# Minimally invasive & safer bronchoscopic methods for lung cancer diagnosis

**DR** SAMANTHA **HERATH** *MBBS MPHIL FRACP*

*Dr Samantha Herath is a Respiratory and Sleep Physician with extensive sub-specialty training and expertise in lung cancer, interventional bronchoscopy and sleep medicine. She became a Fellow of the Royal Australasian College of Physicians in 2011 and completed a competitive interventional bronchoscopy/thoracic malignancy fellowship at the prestigious McGill University in Canada in 2013.*
*P: 1300 586 437 E: info@SydneyRespiratorySpecialist.com.au W: www.SydneyRespiratorySpecialist.com.au*

## THE BURDEN OF LUNG CANCER

Every year around 11,000 patients are diagnosed with lung cancer in Australia. Lung cancer is the leading cause of cancer death worldwide. The death toll of lung cancer alone exceeds combined deaths secondary to breast, prostate, colon and pancreatic cancer.

## EARLY DIAGNOSIS GIVES THE BEST CHANCE OF A CURE

Early diagnosis and surgical resection gives the best chance of cure for lung cancer. Even then the five-year survival of a very early stage localised lung cancer of 1 cm with surgical resection is around 70%. The overall five-year survival of lung cancer is only 14% in Australia. Unfortunately, about 40% of patients present at a time when the cancer has spread to distant sites.

## A GOOD TISSUE BIOPSY IS REQUIRED FOR OPTIMAL TREATMENT

Once an abnormal lung lesion is detected, obtaining a good tissue biopsy from these lesions is of paramount importance to diagnose the malignancy and test for genetic and molecular markers to provide optimal care for the patient.

## MINIMALLY INVASIVE SAFER BRONCHOSCOPY METHODS IN DIAGNOSING LUNG CANCER

Bronchoscopic methods have now been adopted as the first line of investigation in the diagnosis of lung cancer due to the marked safety profile.

The commonest bronchoscopic methods are Linear EBUS, Radial EBUS in combination with cryobiopsy, electromagnetic navigation, virtual bronchoscopy and ultra slim bronchoscopes. These methods can be used alone, but more commonly are used in combination during the same procedure.

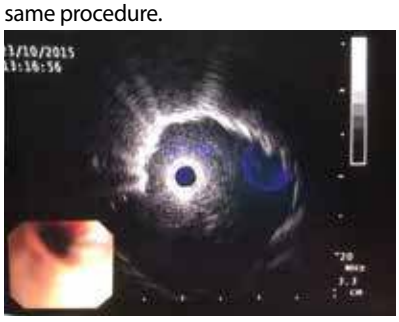

*Figure 1: Radial Ultrasound image of a lung mass*

## LINEAR EBUS

This is the most popular bronchoscopy method for the diagnosis of lung cancer. It is a bronchoscope with a USS that can perform an internal scan of the patient's mediastinal lymph nodes. This method is safe with <1 in 100 risk of a bleed or a pneumothorax. It also gives the added advantage of being able to provide the diagnosis as well as determine the extent of the spread in the mediastinum called mediastinal staging.

Therefore, a patient may only require a single procedure with minimal side effects. With the recent introduction of larger biopsy needles, now linear EBUS can be used to provide core biopsy histology samples that can be used to test for the newest molecular markers.

*Figure 2 : Lung point virtual navigation Bronchoscopy of a lung nodule*

## RADIAL EBUS

Radial EBUS is a thin wire like USS that can be inserted via the bronchoscope to locate abnormal lung masses. Radial EBUS is emerging worldwide as a safe and effective biopsy technique for the biopsy of lung lesions in the lung parenchyma. Various types of biopsies can be performed with the radial EBUS guidance. One such promising biopsy is cryobiopsy which essentially is a 'cold biopsy' of the lung tissue that gives a larger lung biopsy suitable for a multitude of testing without compromising patient safety.

## VIRTUAL BRONCHOSCOPY AND ULTRA-THIN BRONCHOSCOPY

Virtual bronchoscopy is another addition to the bronchoscopy diagnostic methods. Virtual bronchoscopy creates a real-time 3D video of the bronchial tree using the thin slice CT chest scan. This enables accurate location of these lesions by using an ultra-thin bronchoscope which is only 3.7mm in diameter. Lesions can be reached and biopsied with confidence when coupled with this system. Virtual bronchoscopy systems now come in laptop versions which are portable as well as more affordable.

## WHAT ARE THE ADVANTAGES OF THESE NOVEL BRONCHOSCOPIC BIOPSY TECHNIQUES?

1. Increased safety: The key advantage in bronchoscopic biopsy methods is the markedly favourable safety profile. On Radial EBUS studies done over a 1,000 patient meta-analysis the pneumothorax rate was 1% and the bleeding risk was minimal. This is in comparison with CT guided lung biopsy that has a pneumothorax rate up to 20% and bleeding risk around 4%.
2. Reduced time to treatment and avoid multiple procedures: A diagnosis of lung cancer by a CT guided lung biopsy may confirm your suspicion but it is NOT adequate to commence treatment. The patient requires mandatory staging or spread of the disease first. Therefore, bronchoscopy using EBUS is required in majority of patients before any treatment can be commenced. Referral for EBUS as the first investigation would enable a diagnosis and staging during a single procedure and avoid delays.
3. Reduces patient cost and days lost at work: As the patient usually requires a single procedure for diagnosis and staging, the patient cost, days off work, and morbidity due to side effects, are reduced.
4. More patients are eligible to undergo bronchoscopic procedures: Radial EBUS bronchoscopy can be done in patients with lower lung function due to the anticipated lower side effect profile. Bronchoscopy does not require positioning as required for CT guided biopsy and for the anxious patients it is a relief to know that bronchoscopy can be performed under general anaesthesia.

## HOW DO YOU CHOOSE THE BEST BIOPSY METHOD FOR YOUR PATIENT?

The location of the lung lesion as well as the comorbidities of the patient should be taken into account when deciding on the best biopsy technique for the individual patient. Some lung lesions may be better suited for CT guided lung biopsy whilst for many lesions a bronchoscopic biopsy would be the better option. The type of biopsy is also governed by the local expertise and availability of equipment.

## WORKING TOGETHER

A close collaboration with the general practitioner and respiratory physician not only fast tracks the diagnostic process, avoids unnecessary delays and multiple procedures, but also enables holistic care to the patient in dealing with this sobering diagnosis.

*References available on request.*