Clinical Review Criteria
Electromagnetic Navigation Bronchoscopy (ENB)

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Criteria
For Medicare Members
Medicare has no NCD or LCD for Washington for this service. The CPT codes when billed are reimbursed at the APC level when billed in an ambulatory setting.

For Non-Medicare Members
Diagnosis of peripheral lesions
When used with endobronchial ultrasound, electromagnetic navigation bronchoscopy is considered medically necessary.

OR
Fiducial marker placement
There is insufficient evidence in the published medical literature to show that this service/therapy is as safe as standard services/therapies and/or provides better long-term outcomes than current standard services/therapies.

Background
Flexible bronchoscopy (FB) is a minimally invasive procedure that is used for the diagnosis and treatment of lung cancer. Research suggests that the sensitivity of FB is approximately 88% for diagnosing central lesions and 78% for diagnosing peripheral lesions (most commonly defined as lesions that are not visible beyond the visual segmental bronchi). However, the sensitivity of FB is dependent on lesion size. FB does not perform as well for smaller peripheral lesions. It has been estimated that for peripheral lesions less than 2 cm in diameter the sensitivity of FB is approximately 34% (Rivera 2007).

Electromagnetic navigation bronchoscopy (ENB) is a relatively new bronchoscopic tool that combines CT-generated virtual bronchoscopy and electromagnetic tracking of a steerable probe to allow physicians to perform biopsy of peripheral lesion that are not accessible through conventional bronchoscopy. It has also been suggested that mediastinal lymph nodes can be biopsied using ENB. Other uses of ENB include implantation of fiducial markers for radiotherapy, implantation of brachytherapy seeds or catheters, and dye marker placement for surgical resection.

Several ENB systems have received FDA approval. ENB using the superDimensions I Logic™ System (superDimensions, Inc. Minneapolis, MN) is performed in three phases – planning, registration, and navigation and biopsy (Bechara 2011, Schwartz 2010).

1. Planning: A three-dimensional image of the patient’s lungs with anatomical landmarks is constructed using previously taken CT scans and proprietary software.
2. Registration: The steerable navigation catheter is inserted through the bronchoscope. The three-dimensional image with anatomical landmarks created in the planning phase is viewed and correlated with
the actual image from the video bronchoscope. The position of each landmark is marked using a foot pedal.

3. Navigation and biopsy: The steerable catheter is used to navigate to the lesion. The location of the catheter’s tip is displayed on the CT images. Once the catheter reaches the target, it is locked in place, and the working guide is retracted. Once the catheter is in place, any endoscopic tool can be inserted through the channel. This includes transbronchial forceps to biopsy the lesion or guide wire for the placement of fiducial markers.

Medical Technology Assessment Committee (MTAC)

Electromagnetic Navigation Bronchoscopy

08/20/2012: MTAC REVIEW

Evidence Conclusion: Diagnostic yield: A recent RCT that included 118 subjects with evidence of peripheral lung lesions or solitary primary nodules on CT evaluated the diagnostic yield of endobronchial ultrasound (EBUS), electromagnetic navigation bronchoscopy (ENB), and combined EBUS/ENB. Results from this study suggest that combined EBUS/ENB improves diagnostic yield compared to either method alone. The pneumothorax rate was 5% in the EBUS and ENB alone groups and 8% in the combined group. There was no significant difference in pneumothorax rate between the three groups (Eberhardt 2007).

| Diagnostic yield (Eberhardt 2007) |
|------------------|----------------|----------------|
|                  | EBUS           | ENB            | Combined       |
|                  | 69%            | 59%            | 88%            |

A recent meta-analysis also evaluated the diagnostic yield of different guided bronchoscopy methods. Results from this meta-analysis suggest that the diagnostic yield of ENB is approximately 67%. Results from this meta-analysis should be interpreted with caution as the majority of the studies included in the meta-analysis were small case series (Wang Memoli 2012). Since the meta-analysis two additional case-series were identified. The first case-series included 112 subjects and evaluated the diagnostic yield of ENB combined with rapid on-site cytopathologic evaluation (ROSE). Overall, the diagnostic yield in this study was 84%. In lesions less than 2 cm, the diagnostic yield was 75.6% and 89.6% in lesions greater than 2 cm. There were two cases (1.8%) of pneumothorax (Lamprecht 2012). The second case-series included 101 subjects and also evaluated the diagnostic yield of ENB combined with ROSE. The diagnostic yield from this study was 85%. There were 6 cases (5.8%) of pneumothorax (Pearlstein 2012). Fiducial marker placement: A small observational study evaluated the transcutaneous placement of fiducial markers using either CT or fluoroscopic guidance (N=15) or transbronchial placement using ENB (N=8) in patient with small, early-stage, non-small cell lung cancer. Pneumothorax occurred in 8 patients (53%) who underwent transcutaneous placement and no patients who underwent transbronchial placement. The fiducial markers did not show substantial migration during the course of treatment for either method (Kupelian 2007). Conclusion: Diagnostic yield: Results from a RCT, a meta-analysis of mainly small case-series, and two case-series suggests that the overall diagnostic yield of ENB is approximately 59 to 85%. Safety: The pneumothorax rate in the studies ranged from 1.8 to 8%. Fiducial marker placement: There is insufficient evidence to determine the safety and clinical utility of ENB for the placement of fiducial markers.

Articles: Several small observational studies, a randomized controlled trial (RCT), and a meta-analysis were identified that evaluated the use of ENB for diagnosing lung cancer. The meta-analysis and the RCT were selected for review. A few small observational studies were identified that evaluated fiducial marker placement using ENB. The number of patients receiving ENB for the placement ranged from 1 to 12. Due to the small sample size none of these studies were selected for review. A summary of the results from one of the more recent studies is presented below. The following articles were selected for review: Eberhardt R, Anantham D, Ernst A, Feller-Kopman D, Herth F. Multimodality bronchoscopic diagnosis of peripheral lung lesions: a randomized controlled trial. Am J Respir Crit Care Med. 2007;176:36-41. See Evidence Table. Wang Memoli JS, Nietert PJ, Silvestri GA. Meta-Analysis of Guided Bronchoscopy for the Evaluation of the Pulmonary Nodule. Chest. 2011. See Evidence Table.

The use of ENB for diagnosis does meet the Kaiser Permanente Medical Technology Assessment Criteria.

The use of ENB for fiducial marker placement does not meet the Kaiser Permanente Medical Technology Assessment Criteria.

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**Codes**

No specific codes