

Validation of navigated beta-probe imaging with PET/CT-generated activity surfaces

New approach in radio-guided resection for FDG-positive tumors

Wendler, T.; Traub, J.; Ziegler, S.I.; Navab, N.
In collaboration with Intra-Medical Imaging LLC

03 July 2007

Chair for Computer Aided Medical Procedures
Department of Computer Science | TU Munich

Department of Nuclear Medicine
Klinikum rechts der Isar | TU Munich

Background

- Lately β -probes have been proposed for intra-operative localization of residual cancer cells after resection, given their high accuracy and sensitivity¹.
- The combination of them with spatial localization systems offers new possibilities for intra-operative nuclear imaging and radio-guided surgery².

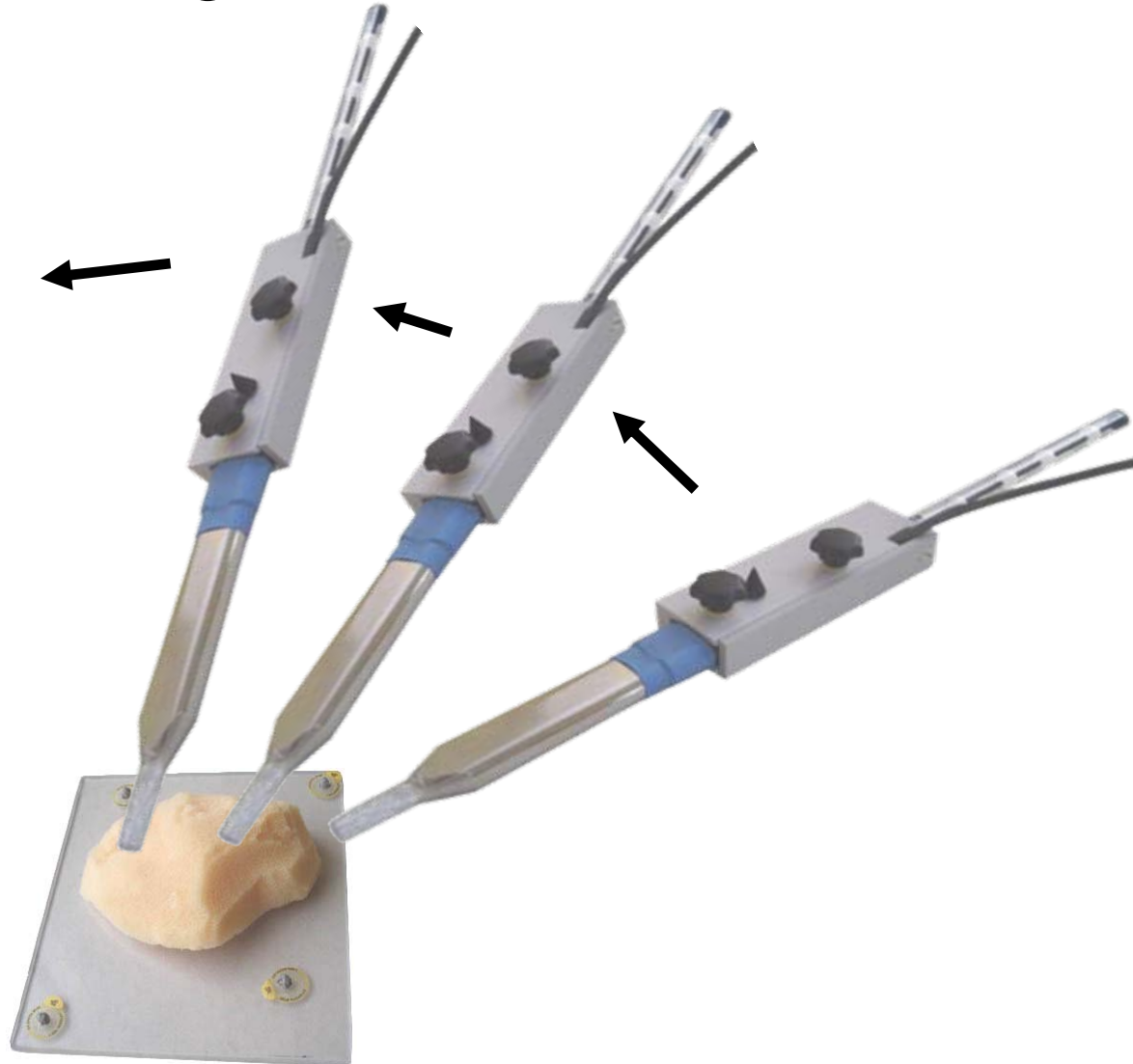
1 E.g. Daghighian et al. 1994, Raylman et al. 1996, Levin et al. 2003, ...

2 Wendler et al. 2006, Kishenkov et al. 2007, Wendler et al. 2007

Background



...

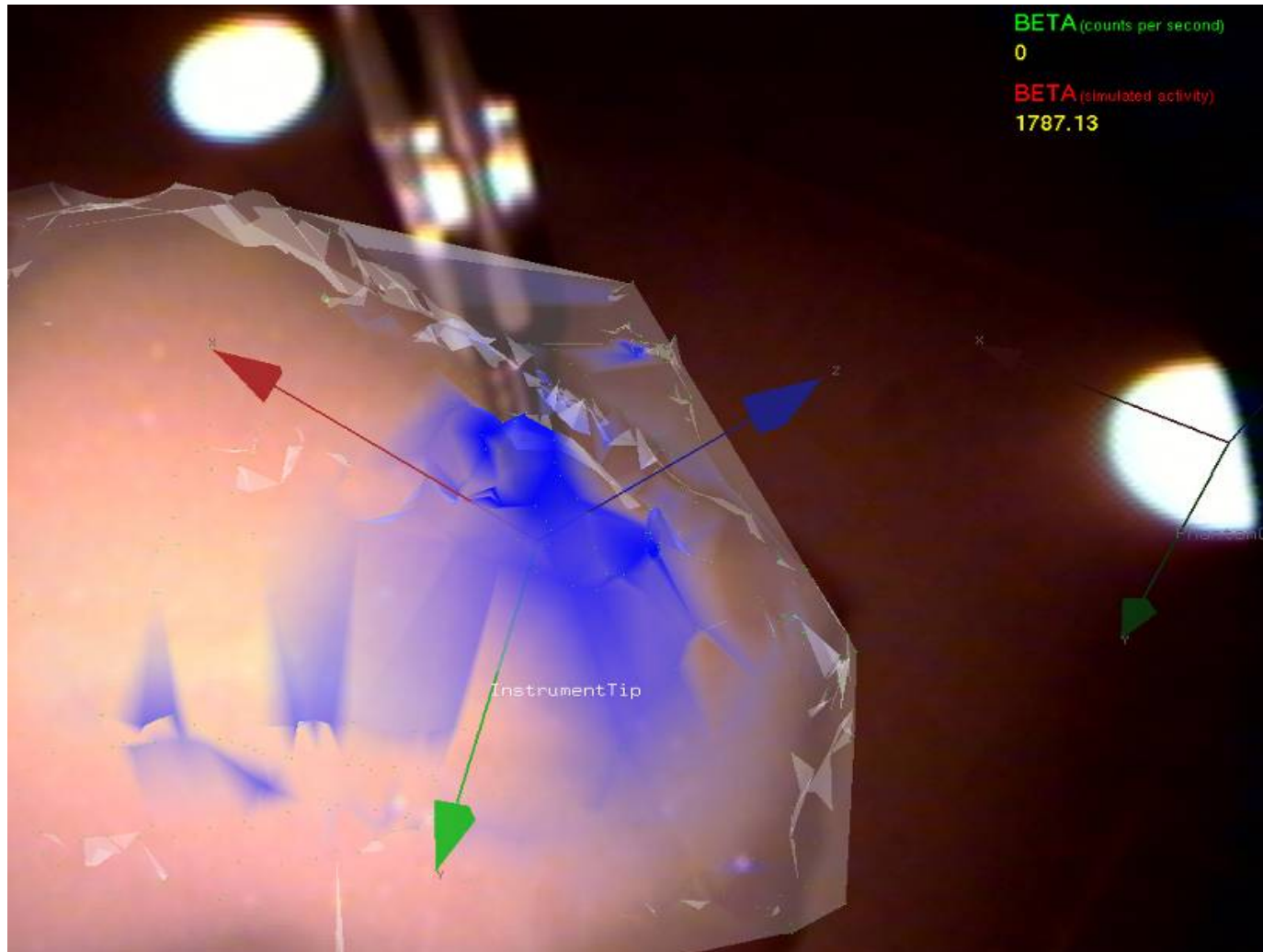


x_1, y_1, z_1, c_1
 x_2, y_2, z_2, c_2
 x_3, y_3, z_3, c_3

...

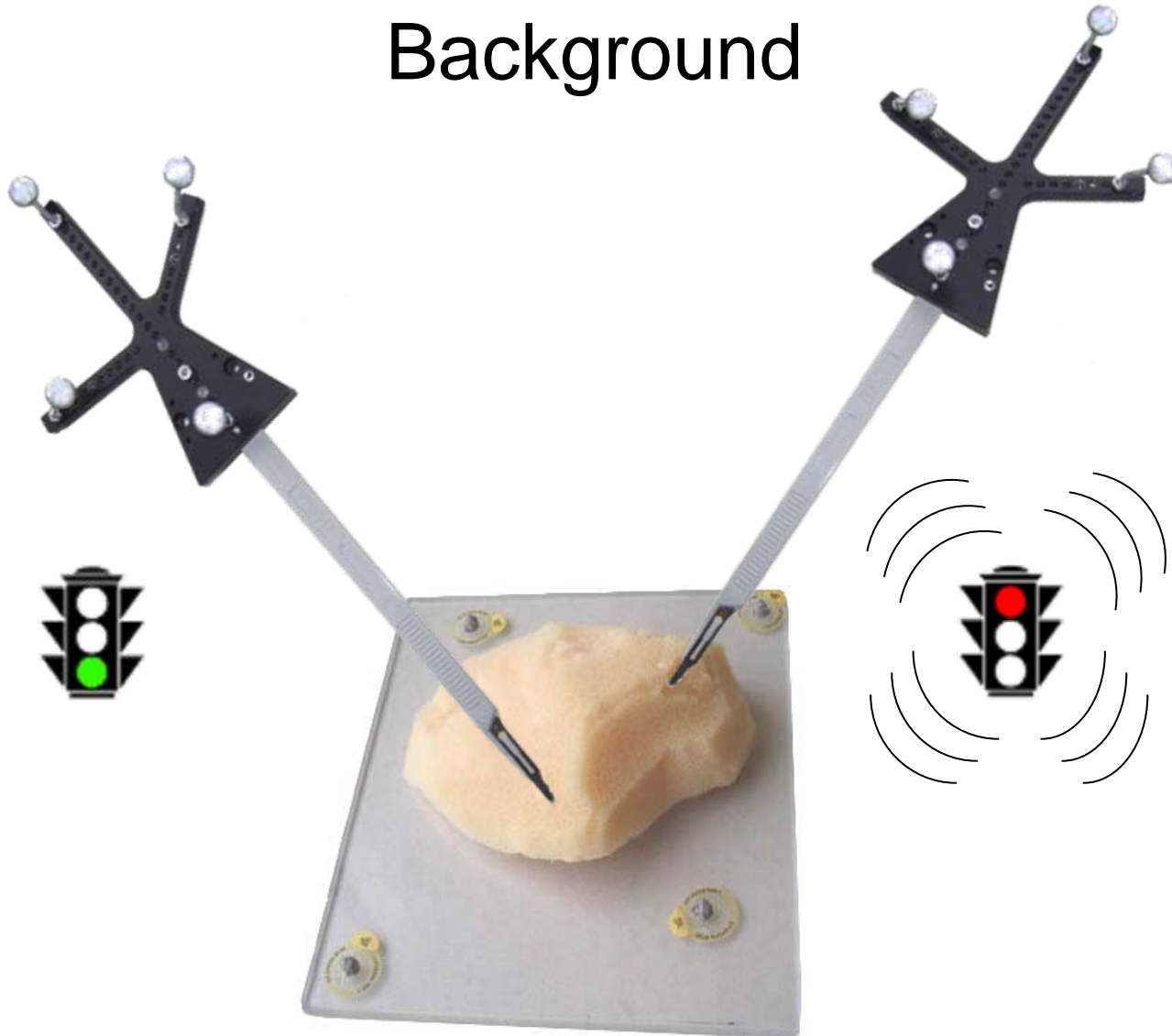
x_n, y_n, z_n, c_n

Background



Adapted from Wendler et al. 2006

Background



Adapted from Wendler et al. 2006

Objectives

- Find ways to validate introduced technology.
- Generation of beta-emission surfaces from a preoperative PET/CT.

Materials

ART2 Cameras
& DTrack,
ART GmbH



Biograph Sensation 16
PET/CT, Siemens

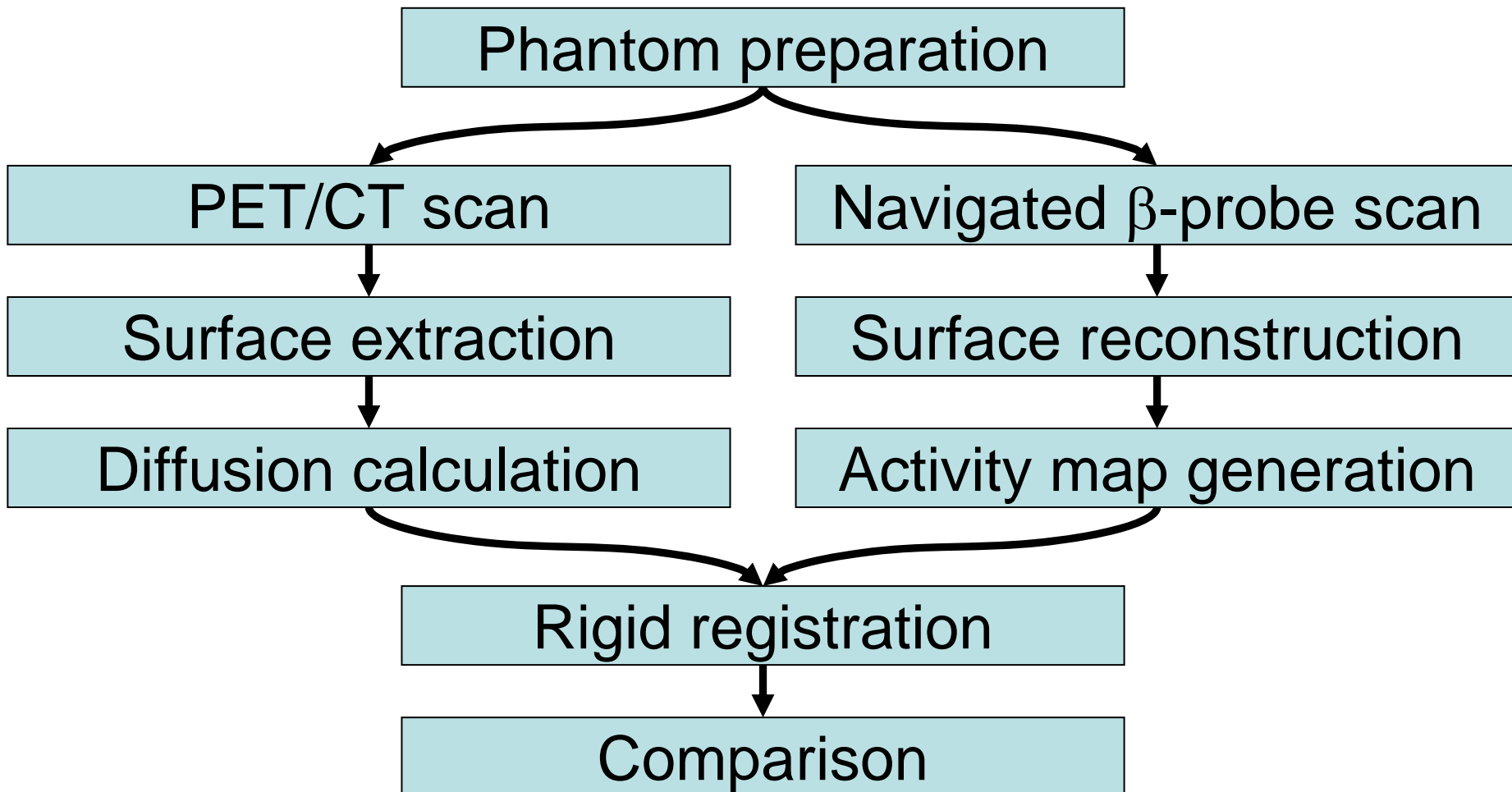


β -probe &
NodeSeeker,
Intra-Medical
Imaging LLC

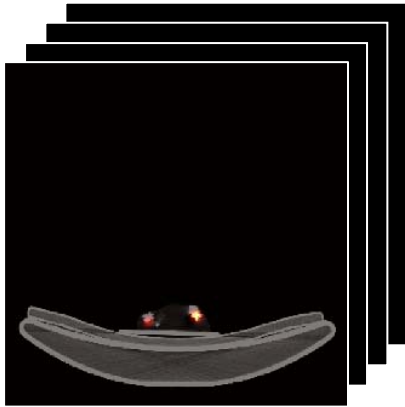


Ad hoc phantom

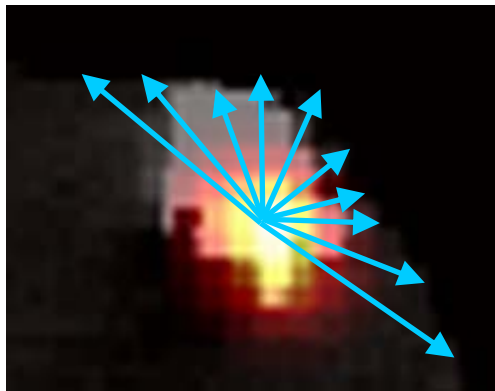
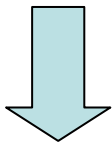
Methods



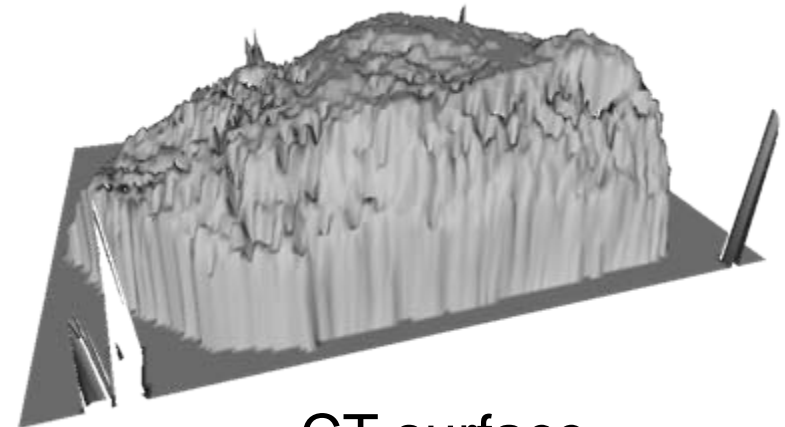
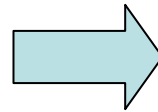
Methods



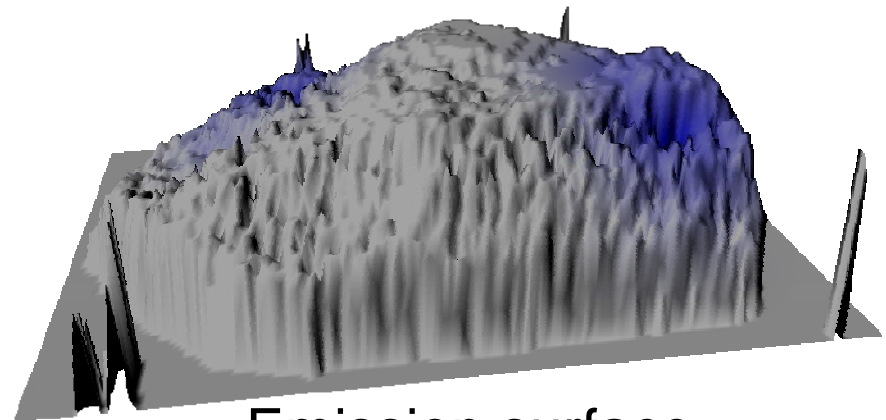
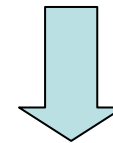
PET/CT volume



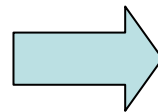
Diffusion calculation



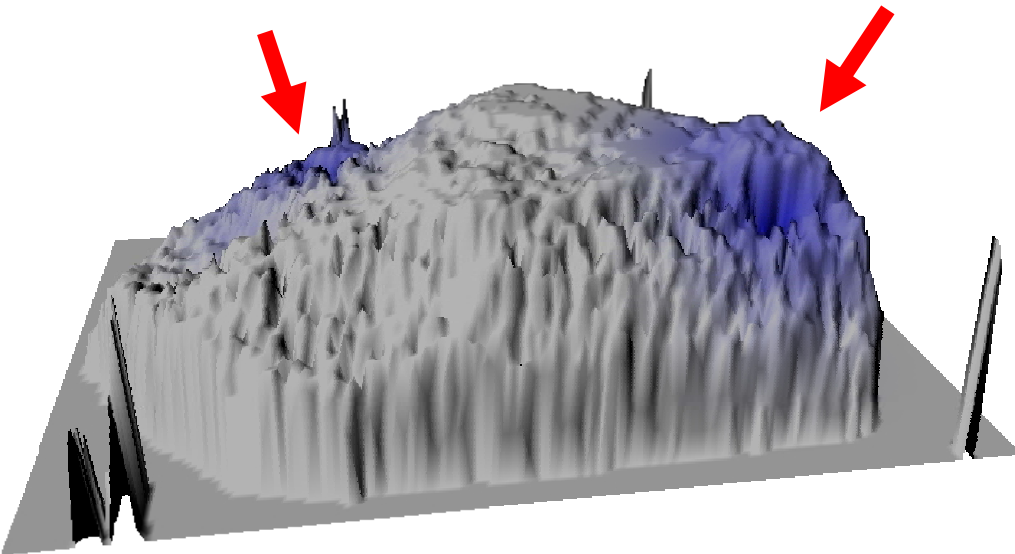
CT surface



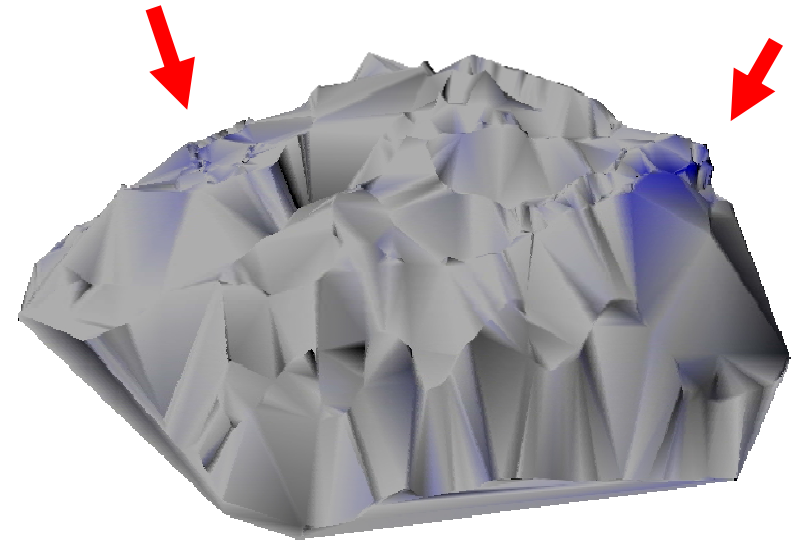
Emission surface



Results



PET/CT generated
emission surface



Navigated β -probe
emission surface

Conclusions

- PET/CT-generated surfaces present a promising visualization for surgical planning.
- The generated PET/CT emission surfaces correlate well with the ones acquired using the β -probe.
- This good correlation allows us to confirm this approach as a valid step toward radio-guided tumor resection and intra-operative nuclear imaging.