

## **A CLINICAL ALGORITHM FOR FINE-NEEDLE ASPIRATION MOLECULAR TESTING GUIDES THE APPROPRIATE EXTENT OF INITIAL THYROIDECTOMY**

Yip, Linwah<sup>1</sup>; Wharry, Laura<sup>1</sup>; Armstrong, Michaele<sup>1</sup>; Silbermann, Ari<sup>1</sup>; McCoy, Kelly<sup>1</sup>; Stang, Michael<sup>1</sup>; Ohori, N. Paul<sup>2</sup>; LeBeau, Shane<sup>3</sup>; Coyne, Christopher<sup>3</sup>; Nikiforova, Marina<sup>2</sup>; Bauman, Julie<sup>4</sup>; Johnson, Jonas<sup>5</sup>; Tublin, Mitchell<sup>6</sup>; Hodak, Steven<sup>3</sup>; Nikiforov, Yuri<sup>2</sup>; Carty, Sally<sup>1</sup>

<sup>1</sup>University of Pittsburgh, Department of Surgery, Pittsburgh, PA, USA; <sup>2</sup>University of Pittsburgh, Department of Pathology, Pittsburgh, PA, USA; <sup>3</sup>University of Pittsburgh, Department of Endocrinology, Pittsburgh, PA, USA; <sup>4</sup>University of Pittsburgh, Department of Hematology and Oncology, Pittsburgh, PA, USA; <sup>5</sup>University of Pittsburgh, Department of Otolaryngology, Pittsburgh, PA, USA; <sup>6</sup>University of Pittsburgh, Department of Radiology, Pittsburgh, PA, USA

**Background/Purpose:** Thyroid surgery (Tx), either total thyroidectomy (TT) or lobectomy, is often needed to diagnose differentiated thyroid cancer (DTC). Determining the correct extent of initial Tx is challenging.

**Objective:** To test if a clinical algorithm using routine cytologic molecular testing (MT) promotes initial TT for clinically significant thyroid cancer (sTC) and correctly limits surgery to lobectomy when appropriate.

**Methods:** After implementing an algorithm for prospective molecular testing (MT) of in-house fine needle aspiration biopsy (FNAB) specimens, we conducted a single-institution cohort study of all patients (n=671) with non-malignant cytology who had Tx from 10/10-3/12, cytologic diagnosis using 2008 Bethesda criteria, and  $\geq 1$  indication for Tx by 2009 ATA guidelines. sTC was defined by histologic DTC  $\geq 1$  cm and/or lymph node metastasis. Cohort 2 patients did not have MT or had inevaluable results. In Cohort 1, MT for a multigene mutation panel was performed for non-benign cytology and positive MT results indicated initial TT.

**Results:** MT guidance was associated with a higher incidence of sTC after TT (p=0.006) and a lower rate of sTC after lobectomy (p=0.03). Without MT results, patients with indeterminate (FLUS/FN) cytology who received initial lobectomy were 2.5X more likely to require 2-stage surgery for histologic sTC (p<0.001). In the 501 patients with non-sTC for whom lobectomy is the appropriate extent of surgery, lobectomy was correctly performed more often with routine preoperative MT (p=0.001).

**Discussion & Conclusion:** FNAB-MT for *BRAF*, *RAS*, *PAX8PPARG* and *RET-PTC* expedites optimal initial surgery for DTC, facilitating succinct definitive management for patients with thyroid nodules.