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Can an intratumoral DNA-encoded immunotherapeutic device platform currently used in the management of cutaneous lesions be scaled in size to function in the treatment of visceral tumors through image-guided techniques?

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Purpose: The mobilization of the immune system as a therapeutic strategy has emerged as a transformative approach to the treatment of cancer. Intratumoral injection of plasmid IL-12, tavokinogene telseplasmid (TAVO), and co-localized reversible electroproporation has demonstrated safe and promising results in the nearly 200 patients enrolled in trials for melanoma, breast cancer, and SCCN. This current delivery platform uses an applicator capable of reaching lesions no more than 1.5 cm at or below the skin. Here, we evaluated the feasibility and performance of an applicator capable of delivering and electroproporating DNA-based immunotherapy directly into the liver, lung, bone, and pancreas in a large animal model, thus paving the way for future visceral lesion treatment in humans.

Materials: Large animal simulations of CT-guided procedures were performed in the liver, lung, pancreas, and femoral medullary cavity using a Siemens Somatom Flash CT Imaging Platform. Two Yorkshire pigs were placed under general anesthesia and monitored in accordance with an approved IACUC protocol. A rigid applicator was placed via percutaneous CT-guided access in liver, lung and pancreatic parenchyma, as well as bone (via an intraosseous trocar). Following applicator placement and confirmation in the respective target organs, the applicator tip (injection port and electroproporation times) was deployed, DNA delivered, and electroproporation commenced.

Results: In this early feasibility study using a live, large animal model, we safely deployed our applicator, injected DNA, and delivered current through the applicator into the animal’s above-mentioned target tissues. The treated animal recovered from the procedure without incidence.

Conclusions: These results demonstrate feasibility of the device to reach high value tissue targets. The ability to deliver potent and safe immunotherapy directly to a tumor presents a meaningful opportunity to drive strong clinical responses in difficult to treat malignancies and offers a potentially new solution for interventional radiologists in managing these patients.

Assessing effect of cryoablation and transarterial bland embolization of renal cell carcinoma bone metastases on systemic biomarkers of tumor immunity: a pilot investigation to help guide timing of immunotherapy relative to osseous metastasis treatment with embolization and cryoablation

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Purpose: Multiple Interventional oncologic procedures have been used in management of renal cell carcinoma osseous metastases, including embolization, thermal ablation, fixation and steroid injection. It is hypothesized that these therapies may impact effect of systemic immunotherapies by modulating immunosuppressive tumor microenvironment. In this study, we evaluate the influence of embolization and cryoablation of renal cell carcinoma (RCC) bone metastases on neutrophil-to-lymphocyte ratio (NLR), as increased NLR has been associated with poor response to immune checkpoint inhibitor therapy.

Materials: Retrospective analysis of all adult patients (age ≥18 years) from 2015-2018 treated with transarterial bland embolization and cryoablation for pain palliation of RCC bone metastases. Immunotherapy administration within 6 months of embolization was documented. Baseline NLR was calculated 1 week prior to embolization/cryoablation, and compared to NLR within 1 week, 1 month, and 6 months after embolization and/or cryoablation.

Results: A total of 52 patients (31:19:2) embolization:cryoablation:embolization+cryoablation, 38:14 male:female, mean age 60, average lesion size 72.2 cm ± 7.3) were included with treatment locations in the thorax (6), spine (12), pelvis (24), and extremities (9). 33 patients received the immune checkpoint inhibitor nivolumab of which 6 embolization, 5 cryoablation and 2 embolization+cryoablation were within 1 month of receiving nivolumab. Overall, univariate analysis confirmed a significant