

AbstractID: 10600 Title: An Investigation of Interference between Electromagnetic Transponders and Wireless MOSFET Dosimeters

Purpose: A phantom study to systematically investigate potential interferences between Calypso[®] Medical electromagnetic transponder and Sixel[®] DVS wireless MOSFET dosimeter when used in same patient.

Method and Materials: A 30x30x5cm³ (Virtual Water[®]) phantom has a center hole for two separate 8cm diameter inserts with grooves for three pairs of transponders and dosimeters on each insert, respectively. The grooves of orthogonal and parallel orientations between transponders and dosimeters (long axes) were machined on the two inserts, respectively, with transponder-dosimeter distance at 0, 1 and 2cm.

In the transponder-localization test (test1), transponder locations were obtained without and with dosimeters at different distances. Multivariate analysis tested the null hypothesis: the localized transponder coordinates are the same among datasets of control and various dosimeter locations. The 95% confidence-intervals were also determined for the localization difference between control and test groups. In the dose-measurement test (test2), 7 fractions of 1Gy were administrated to the dosimeters inside the phantom in an alternating fashion of without (fraction# 1, 3, 5, 7) and with transponders. Readings from fractions of no transponders were fit using a 2nd order polynomial. The dose differences between fit-interpolated and corresponding measured values of fraction 2, 4, 6 were calculated.

Results: For test1, multivariate analysis indicated that transponder localization accuracy was affected by the dosimeter. However, the 95% confidence-intervals of the localized positional differences between control and test groups were less than 0.1mm, which is less than Calypso clinical display increment, 0.5mm. For test2, the maximum deviation of polynomial fitted dose values from measurements are within 1.5% and 0.8% for orthogonal and parallel configurations, respectively.

Conclusion: This study showed no clinically significant interference between the transponder and dosimeter systems and demonstrated feasibility of combined use of transponders and dosimeters in the same patient.

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