

AbstractID: 10336 Title: CT Detection of Primary and Metastatic Lesions with a Nano-Agent in Rabbits: Validation with FDG-PET

Purpose: To evaluate the performance of a recently engineered nano-sized liposome CT agent to detect primary and metastatic tumor lesions in a VX2-sarcoma rabbit model as compared to FDG-PET.

Method and Materials: Nine New Zealand White rabbits bearing VX2-sarcoma in their left lateral quadriceps received a single intravenous injection of 80 nm liposomes co-encapsulating 185 ± 37 mg/kg iodine in the form of iohexol (Omnipaque[®]) and 7 ± 1 mg/kg gadolinium in the form of gadoteridol (Prohance[®]). The CT/PET (GE Discovery ST) imaging session took place twelve days after the tumor inoculation procedure, five days post liposome contrast administration and one hour post-FDG injection (30.3 ± 5.1 MBq/kg). Following CT/PET imaging, the rabbits were sacrificed and the primary and metastatic lesions were examined by a pathologist. The measurement of tumor size was performed on the CT data set. The registration of the CT and PET images was performed using MIPAV.

Results: Liposome-CT demonstrated the same sensitivity and specificity as FDG-PET for the detection of the 9 primary tumors (volumes = 25 - 7280 mm³, $SUV_{max} = 1.5 - 10.9$, $HU_{max} = 173 - 596$). In addition, liposome-CT detected 13 metastatic muscle lesions (volumes = 14 - 2732 mm³, $HU_{max} = 254 - 493$) that were histologically malignant, while FDG-PET identified 7 (volumes = 54 - 1044 mm³, $SUV_{max} = 2.7 - 7.1$). For the 16 lesions detected by both imaging modalities, there was a positive correlation between the PET SUV_{max} and the CT HU_{max} .

Conclusion: In this investigation, increased contrast of primary and metastatic lesions in CT was achieved with the administration of the liposome nano-agent. This demonstrates the feasibility of employing the liposome-CT method for effective tumor detection and localization.