EMN is an image-guided localization device which assists in placing endobronchial accessories in the target areas of the lung. It operates on the principles of electromagnetism. EM Location Board placed under the cephalic end of the bronchoscopy table produces low frequency EM waves to create EM field over the patient’s chest. A micro-sensor once placed within the field, its position in x, y, z axes as well as in–motion (roll, pitch and yaw) is captured by the EMN system and displayed on the monitor in real–time, superimposed upon previously acquired CT images. The locator guide allows its distal end to be steered in 360 degrees; it is placed through the working channel of the bronchoscope via extended working channel to reach the peripheral lesions.

Schwarz performed the first successful animal trial to determine the practicality, accuracy and safety of EMN in locating peripheral lung lesions (PLL) in a swine model. Becker in his pilot study obtained biopsies of the PLL under the guidance of EMN in 30 adults and achieved diagnostic yield of 69%. Schwarz also performed a study on difficult to reach PLL (15–50 mm) under EMN guidance and achieved identical yield. A prospective, single center, pilot study on 60 patients was conducted by Gildea to determine the ability of EMN to sample PLL and mediastinal lymph nodes achieving diagnostic yield of 74% for PLL and 100% for mediastinal lymph nodes; 80.3% for all bronchoscopic procedures irrespective of the size and the location of the lesion. Prospective studies were undertaken by Makris and Eberhardt to determine the yield of EMN without fluoroscopic guidance in the diagnosis of PLL. The yield was found to be 67% and 62.5% respectively and was independent of lesion size. Diagnostic yield was lower for the upper lobe lesions probably due to the acute angle of the corresponding bronchus as well as for the lower lobes, probably related to the diaphragmatic movement. Studies concluded that EMN can be used as a stand alone procedure (without fluoroscopy) without compromising diagnostic yield or increasing the risk of pneumothorax.

It has also been established by a prospective, randomized trial that combination of EBUS and EMN improves the diagnostic yield of FB in PLL without compromising safety. In this study, 72% of all 118 pts had a positive diagnostic yield via FB. Combined EBUS/EMN had a significantly higher diagnostic yield of 88% compared to that of EBUS (69%) and EMN (59%) alone. The diagnostic yield from the lower lobes was significantly lower, consistent with the previous studies.

A retrospective, single center study was carried out to evaluate the diagnostic yield of bronchoscopy, guided by EMN plus the Rapid On–Site Evaluation (ROSE) of the cytology specimens. Of 248 subjects, 65% received a definitive malignant or non–malignant diagnosis on the day of the procedure. It was concluded that combination of EMN and ROSE can provide a better diagnostic yield in patients with a peripheral lung lesions.

Recently; the combination of EMN, PET–CT and ROSE were further studied for the routine diagnostic work–up of peripheral lung lesions. EM. In 76.9% of 13 patients EMN resulted with a definitive diagnosis. Patients with peripheral lung lesions, EMN in combination with ROSE and prior PET–CT was shown to be safe and highly effective.
Pneumothorax is the most common complication encountered with the use of EMN and occurs in the range of 0–6%. Self-limiting bleeding may be encountered in some. There is also a small possibility of EWC being dislodged from its primary site during sampling of the tissue requiring repeat navigational stage of the procedure. Use of fluoroscopy during the sampling of the tissue can help identify the problem. In a single case, repeated insertion and removal of biopsy forceps perforated the EWC.

We believe that major obstacle to the wide spread use of the EMN is its cost and the need for expensive disposable accessories.

EMN is a promising technology not only in diagnosing the PLL and mediastinal lymphnodes, but also may provide a means for therapeutic interventions for the treatment of lung cancer especially in the area of interstitial brachytherapy, minimally invasive robot-assisted (MIRA) lung brachytherapy, and Sterotactic radiosurgery (Cyberknife).

Electromagnetic navigation is a novel tool which aids diagnostic yield of flexible bronchoscopy for the PLL and mediastinal lymph nodes. The procedure is safe, effective, and easy and can be performed with or without the use of fluoroscopy. It plays a complementary role with endobronchial ultrasound. It has a potential to be a helpful tool in improving outcomes from interstitial brachytherapy and cyberknife therapy. Its upfront cost and that associated with the accessories could hinder its popularity. Emerging radiological tools, such as "Lung Mapping" may pose a challenge to the technology of EMN.