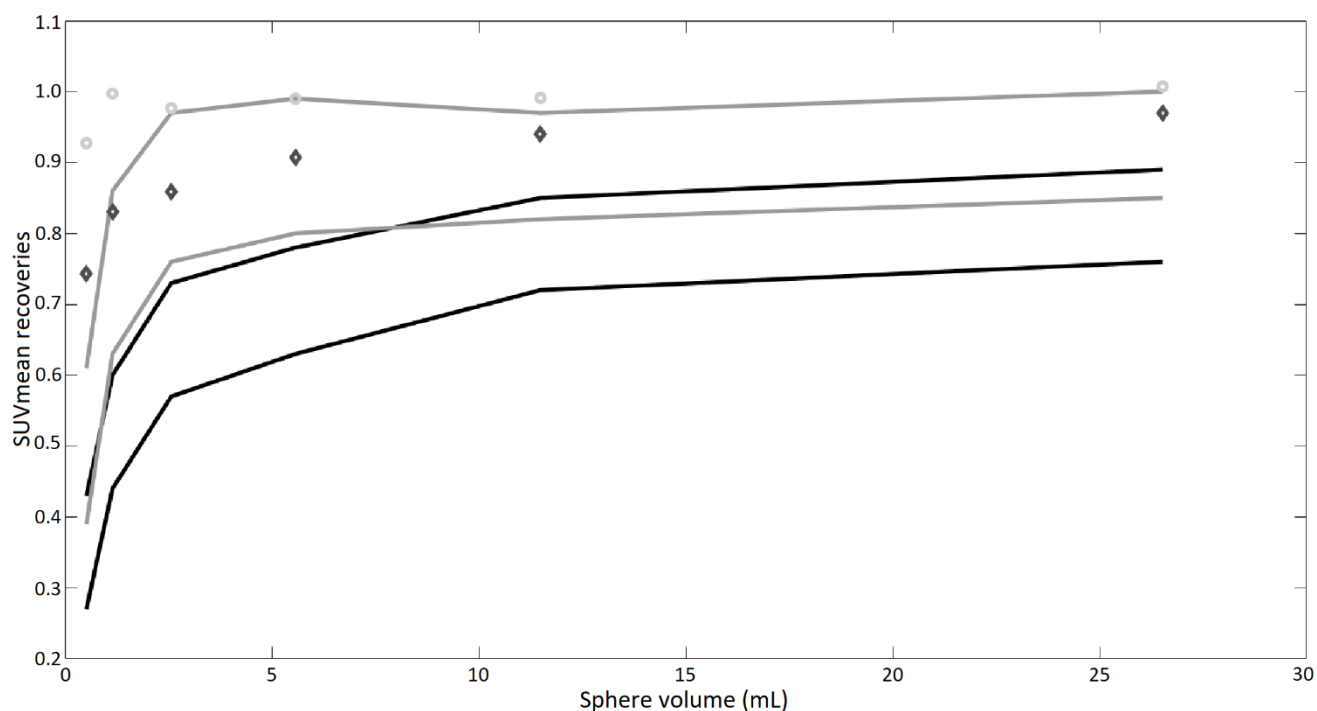


Supplemental Figure 1 – SUVmax recovery coefficients as function of the sphere sizes in the NEMA NU 2 IQ phantom using 4 iterations, 5 subsets, applying TOF, no filter (nonEARL), with (circle) and without (diamond) PSF resolution modelling. For comparison, the upper- and lower limits of SUVmax recoveries as described by current EARL guidelines (EARL1 (solid black lines)) and EARL 2019 guidelines (EARL2 (solid grey lines)) have been included.



Supplemental Figure 2 – SUVmean recovery coefficients as function of the sphere sizes in the NEMA NU 2 IQ phantom using 4 iterations, 5 subsets, applying TOF, no filter (nonEARL), with (circle) and without (diamond) PSF resolution modelling. For comparison, the upper- and lower limits of SUVmean recoveries as described by current EARL guidelines (EARL1 (solid black line)) and EARL 2019 guidelines (EARL2 solid grey line)) have been included.

Table 1 – Current EANM recommendations for FDG administration (20) describe for a patient of 75 kg in weight for the Vision with a bed overlap of 49.7% to administer 7 MBq·min·bed⁻¹·kg⁻¹. This equals 3.5 MBq·kg for scanning 2 min per bed position and 2.33 MBq·kg for scanning 3 min per bed position. Following the standard operating procedure “EARL procedure for assessing PET/CT system specific patient FDG activity preparations for quantitative FDG PET/CT studies” (23) results were obtained for 15, 30, 60, 120, and 300 s of scan time, respectively, using the EARL1 reconstruction with 4 iterations, 5 subsets, a matrix size of 220, applying PSF and TOF, and a Gaussian filter of 7 mm. Results indicated in green represent Coefficient of Variance values of <15%. The corresponding activity dose and scan duration provide a first insight in applicable activity dose and scan duration for clinical practice.

Translating this to continuous bed motion (Flow) scanning versus step-and-shoot for a typical whole body scan of ~105 cm: with an axial FOV of 26.3 cm and a bed overlap of 49.7%, 105 cm means 8 total beds. 8 total beds in 1 min per bed position step-and-shoot acquisition (see *) corresponds to 8 minutes scan duration. Conversion of the above mentioned step-and-shoot acquisition to continuous bed motion (without overlap) equals a table speed of ~2.2 mm/s.

EARL1: PSF TOF 4i5s m220 G7

| Activity (MBq/kg)/Duration (s) | | 15 | 30 | 60 | 120 | 300 |
|--------------------------------|--------------|----|----|----|-----|-----|
| T0 | 4 MBq/kg | 14 | 10 | 9 | 7 | 4 |
| T0+1h | 2,73 MBq/kg | 15 | 11 | 9 | 7 | 4 |
| T0+2h | 1,87 MBq/kg | 18 | 13 | 10 | 8 | 5 |
| T0+3h | 1,29 MBq/kg | 22 | 16 | 11 | 8 | 6 |
| T0+4h | 0,88 MBq/kg* | 26 | 19 | 14 | 10 | 7 |
| T0+5h | 0,56 MBq/kg | 32 | 26 | 18 | 13 | 8 |
| T0+6h | 0,41 MBq/kg | 37 | 30 | 21 | 15 | 10 |

*For scanning 1 min per bed position on the Vision, FDG administration can be decreased by a factor ~8

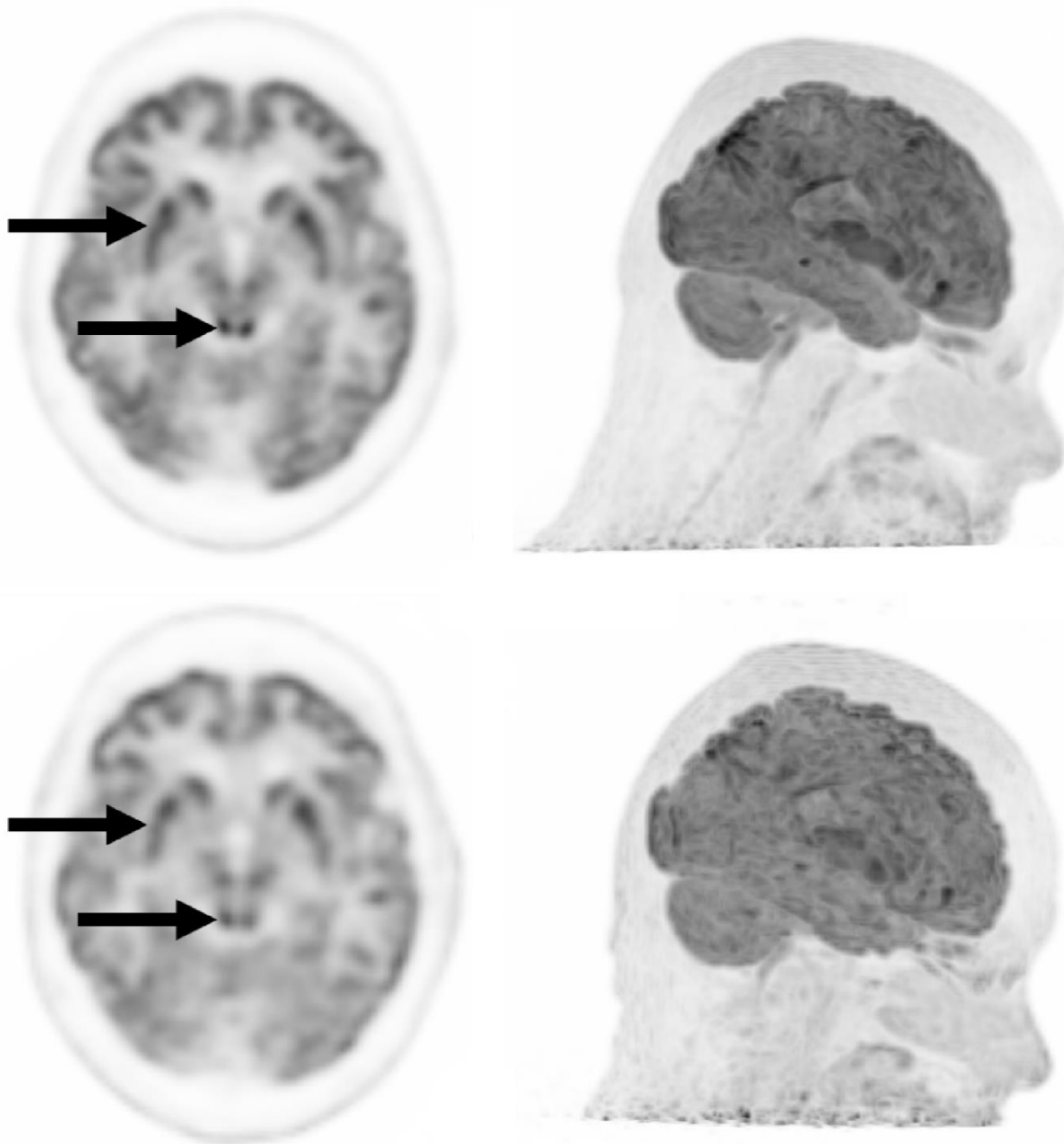
Table 2 – Following the standard operating procedure “EARL procedure for assessing PET/CT system specific patient FDG activity preparations for quantitative FDG PET/CT studies” (23) results were obtained for 15, 30, 60, 120, and 300 s of scan time, respectively, using the EARL2 reconstruction with 4 iterations, 5 subsets, a matrix size of 220, applying PSF and TOF, and a Gaussian filter of 5 mm. Results indicated in green represent Coefficient of Variance values of <15%. The corresponding activity dose and scan duration provide a first insight in applicable activity dose and scan duration for clinical practice.

| EARL2: PSF TOF 4i5s m220 G5 | | | | | | |
|--------------------------------|--------------|----|----|----|-----|-----|
| Activity (MBq/kg)/Duration (s) | | 15 | 30 | 60 | 120 | 300 |
| T0 | 4 MBq/kg | 20 | 14 | 10 | 7 | 5 |
| T0+1h | 2,73 MBq/kg | 22 | 17 | 12 | 9 | 6 |
| T0+2h | 1,87 MBq/kg* | 26 | 20 | 14 | 11 | 7 |
| T0+3h | 1,29 MBq/kg | 33 | 24 | 16 | 11 | 8 |
| T0+4h | 0,88 MBq/kg | 42 | 29 | 21 | 15 | 10 |
| T0+5h | 0,56 MBq/kg | 48 | 38 | 26 | 18 | 12 |
| T0+6h | 0,41 MBq/kg | 56 | 43 | 29 | 22 | 13 |

*For scanning 1 min per bed position on the Vision, FDG administration can be decreased by a factor ~4

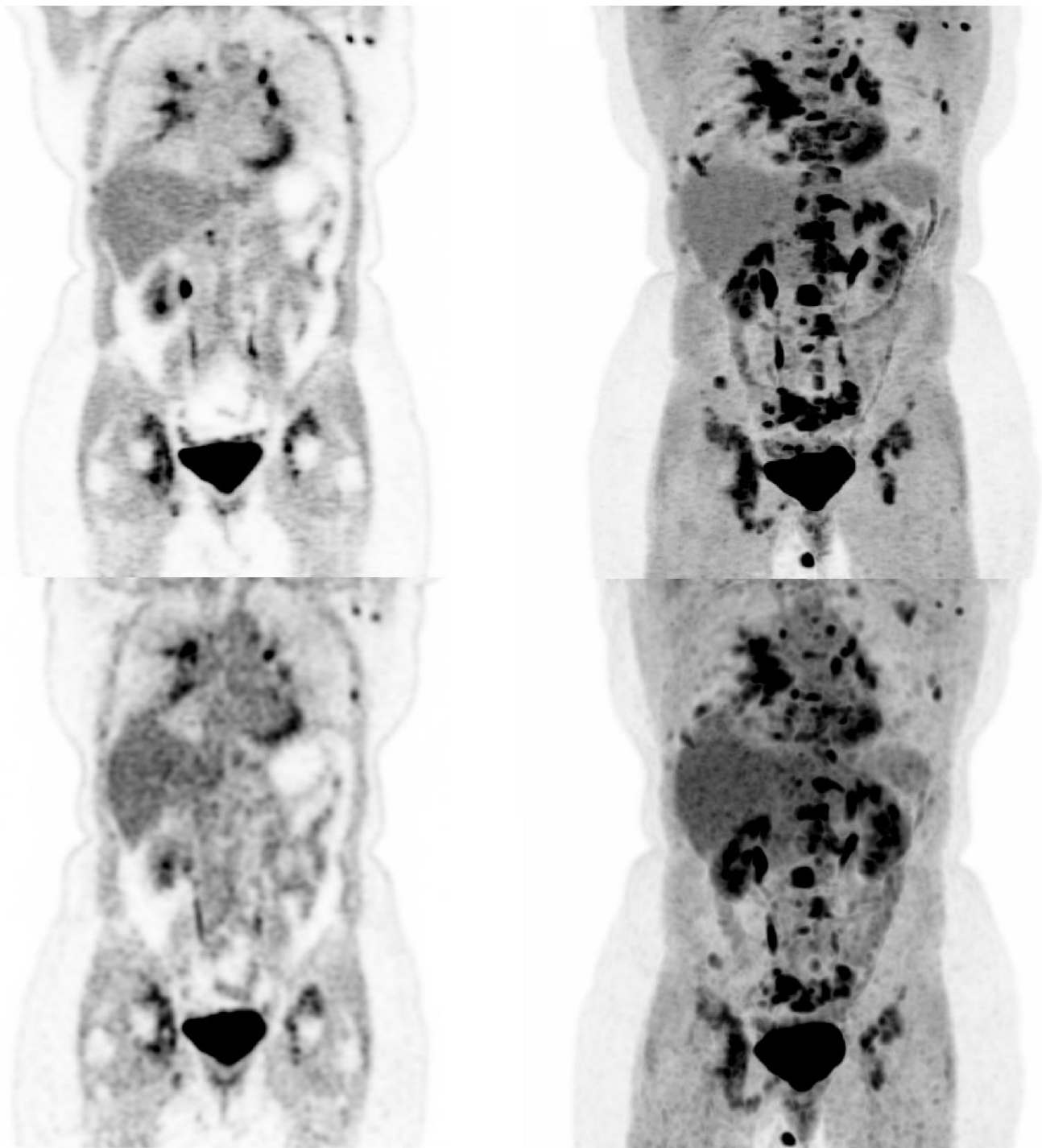
Table 3 – Following the standard operating procedure “EARL procedure for assessing PET/CT system specific patient FDG activity preparations for quantitative FDG PET/CT studies” (23) results were obtained for 15, 30, 60, 120, and 300 s of scan time, respectively, using the vendor recommended reconstruction protocol with 4 iterations, 5 subsets, a matrix size of 440, applying PSF and TOF. Results indicated in green represent Coefficient of Variance values of <15%. The corresponding activity dose and scan duration provide a first insight in applicable activity dose and scan duration for clinical practice.

| Vendor recommended: PSF TOF 4i5s m440 ap | | | | | | |
|---|-------------|-----------|-----------|-----------|------------|------------|
| Activity (MBq/kg)/Duration (s) | | 15 | 30 | 60 | 120 | 300 |
| T0 | 4 MBq/kg | 52 | 35 | 25 | 18 | 11 |
| T0+1h | 2,73 MBq/kg | 61 | 44 | 31 | 23 | 14 |
| T0+2h | 1,87 MBq/kg | 76 | 53 | 37 | 27 | 17 |
| T0+3h | 1,29 MBq/kg | 87 | 63 | 43 | 31 | 20 |
| T0+4h | 0,88 MBq/kg | 119 | 84 | 59 | 39 | 24 |
| T0+5h | 0,56 MBq/kg | 138 | 97 | 64 | 45 | 28 |
| T0+6h | 0,41 MBq/kg | 166 | 114 | 77 | 56 | 35 |



Supplemental Figure 3 – Brain images acquired on the Biograph Vision (upper row) and images acquired on the Biograph mCT (lower row). Data acquired on the Vision were reconstructed using TOF OP-OSEM with 8 iterations and 5 subsets, with resolution modelling into a 440x440 matrix with a size of 1.6x1.6x1.6 mm. Data from the mCT were reconstructing using TOF OP-OSEM with 6 iterations, 21 subsets, and resolution modelling. The resulting image size was 400x400 with a voxel size of 2x2x2 mm. For both reconstruction protocols, no filter was used. The black arrows indicate the striatum and thalamus.

In the images acquired on the Vision a more clear demarcation of the striatum and thalamus can be observed.



Supplemental Figure 4 – Illustrative coronal images acquired on the Biograph Vision (upper row) and acquired on the Biograph mCT (lower row) of a 56-year old female patient with metastasized Non-Small Cell Lung Carcinoma. On visual inspection, the difference in tissue structures is more clearly defined in images obtained from the new digital Biograph Vision.

It should be noted that a 2 mm Gaussian filter was applied on the images acquired on the Biograph mCT in contrast to the images acquired on the Biograph Vision. Also, an approximate 20-30 longer uptake time applies to the scans performed on the Biograph Vision in comparison to the scans performed on the Biograph mCT system. These differences in reconstruction and ^{18}F -FDG uptake time may result in relatively small differences in image quality.