

Quantitative analysis of ⁶⁸Ga-DOTATOC PET/CT uptake in the pituitary and adrenal glands using textural features and SUV indices



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Aims

- Investigate the biodistribution of ⁶⁸Ga-DOTATOC by evaluating the somatostatin receptors (SSTRs)
- Correlated the SUV uptake with treatment response to ¹⁷⁷Lu-DOTATOC therapy

Materials & Methods

- Sample: 160 patients referred for imaging using ⁶⁸Ga-DOTATOC PET/CT on a Siemens Biograph Vision-450 at BRFAA
- Image Analysis: LIFEx, utilizing 3D-manual segmentation for each ROI
- ROIs: Pituitary gland, left adrenal gland, and right adrenal gland

Results & Conclusions

Following linear regression analysis SUV_{mean} shows:

- **no correlation** with the patient body weight or the injected activity
- **highest correlation (p-value<<0,01) with the coefficient of variation (COV)**, an intensity-based textural feature, across all 3 glands where COV remained stable (table 1).

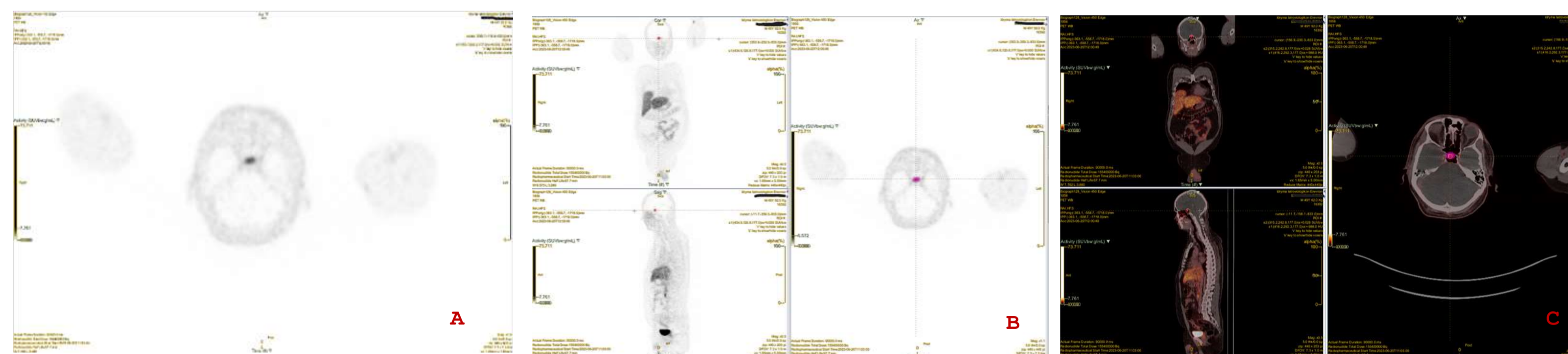


Fig 1. Normal ⁶⁸Ga-DOTATOC distribution in the pituitary gland. **A**, Axial projection on the PET image. **B**, ROI delineated in all projections on the PET image. **C**, Fusion PET/CT.

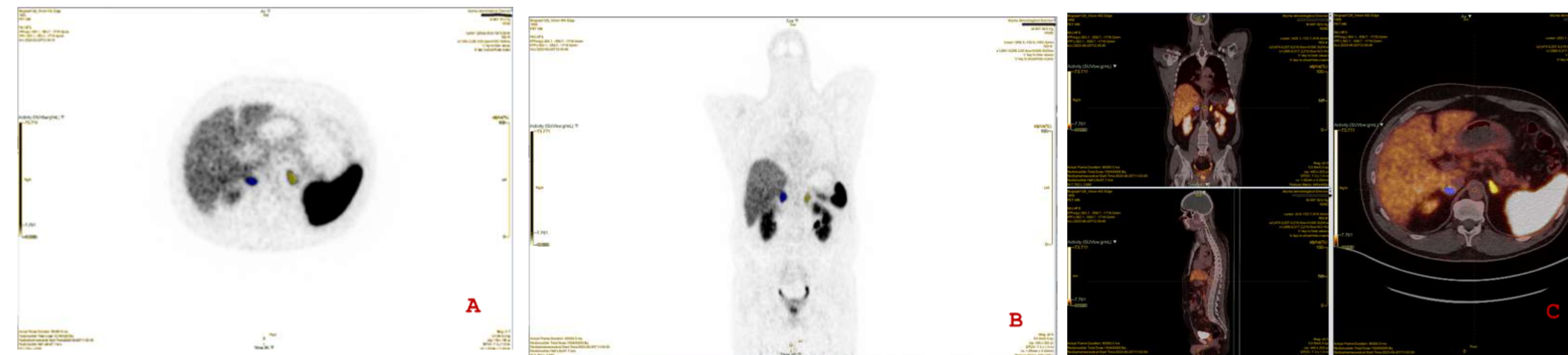
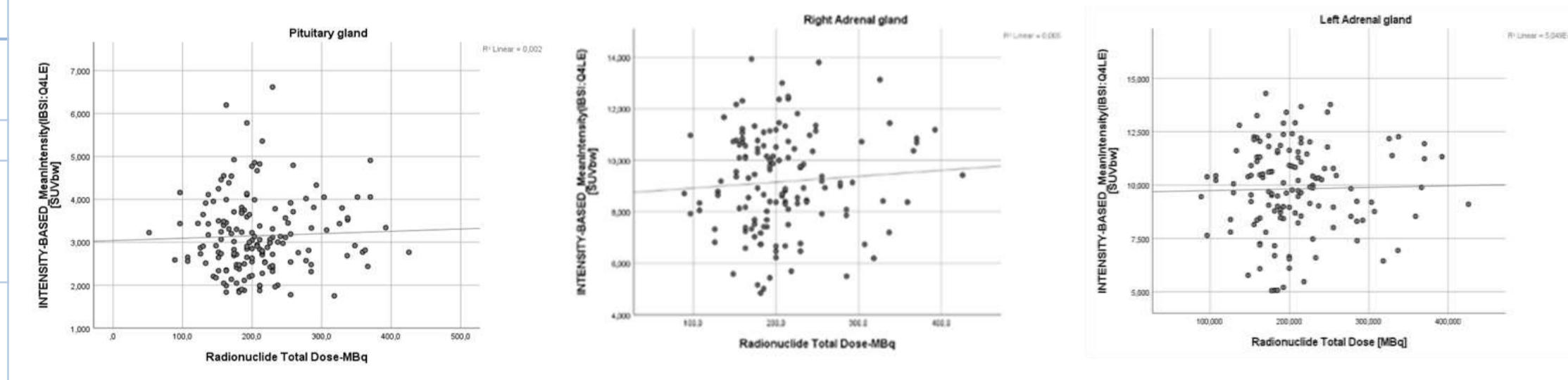


Fig 2. Normal ⁶⁸Ga-DOTATOC distribution in the adrenal glands. **A**, ROIs delineated in axial projection on the PET image. **B**, ROIs delineated in coronal projection on the PET image. **C**, Fusion PET/CT.

| Table 1. Description of COV statistics | | | | | | |
|--|-----|-------|-------|-------|-------|-----------|
| COV | N | Range | Min | Max | Mean | Std. Dev. |
| PITUITARY | 160 | 0.333 | 0.28 | 0.614 | 0.449 | 0.061 |
| LEFT ADRENAL GLAND | 129 | 0.298 | 0.191 | 0.489 | 0.296 | 0.062 |
| RIGHT ADRENAL GLAND | 129 | 0.272 | 0.19 | 0.462 | 0.299 | 0.064 |



This indicates a consistent receptor distribution across all 3 glands. Saturation of these receptors by the radiopharmaceutical leads to no further uptake in that area.

Pituitary:

$$SUV_{mean} = 1.15 + 0.07 \times SUV_{max} - 1.6 \times COV + 0.0006 \times Energy + 0.29 \times Diff_Entropy - 0.14 \times Sum_Entropy$$

Right Adrenal gland:

$$SUV_{mean} = 0.4 - 0.0002 \times VOI + 0.37 \times SUV_{max} - 18.2 \times COV + 2.14 \cdot 10^{-5} \times Energy + 0.9 \times Diff_Entropy$$

Left Adrenal gland:

$$SUV_{mean} = -0.37 + 0.0003 \times VOI + 0.34 \times SUV_{max} - 16.6 \times COV + 2.62 \cdot 10^{-5} \times Energy + 1.02 \times Diff_Entropy$$

