being internalized versus 20.6±2.3% cellular uptake and 9.8±1.3% internalized fraction, respectively. PET/CT images 1 h p.i. revealed the same biodistribution pattern for both radiotracers, which was characterized by accumulation mainly in the tumor - with \([^{61}Cu]\)Cu-NODAGA-PSMA-I&T showing higher uptake - and in the kidneys. The biodistribution pattern of \([^{61}Cu]\)Cu-NODAGA-PSMA-I&T was the same on PET/CT images at 4 h p.i. The kidney uptake of \([^{61}Cu]\)Cu-NODAGA-PSMA-I&T could be reduced significantly, from 96% to 72% to 34% IA/g at 1h p.i. by increasing the injected amount, from 200 to 400 to 1000 pmol, respectively. Quantitative biodistribution studies in LNCaP xenografts are in progress and will be presented. **Conclusion:** \([^{61}Cu]\)Cu-NODAGA-PSMA-I&T compared well with \([^{68}Ga]\)Ga-DOTAGA-PSMA-I&T on PET/CT images in terms of total body distribution, while showing higher tumor uptake and offering the possibility of delayed images. \([^{61}Cu]\)Cu-NODAGA-PSMA-I&T is considered for clinical evaluation versus established \([^{68}Ga]\)Ga-PSMA tracers. **References:** 1. J. Svedjehed et al., EJNMMI Radiopharmacy and Chemistry 2020;5:21

**OP-0042**

**Synthesis, radiolabelling and in vitro characterisation of a bimodal BODIPY-labelled PSMA-targeting bioconjugate for dual imaging of prostate cancer**

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**Aim/Introduction:** BODIPY dyes represent a promising class of fluorophores with excellent fluorescence properties. These dyes also offer the possibility to introduce the positron-emitter fluorne-18, allowing the development of hybrid nuclear and fluorescent imaging probes.\(^1\)\(^2\) The aim of the study was to demonstrate the use of \([^{18}F\)]-labelled BODIPY dyes for dual imaging of prostate cancer. Therefore, a BODIPY peptidomimetic targeting the prostate specific membrane antigen (PSMA) was synthesised, radiolabelled and tested in terms of its biological applicability. **Materials and Methods:** For the preparation of the bimodal PSMA-targeting conjugate Glu-CO-Ahx-BODIPY 1, both the synthesis of the PSMA-binding motif Glu-CO-Lys and the coupling of the Ahx spacer were performed on solid support using standard Fmoc-chemistry. Conjugation of BODIPY was carried out in solution to obtain the final bioconjugate. Fluorescence properties were measured by fluorescence spectroscopy. The bioconjugate was radiolabelled by Lewis-acid catalysed isotopic \(^{18}F/^{19}F\) exchange for 15 min at room temperature. Binding affinities of the conjugates were determined by competitive cell binding experiments in the human prostate cancer cell line LNCaP. Specific internalisation of the \(^{18}F\)-labelled compound was demonstrated along with blocking experiments using 2-PMPA. Cellular localisation of the BODIPY-PSMA conjugate was studied by fluorescence microscopy. Results: The bioconjugate was obtained in 38 % yield after purification by semi-preparative RP-HPLC. Absorption and emission maxima of 1 were detected at wavelengths of 490 nm and 510 nm, with high fluorescent quantum yields and fluorescence lifetimes in the nanosecond range. Bioconjugate 1 showed a high PSMA affinity comparable to PSMA-11. Radiolabelling was achieved in molar activities of ~ 1 MBq nmol\(^{-1}\) with radiochemical purities of >99 % after C\(_{18}\) Sep-Pak purification. After 1 h, 0.4 % of compound \([^{18}F\)]1 were bound to PSMA on the cell surface of LNCaP cells and 3.4 % were specifically internalised. PSMA-mediated uptake of compound 1 into LNCaP cells was confirmed by fluorescence microscopy showing gradual internalisation over time. **Conclusion:** Compound 1 was readily prepared and radiolabelled under mild conditions in moderate molar activities and high radiochemical purities, without altering the fluorescent properties of the BODIPY dye. In cell experiments, 1 showed a high PSMA-affinity and might be a suitable candidate for the development of PSMA-specific dual-imaging agents. **References:** 1. Kowada, T., Maeda, H. & Kikuchi, K. Chem. Soc. Rev. 44, 4953-4972 (2015). 2. Paulus, A. et al. EJNMMI Res 5, 120 (2015).

**OP-0044**

**Quantitative Ex Vivo Imaging of \(^{225}\)Ac with the iQID Alpha Camera**

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Aim/Introduction: Quantitative measures such as the intratumoural activity distribution of a radiopharmaceutical and the corresponding absorbed dose distribution are useful information for radiopharmaceutical therapy (RPT) and radiopharmaceutical development. The ionizing-radiation Quantum Imaging Detector (iQID) is a scintillation-based detector able to image alpha particles, such as those emitted from tissue sections of mice injected with an alpha-emitting radiopharmaceutical. Quantitative imaging enables the determination of dose rates and time integrated activities within tumour sections. The aim of this work is to generate quantitative images of the activity distribution and dose rates within tumour sections of mice who were injected with an $^{225}$Ac labelled antibody. Materials and Methods: Small drops of a solution containing $^{225}$Ac with activities ranging from 0.8 Bq to 95 Bq were pipetted onto a silver-doped Zinc Sulfide (ZnS:Ag) scintillator and imaged with the iQID detector. The images were segmented and a calibration factor was calculated by generating a calibration curve and performing a linear fit. Four tumour bearing mice were injected with 18.4 kBq ± 2 kBq of an $^{225}$Ac labelled antibody. Three days post injection, the tumours were collected, frozen, and sliced into 14 um slices for autoradiography with the iQID detector. The calibration factor was used to convert the iQID images into units of activity (Bq). A dose kernel for $^{225}$Ac was created using GATE version 9.0 assuming water as the medium. The kernel was convolved with the iQID image to generate dose rate maps of each tumour slice. The tumour slices were segmented and the total dose rate within each slice was calculated. Results: The measured calibration factor for the $^{225}$Ac isotope in the iQID camera was 0.33 cps/Bq. Using this factor, activity maps in units of Bq and dose rate maps in units of Gy/s were generated. Total activities within the slices range from 1.1 Bq to 2.7 Bq and total dose rates ranged from 0.6 to 1.5 Gy/s. Visually, activity distributions were heterogeneous. Conclusion: We present a method to generate $^{225}$Ac quantitative images of the activity distribution and dose rates within mouse tissue sections using the iQID detector. This work has the potential to find correlations between dose, dose rates, and the degree of tumour heterogeneity with the therapeutic efficacy and other biological variables. Moreover, it will allow us to understand the distributions of different radiopharmaceuticals within tissue and correlate it with therapeutic outcomes. References: None.