



Chemical Shift MRI

-Dr. Bhoomi Angrish

Chemical shift magnetic resonance imaging (MRI) helps to characterize lesions with fat and can help distinguish thymic hyperplasia from tumors, particularly lymphoma.

Highlighted here are two cases, one of a 24-years old patient with non-Hodgkin's lymphoma (Fig. 1) and the other of a 29-years old with Hodgkin's lymphoma (Fig. 2). Both had lesions in the thymus that were suspicious for recurrent disease.

Chemical shift MRI qualitatively showed a decrease in the signal intensity of the thymus on opposed-phase images relative to the in-phase images. Quantitative assessment with the chemical-shift ratio (CSR) and signal intensity index (SII) showed that the enlargement was due to thymic hyperplasia and not tumor. Both patients were still biopsied under CT scan guidance to be doubly sure and the biopsies confirmed the absence of tumor and the presence of normal thymic tissue.

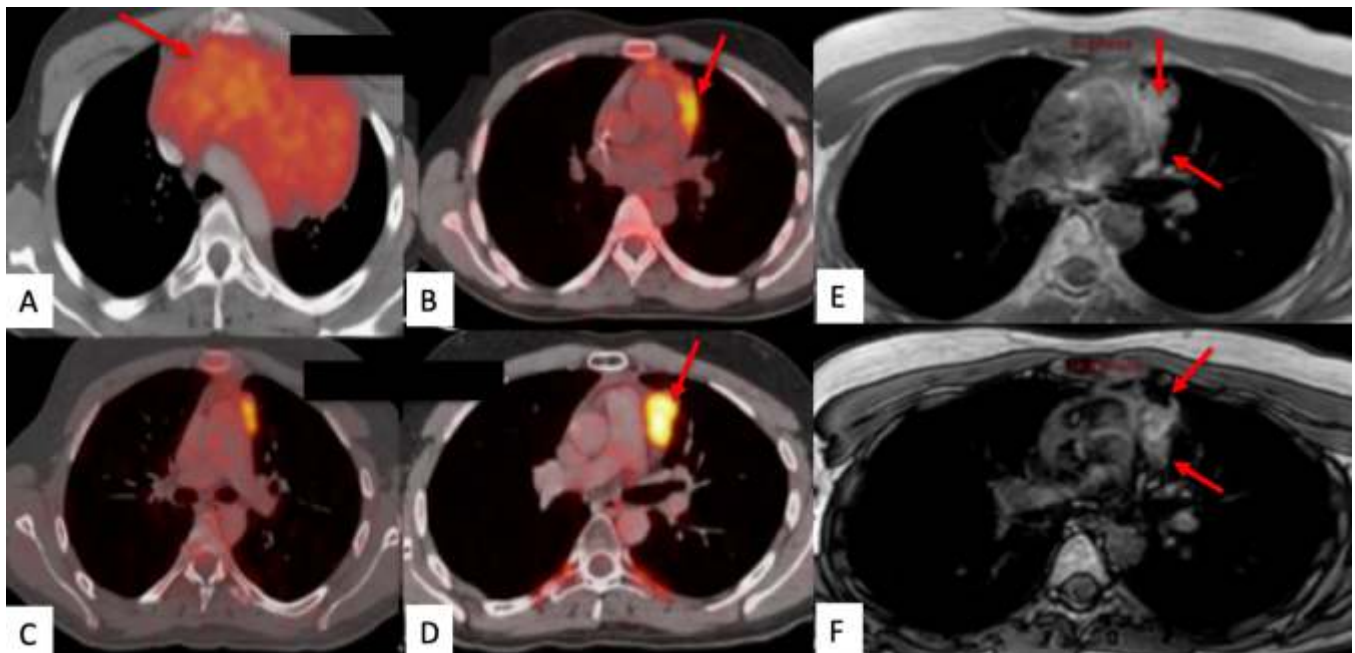
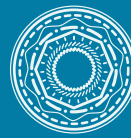


Fig. 1: 24-years old patient with non-Hodgkin's lymphoma. The first PET/CT (A) shows a large tumor (arrow) in the prevascular mediastinum involving the thymus in April 2018, which improved considerably on chemotherapy on the Jun 2018 scan (arrow B), with further improvement on the Sep 2018 scan (arrow in C). The Jan 2019 scan (arrow in D) however showed increased size and uptake, which was worrisome for possible relapse.

A chemical shift MRI showed lobulated soft tissue in the prevascular space of the superior mediastinum with heterogeneous iso-to-hyperintense signal on the T1W in-phase image (arrows in E) with patchy suppression of signal on the T1W opposed-phase image (arrows in F).

Quantitative analysis of this soft tissue showed a chemical shift ratio (CSR) of 0.64 while the signal intensity index (SII) was 23.57%, which favored normal or hyperplastic thymic soft tissue rather than residual tumor.


At a glance:

- ◆ Chemical shift MRI is a specialized technique to evaluate the presence of intra-cellular fat.
- ◆ It helps in differentiating thymic hyperplasia from tumor.
- ◆ It is also useful in the adrenal gland to differentiate benign adenoma from metastasis.

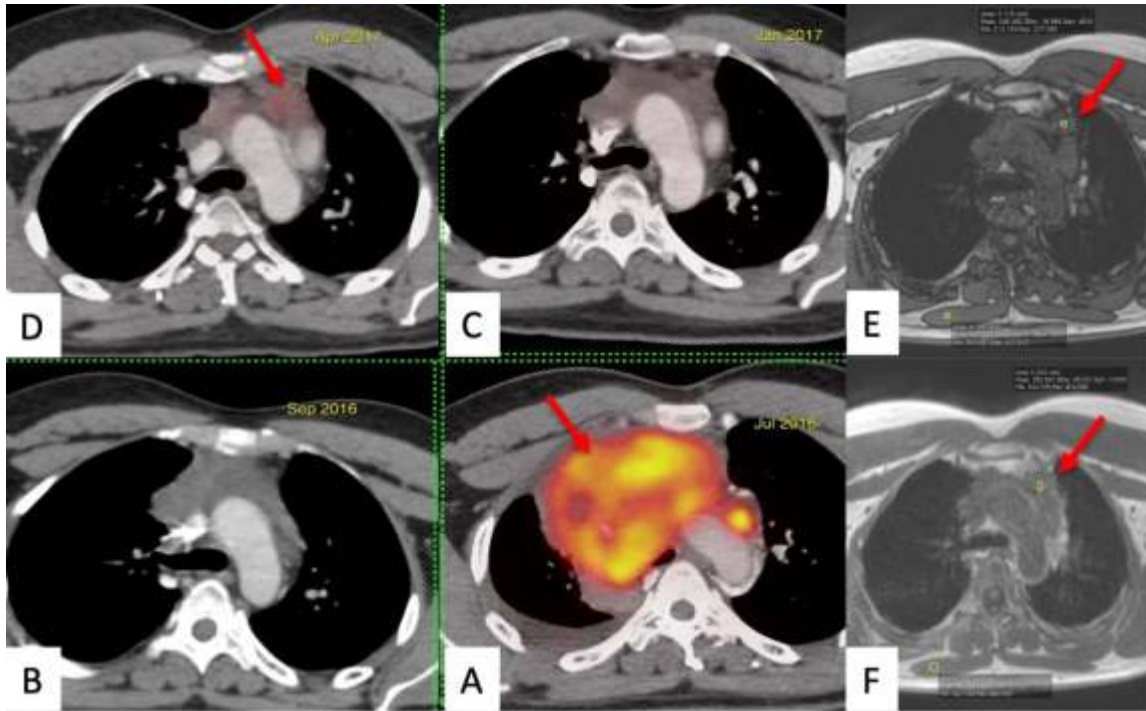


Fig. 2: 29-years old with Hodgkin's Lymphoma. The first PET/CT (A) shows a large prevascular space tumor, which improved significantly (B,C). The follow-up PET/CT at 9 months shows a focus of uptake that was worrisome (arrow in D).

A chemical shift MRI was done. Quantitative analysis of the soft tissue shows a CSR of 0.8 while the SII was 40%, suggestive of normal or hyperplastic thymic soft tissue. A CT guided biopsy was still performed at the insistence of the oncologist and showed absence of viable tumor tissue.

References:

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