

POSTER PRESENTATION

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Image guided cryoablation of cancer with intra-tumoral injection of anti-CTLA-4 and PD-1 immune check-point inhibitors

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Background

Image guided cryoablation of cancer destroys tumor tissue and can activate tumor-specific T cells by increasing

the presentation of tumor antigens and causing the release of “Danger signals” to stimulate the immune system. However, the development of a systemic anti-cancer

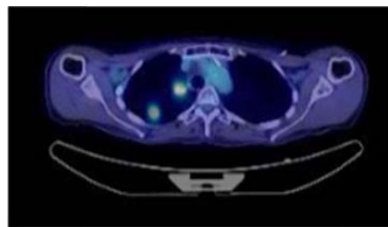


Image above demonstrates FDG PET/CT with abnormal uptake in two right upper lobe nodules.

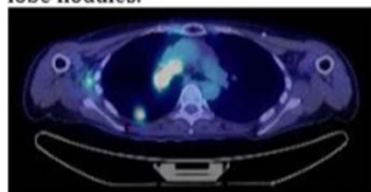


Image above demonstrates FDG PET/CT with abnormal uptake in right supra-hilar lymph nodes, right upper lobe nodule and right axillary lymph node.

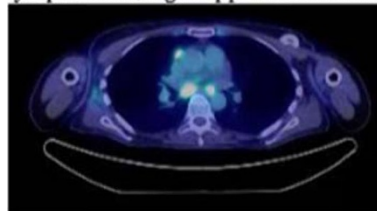


Image above demonstrates FDG PET/CT with abnormal uptake in bilateral infra-hilar and right peri-aortic lymph nodes.

Figure 1

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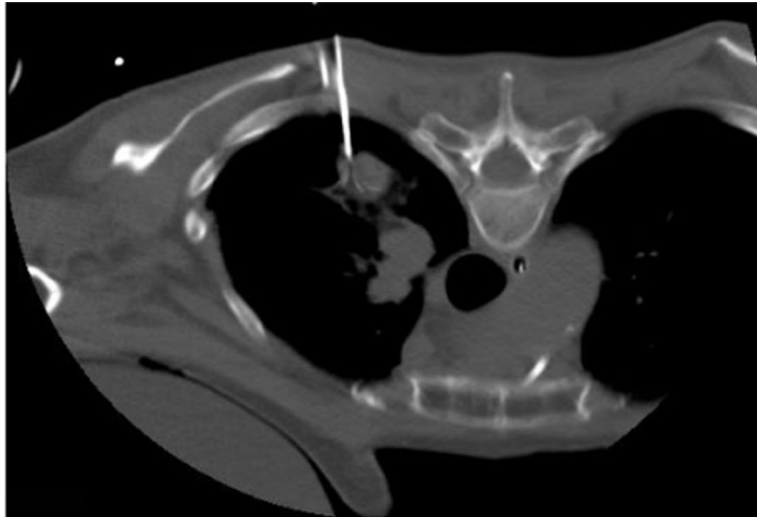
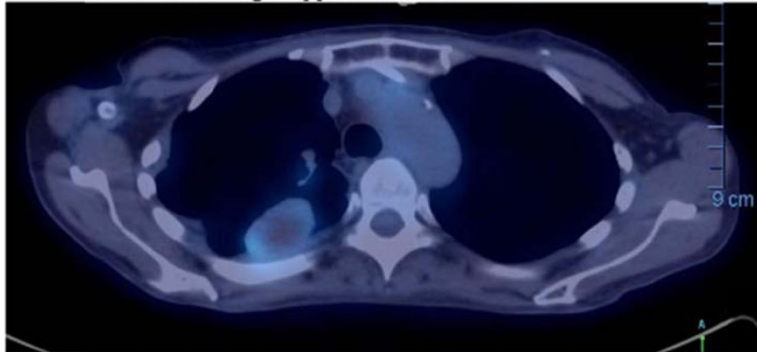
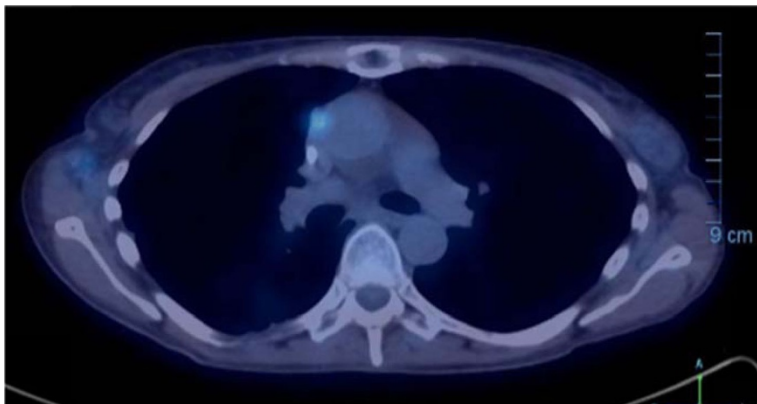


Image above is a CT scan performed during the ablation procedure demonstrating ablation needle with a right upper lobe lesion.



The image above demonstrates a FDG PET/CT scan performed 2 months after treatment with minimal peripheral FDG uptake of the ablated tumor site.

Figure 2

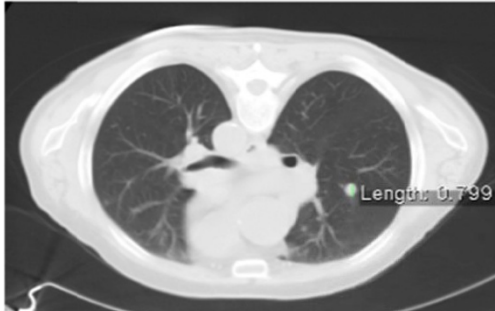


The above image is a FDG PET/CT performed 2 months after treatment showing resolution of infra-hilar adenopathy, with minimal residual uptake in peri-aortic adenopathy.

Figure 3

Patient #2

Patient is a 68 year old male with a 2 year history of a left renal mass. The patient underwent a left nephrectomy with a diagnosis of renal cell carcinoma. A subsequent CT scan demonstrated numerous lung nodules (>20) and a large L5 vertebral body mass. The patient was then treated with Cryoablation of the L5 mass with intra-tumoral injection of Ipilimumab and Nivolumab into the ablated tumor site. A follow up CT scan 7 weeks after treatment demonstrated complete resolution of the lung nodules with a stable L5 mass.

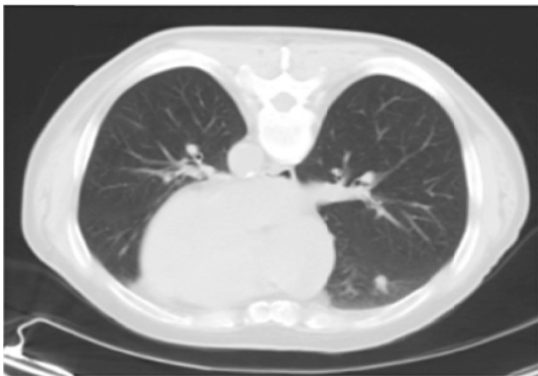


The image above demonstrates a CT scan of the chest with a lung nodule.

Figure 4

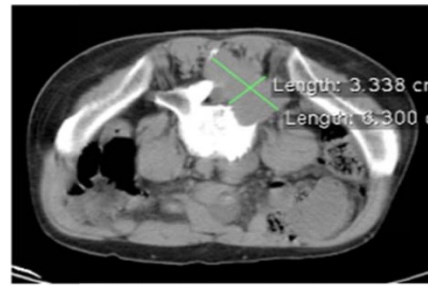


CT scan of the chest demonstrates multiple bilateral lung nodules.

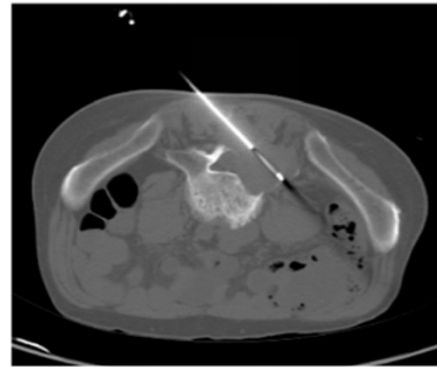


CT scan of the chest demonstrating additional lung nodule.

Figure 5



CT scan of the lumbar spine demonstrating L5 mass.



CT scan during ablation procedure demonstrating Cryoablation of L5 mass.

Figure 6



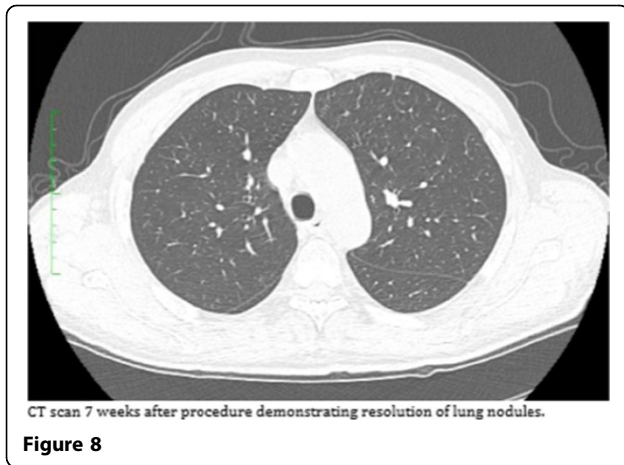
CT scan 7 weeks after procedure demonstrating resolution of lung nodules.



CT scan 7 weeks after procedure demonstrating resolution of lung nodules.

Figure 7

immune response may be restrained by immune checkpoint inhibitors. In recent years, the U.S. Food and Drug Administration–approved antibody drug ipilimumab, nivolumab and pembrolizumab as inhibitors of CTLA-4



and PD-1 blockade, by direct injection into the ablated tumor, will enhance anti-tumor immunity and rejection of tumor metastases.

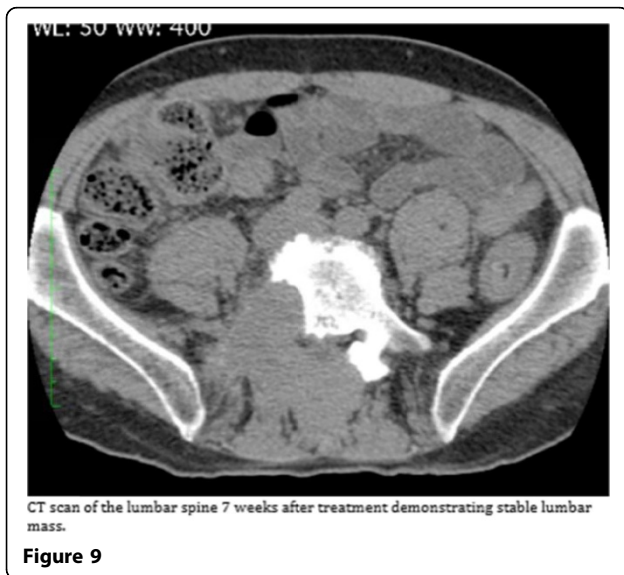
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and PD-1. By blocking these immune check-point receptors, these antibodies can promote tumor rejection, but their full application has yet to be fully determined.

Methods

In our human case studies, we offer a proof-of-concept in multiple tumor types that intra-tumoral CTLA-4 and PD-1 blockade combined with cryoablation of a primary tumor can cause regression of secondary tumors at a distant site.

Results

From past clinical experience, we know that secondary tumors are unlikely to be affected by cryoablation alone, the combination treatment was sufficient to cause complete cancer regression and tumor rejection. Cryoablation is currently used to treat a targeted tumor, our results suggest that combination therapy with CTLA-4

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