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QUANTITATIVE PET-CT RESPONSE IN SOLID TUMORS: COMPARISON OF STANDARDIZED UPTAKE VALUES DETERMINED BY BODY WEIGHT, LEAN BODY MASS AND BODY SURFACE AREA

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BACKGROUND-AIM

The aim of the study was to analyze the percentage variations in the quantitative PET-CT response by the use of standardized uptake values weighted for body mass, lean body mass and body surface area.

METHODS

15 patients (median age 63 yrs, range 44-87) underwent PET-CT examinations pre- and post- chemotherapy treatment. 24 solid lesions were found. PET-CT examinations were performed on Philips PET-CT Gemini TF 16 slices. The datasets were reconstructed by using OSEM iterative algorithms (3 iterations, 33 subsets). Volume of interest (VOI) was drawn by using automatic threshold technique starting from 20%. Pre- and post- treatment max, mean and peak standard uptake values (SUV) weighted for body mass (BW) were collected by using Philips analysis software. SUV peak was obtained with 12-mm diameter spheres. SUVs weighted for lean body mass (LBM) and body surface area (BSA) were calculated by using the following formula: LBM = weight (kg)– ((0.61*weight)-(0.23*height (cm))+(0.04*age (y))+15); BSA = (weight (kg))$^{0.425}$ x (height(cm))$^{0.725}$ x 0.007184. Max, mean and peak values were also calculated for SUV_{LBM} and SUV_{BSA}. Percentage PET-CT responses were obtained as difference between pre- and post- treatment SUVs divided to pre-treatment result, as reference. PERCIST classification criteria (PET partial response ≤ -30%, -30% ≤ PET stable disease ≤ 30%, PET progressive disease ≥ 30%) was used as reference.
One-way ANOVA test was performed ($p<0.05$) in order to compare max, mean and peak SUVs, weighted for body mass, lean body mass and body surface area. The same test was performed among max, mean and peak SUV_{BW}, SUV_{LBM} and SUV_{BSA}.

RESULTS

Inter-lesions mean PET-CT response, calculated for max, mean and peak values weighted for body mass (-19%, -16%, -15%), lean body mass (-19%, -16%, -15%) and body surface area (-18%, -16%, -15%), showed stable disease states. Comparing max, mean and peak percentage PET-CT response no difference were found in classification according PERCIST criteria using SUV_{BW}, SUV_{LBM} and SUV_{BSA}. Very low percentage PET-CT response difference was found among max, mean and peak SUV_{BW}, SUV_{LBM} and SUV_{BSA} (range 0.4%-1.5%). These results were confirmed by one-way ANOVA tests that showed no statistically significant differences in all analyzed cases.

CONCLUSION

According PERCIST criteria, SUV lean body mass must be used to evaluate PET response. Our study showed no influence of body weight, lean body mass and body surface area calculation method on percentage response. In conclusion, all previous parameters could be used to assess quantitative PET-CT response in solid tumors.