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## **DIFFERENT POSITIONING OF THE UPPER ARMS IN WHOLE BODY FDG PET/CT: EVALUATION OF ARTIFACTS AND STRATEGIES TO REMOVE THEM**

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### **BACKGROUND-AIM**

To evaluate positioning related PET/CT artifacts in two groups of patients who performed Whole Body acquisition (WB) with upper arms in the Field of View (FOV).

### **METHODS**

We evaluated 415 WB performed between Jan 2012 and Dec 2013. Group I (G-I) consisting of 140 patients (average weight 75.11 kg) performed PET/CT in the torso position. Group II (G-II) made up of 275 patients (average weight 69.40 kg) underwent PET/CT with arms above the abdominal/pelvic district supported by a foam rubber pillow 20 cm thick. Both groups were in supine position with the arms were immobilized with a restraint band.

PET/CT Philips Gemini TF Big Bore was used. CT parameters : 120 kV, 120 mAs, pitch 0.813, 16x1.5mm collimation, FOV 600. PET parameters: 1'15 " bed/position, 576 mm FOV, 2.5 MBq/kg of 18F- FDG.

Artifacts in anatomic regions of the chest, abdomen and pelvis were evaluated using four criteria: none (no artifacts), slight (CT artifacts didn't require reconstruction algorithms), moderate (CT artifacts that required special reconstruction algorithms for PET image visualization), severe (PET/CT artifacts that cannot be resolved with reconstruction algorithms).

Two algorithms on PET images were used: Body-Mtl-CNTRST-Ctac-nac (BMC) for beam-hardening artifacts and Body-Mtn-OutFOV-Ctac-nac (BMOF) to reduce artifacts caused by patient movement.

### **RESULTS**

Patients with metal implants were excluded (26 in G-I and 7 in G-II). No groups showed severe artifacts.

In G-I 240 artifacts were recorded: 30 slight (22,5% of cases) in the thorax; 128 in the abdomen artifacts (96,2%): 90 slight (71.3%) and 38 moderate (29,7%). 82 slight artifacts (61,6%) on pelvis.

In G-II 118 artifacts were detected: 19 slight (16.2% of cases) on thorax. 91 artifacts in the abdomen (77.1%): 82 slight (91,1%) and 9 moderate (9,9%). 8 artifacts in the pelvis (5.9% of cases): 7 slight (87.5%) and 1 moderate (12.5%).

Moderate artifacts were seen in the abdominal area in both groups and in the pelvis area exclusively in G-II. In 38 patients of G-I (29,7%) BMC was applied due to excessive beam hardening effects, especially in patients weighing more than 90kg. In 10 patients of G-II, BMOF was used because the incorrect positioning of the restraint band caused elbows movement.

### **CONCLUSION**

The best position was with the arms resting on a foam rubber pillow above abdominal/pelvic district which reduced artifacts in the thorax, abdomen and pelvis with lower PET/CT image degradation.

The positioning requires an accurate use of the foam rubber pillow with immobilization of the elbows to avoid BMOF algorithm for movement correction which does not support SUV values.