RT) was lower than those submitted to RT. The increment in the percentage of CB with MN was similar in both analyzed groups (with and without previous RT). The observed values of MN/CB in patients without previous RT was equivalent to a dose range of 0.08 to 0.10 Gy of ^{153}Sm -EDTMP in vitro. The relatively low frequency of lymphocyte with micronuclei one hour after the exposure to ^{153}Sm -EDTMP supported the idea that radiation damage in lymphocytes of patients with painful bone metastasis was minimal but later stochastic effects may be significant.