

DEVELOPMENT OF A SOFTWARE TOOL FOR AN INTERNAL DOSIMETRY USING MIRD METHOD

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ABSTRACT

The aim of this thesis was to develop software which provides sufficient tools for internal dosimetry using the MIRD (Medical Internal Radiation Dose) method in a single environment. The graphic user-interface development environment (GUIDE) in MATLAB software was used to develop a graphic user-interface-based software named CALRADDPOSE. The absorbed-dose calculation in this software was performed using the MIRD method. The data for absorbed-dose calculation, including radiation decay data, organ masses, and absorbed fraction, were downloaded from the RADAR website. The CALRADDPOSE software consisted of five modules such as the 'Welcome' module for creating a main directory and navigating to other modules, the 'Planar Image Processing' module for planar image analysis, the 'SPECT Image Processing' module for SPECT image analysis, the 'Residence Time Calculation' module for residence time calculation, and the 'Dose Calculation' module for absorbed-dose calculation. To evaluate the accuracy of the calculation processes in the CALRADDPOSE software, fifteen Ga-67 studies were used as test datasets. Paired t-test was performed with a 95% confidence interval in order to compare residence times and absorbed doses obtained from this software and those obtained from the commercial software named OLINDA/EXM (Organ Level Internal Dose Assessment). The results showed that there was no statistically significant difference in the residence times and absorbed doses calculated by CALRADDPOSE and OLINDA/EXM with p-value = 0.489 and 0.228, respectively. In conclusion, CALRADDPOSE is a graphic user-interface-based software, which can perform all steps of internal dosimetry within a single environment leading to reduced calculation time and reduced possibility of error. CALRADDPOSE also provides fast and accurate results which may be useful for educational, research, or clinical purposes.

KEY WORDS: INTERNAL DOSIMETRY / MEDICAL INTERNAL RADIATION DOSE / CALRADDPOSE SOFTWARE

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