

SUMMARY

ECHEIMBERG, J. O. **Development of an experimental method for measures of single strand breaks (SSB) and double strand breaks (DSB) in molecules of deoxyribonucleic acid (DNA) irradiated by proton beams of 10 MeV.** 2003. 107 pp. Dissertation of Master's degree - Institute of Physics, Universidade de São Paulo, São Paulo.

Nowadays there is great interest in the application of proton beams in therapies for the control of cancer due to the Bragg curve with its characteristic peak. However, as the experiments to measure the interaction proton-DNA are of difficult accomplishment, the knowledge regarding the effects of this interaction type is not sufficient. The experimental difficulties are largely intensified due to the energy range of the proton at 10 MeV. The project of the experimental apparatus was calculated strictly through computational simulations with the GEANT 3.21 simulation tool. The apparatus was compound by a system of sample compartment and supports, all pieces made on aluminum. An alternative dosimetric method was accomplished through the measurements of proton tracks in polymer films (Makrofol-E), which also serve as blocking to the samples of DNA. The Makrofol-E efficiency found was $(0,75 \pm 0,25)\%$. The electrophoresis technique in agarose gel was improved and a program was especially built for analysis and quantification of the SSB and DSB damages. The survival fraction, ϕ , obeys exponential decay law with dose. The decaiment constants, γ , for aqueous DNA and aqueous DNA plus glycerol (7,4 mM) were $(30 \pm 7) \cdot 10^{-4} \text{Gy}^{-1}$ and $(39 \pm 6) \cdot 10^{-4} \text{Gy}^{-1}$, respectively.

Key word: Proton, DNA, SSB, DSB, electrophoresis, sample compartment, quantification