

AbstractID: 10882 Title: Sensitivity of treatment assessment to different PET normalization techniques

Purpose: Assessment of treatment outcome based on PET imaging requires accurate and robust patient-specific normalization of tracer uptake. This study investigates the sensitivity of treatment response as a function of various PET imaging normalization methods.

Materials and Methods: Fourteen patients undergoing molecular targeted therapy received [¹⁸F]FLT (cellular proliferation marker) PET/CT scans that were acquired pre, mid and post therapy. SUV normalization was performed using body weight (BW), body surface area (BSA), and lean body mass (LBM). Dependence of treatment response outcome on the normalization technique was evaluated both experimentally and analytically. Additional normalization of the SUVs was performed using an external reference source comprised of Ge-68 to reduce the inherent variations in scanner stability. Robustness of treatment response outcome was assessed by evaluating ratios of both corrected and uncorrected SUVs.

Results: The absolute mean values of the SUVs were 2.3 ± 0.8 , 1.4 ± 0.4 , and 0.05 ± 0.02 for BW, LBM, and BSA respectively. Despite a substantial difference in their values, the treatment response ratios between the post and pre scans were found to be within 0.3% on average for all types of SUV normalizations. For the largest weight change of about 6%, the difference between treatment response ratios was less than 1% for SUVs based on BSA versus LBM and it was about 3% for SUVs based on BSA versus BW. After reference source normalization, the treatment response ratios shifted by 5.5%. For post and mid scans, the treatment response ratios shifted by -2.4% after reference source normalization.

Conclusions: The type of SUV normalization technique used does not affect treatment response assessment unless there is a significant change in weight. On the other hand, the treatment response is influenced by normalization with the external reference source.