Surveillance and Treatment Monitoring in Thymic Tumors via Circulating Tumor DNA

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Background:
Circulating tumor DNA (ctDNA) consists of non-pathologic nucleic acid fragments shed from tumor cells. Thymic epithelial tumors (TETs) are rare malignancies of the anterior mediastinum subdivided into thymomas and thymic carcinomas. The detection of ctDNA in plasma offers a potential marker for minimum residual disease (MRD). This study aims to evaluate the clinical utility of serial ctDNA testing in two patient groups with thymic tumors: (1) those undergoing curative-intent resection monitored for MRD and recurrence, and (2) those with metastatic disease receiving systemic therapy, in whom ctDNA trends may correlate with treatment response.

Methods:
Retrospective chart review was conducted on a sample of thymic tumor patients (n=36). Charts were assessed for patient demographics, tumor characteristics, ctDNA values, recurrence/progression events, and treatment response. Patient blood samples were tested using bespoke Signatera mPCR-NGS. Testing occurred roughly every 3-6 months, along with corresponding CT examination.

Results:
In patients who underwent curative-intent resection (n=22), 20% developed radiographic recurrence tested positive for elevated ctDNA postoperatively. No patients with preoperative ctDNA detection experienced recurrence (n=3). Positive ctDNA detection had a potential false positive rate of 11.8%. In patients with advanced disease (n=14), radiographic progression and stable disease were associated with higher mean levels of ctDNA compared to partial/complete response to treatment (10.73, 10.70, and 0.20 mtm/mL, respectively). Disease progression and ctDNA levels had a weak positive correlation (r=0.11) and 55% concordance.

Conclusion:
ctDNA is not reliable as a standalone surveillance tool or progression marker in thymic tumor patients. Most patients that underwent curative-intent resection and experienced recurrence did not have detectable ctDNA levels postoperatively. The correlation between ctDNA levels and radiographic progression in advanced disease is weak, though consistently low levels were observed in responding patients and may be useful in tracking treatment response.