Multidisciplinary integration in oncology treatment: synergy in radiology & radiotherapy departments

Fernando M. Costa [1*], Daniela Saraiva [1], Filipa Fonseca [1], João Casalta Lopes [1], Vítor Silva [1], Armanda Monteiro [1], Ana Catarina Silva [1], Lígia Osório [1]

[1] *Unidade Local de Saúde São João, Alameda Professor Hernâni Monteiro, 4200-319 Porto, Portugal*
** fernando.miguel.costa@ulssjoao.min-saude.pt*

Background: The multidisciplinary impact between magnetic resonance imaging (MRI) and radiosurgery (SRS) has revolutionized cancer treatment, enhancing precision and patient outcomes. MRI provides superior soft tissue contrast in SRS where precise and effective high doses are delivered to small target volumes [1–3]. Image-fusion between MRI and Computed Tomography (CT) provides better visualization of the target and surrounding tissues. To improve the quality of image co-registration, cooperation between the Radiology (RD) and Radiotherapy (RT) departments in patient positioning was tested, incorporating the use of a thermomoldable cervical cushion in both CT and MRI planning [4,5]. **Aim:** Understand the impact of RD/RT synergy on the image-fusion planning with the use of thermomoldable cushion. **Methods:** Two hundred co-registrations of patients treated at our institute were analysed. The sample was divided equally into two different acquisition configurations: the diagnostic configuration (A) and the RD/RT synergy configuration (B). Rotational deviations in pitch (X-axis), roll (Y-axis) and yaw (Z-axis) dimensions were extracted from image-matching. For normality assessment Kolmogorov-Smirnov test was used to prove that all data was normally distributed and an independent sample t-test ($p<.05$) to compare deviations between groups. **Results:** A significant difference for the absolute value of rotational deviations was observed between the A and B configurations for X-axis (7.44 ± 5.9vs.3.46 ± 2.39 $t(120.0)=6.01$,$p<.001$), Y-axis (2.86 ± 2.24vs.1.59 ± 1.36 $t(150.3)=4.66$,$p<.001$), and Z-axis (4.18 ± 3.81vs1.7 ± 1.32 $t(112.2)=5.91$,$p<.001$). Quartile 1 and 3 values for the different axis and groups were: X(A)=(-23.6;27.4), X(B)=(-9;8.9), Y(A)=(-8.9;11,2), Y(B)=(-6.4;5.1), Z(A)=(-14.9;17.3), and Z(B)=(-5.3,4.6). **Conclusions:** In image co-registration, rotational deviations in image-matching must tend to zero to reduce resolution adaptation uncertainties. In the two groups, there was a statistical difference in all axis, with group-B obtaining better values, proving the importance of synergy [4]. Cooperation between RD/RT departments proved to be extremely important and had an impact on SRS. Other areas should be studied to improve patient healthcare.

Keywords: Image-fusion; Magnetic Resonance Imaging; Radiosurgery; RD/RT Sinergy.

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