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# STUDY ON THE DOSE OF CISPLATIN RADIOLABELED WITH PT-191 BY COMPUTER SIMULATION

BUSSOLOTTI, G.R.[1,2], KRSTIC, D.[3], NIKEZIC, D.[3], LEAL, A.S.[1] and MENDES, B.M.[1]

[1]Centro de Desenvolvimento da Tecnologia Nuclear, 31270-901 Belo Horizonte, MG, Brazil
[2]Universidade Federal de Minas Gerais, 30130-100 Belo Horizonte, MG, Brazil, giovanabussolotti@gmail.com
[3]Department of Physics, Faculty of Sciences, University of Kragujevac, 34000 Kragujevac, R.Domanovic 12, Serbia

**Introduction:** Cisplatin is currently used in the treatment of many tumors, such as head and neck, esophagus, bladder, testicle, etc. It has also been proven effective against many other types of cancer, including carcinoma, lymphoma, sarcomas, and germ cell tumors. In vitro studies suggest that after radiolabeling, there is a possibility of synergy between the radiotherapeutic and chemotherapeutic effects of cisplatin. Radioactive cisplatin also enables imaging procedures that can provide information about biodistribution in sensitive organs and in tumors, allowing better treatment management. Activation of natural platinum in a reactor is feasible, but generates several radioisotopes (Pt-191, Pt-193m, Pt-195m, Pt-197 and Pt-199). Prior to any clinical study with activated cisplatin, a dosimetric study including all radioisotopes is mandatory. In this work we evaluated the Pt-191 dosimetry as a part of the whole activated natural cisplatin dosimetric evaluation.

**Material and method:** MCNP6.1 was used for radiation transport. Adult male and female analytic and ICRP 110 voxelized phantoms were used for caculating S-values from source organs. Time integrated activity coefficients (TIAC) were derived using biological half-life of cisplatin in source organs described in the work of Sathekge et al., (2013) and physical half-life of Pt-191. A computer program was developed in house in $C^{++}$ to extract absorbed dose per source particle data from the output files. The absorbed dose in all organs of the phantoms and effective dose per injected activity were calculated using the source organ TIACs. Dosimetric results from MIRDCalc software were also included for comparison purposes.

**Results**: The absorbed dose results for the main organs are presented in figures 1 and 2. The full tables can be obtained with (giovanabussolotti@gmail.com). Higher absorbed dose values were obtained for spleen, liver, kidneys, gallbladder and adrenals. The effective dose per injected activity calculated using the analytical phantoms was 0.22 mSv/MBq. Effective dose was ICRP voxelized phantons and MIRDCalc were 0.21 mSv/MBq and 0.19 mSv/MBq, respectively.

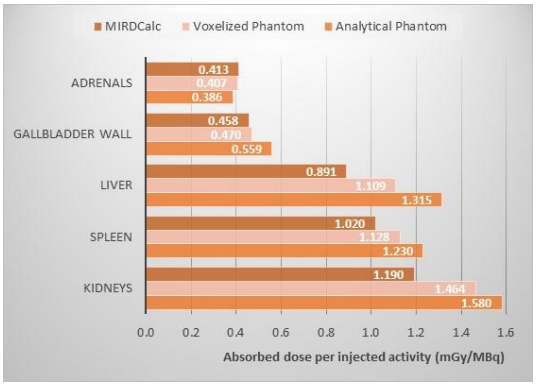


Figure 1: Comparison graph of the voxelized and analytic ***female*** phantoms.

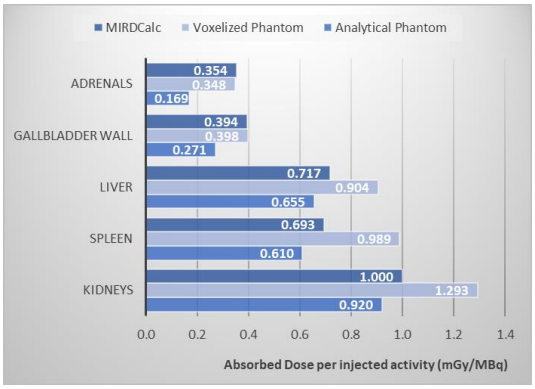


Figure 2: Comparison graph of the voxelized and analytic ***male*** phantoms.

**Conclusions:** The dosimetry of $^{191}$Pt-Cisplatin was evaluated using two type or phantons in MCNP and compared with MIRDCalc results. Future work will be focused in the remaining radioisotopes originated from natural platin activation.