

## ► Robotic Bronchoscopy Aids Early Cancer Diagnosis & Prompt Lung-Sparing Surgery

Lung cancer screening efforts, including through the use of low-dose chest CT, are identifying more pulmonary nodules when these lesions could represent early-stage lung cancer. Such neoplasms are often located deep in the lungs and so are difficult to biopsy. Now though, robotic-assisted bronchoscopy is not only permitting specialists to extract biopsy tissue with near-certain precision, but also to tag the tumors for easier, more-accurate, less-invasive removal with lung-sparing surgery.

“Close to 95% of the time, we’re able to get biopsied tissue of the lesion that was identified on imaging, and then we can mark the location for our surgeons. That helps them see and zero in on the tumor better—and then remove it with lung-sparing robotic video-assisted thoracic surgery (VATS),” said Virtua pulmonologist Mark Weir, MB ChB.

### More Dependable for Faster Care Sequencing

Bronchoscopy, via endotracheal access, has overtaken transthoracic needle biopsy for lung biopsy, due in part to the complication rate and accuracy issues of the previous approach. Now, robotic bronchoscopy gives pulmonologists controlled access to the periphery of the lungs where most cancerous lung nodules are located and where narrower distal airways may be unreachable using standard bronchoscopy.

The system targets lesions based on CT images, transposed by planning software for 3D modeling of lung anatomy. Adding to visual navigation, the system uses electromagnetic sensors and fluoroscopy for positional data. With a remote controller and high-resolution camera, the operator has unprecedented articulation and views, and improved ability to include mediastinal lymph node staging.

The ultrathin scope reaches all distal segments of the lungs with precision not possible with manually manipulated scoping. Distal tip articulation can aim the catheter at small targets, even when located outside the airway.

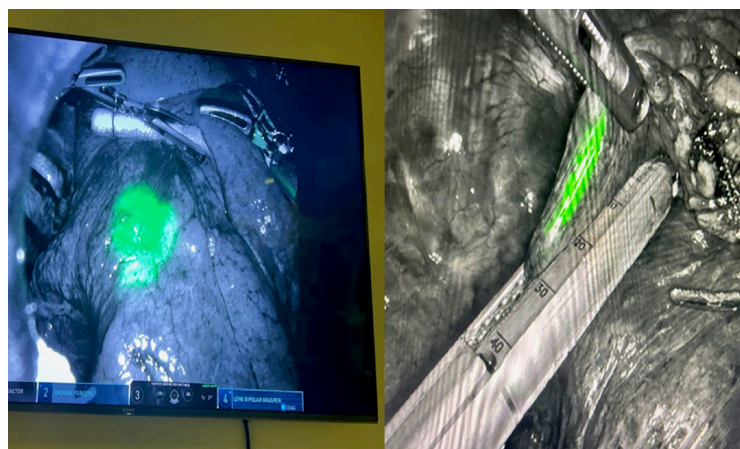
“With accurate diagnosis and staging, we get patients through our lung cancer pathway faster, and cut surgical delays, for the greatest chance of cure,” said Dr. Weir.

### Tumor Marking Brings Major Value to Surgery

In a related advance, Virtua’s pulmonologists can either dye mark or plant a fiducial coil next to a lung tumor at the time of bronchoscopic biopsy to guide the surgeon to the exact location requiring resection. Dyed with indocyanine green (ICG), the fiducial fluoresces bright green when viewed through the robotic surgical system’s near-infrared imaging.

Lung-sparing surgery using a wedge section (segmental resection) rather than a lung lobectomy requires precise localization of the cancerous lesion. With ICG marking, the surgeon’s previously difficult task of pinpointing such a tumor, biopsied earlier, is largely resolved. The ICG dye may remain detectable for as much as a week or two after its placement during the diagnostic bronchoscopy. The technique proves highly valuable for removal of both primary and secondary malignant neoplasms of the lung.

“Marking smaller, asymptomatic lesions is critical to giving us the best chance of preserving as much lung tissue as possible,” said Virtua thoracic surgeon Matthew Puc, MD. “These techniques—of mapped robotic biopsy and tumor tagging—are hugely complimentary to our lung cancer screening and our overall lung cancer program.”



Left, ICG-dyed coil as neon-green tumor marker on lung pleural surface. Right, lesion resected with surgical stapler.

Images courtesy Annals of Thoracic Surgery

For patient appointments, call 888-VIRTUA-3 (888-847-8823).

## Cryobiopsy Yields Better Tissue Samples for Fibrotic Lung

An estimated 100,000 people in the U.S. may have some type of interstitial lung disease (ILD), all forms of which cause inflammation and scarring of lung tissue. The etiology of these 100 or so various pulmonological conditions may be long-term exposure to hazardous substances, autoimmune or connective tissue diseases, hypersensitivity pneumonitis, or other causes—or may remain idiopathic. ILD can be progressive and typically leaves patients with a need for significant oxygen supplementation.

Biopsy serves to confirm the disease and help identify the cause. As with extracting samples of potentially cancerous nodules, however, thoracic needle biopsy comes with risks—and with challenges for ILD biopsy. Particularly, this conventional approach may not allow retrieval of an adequate amount of tissue for diagnosis.

“Our option has been to perform a thorascopic wedge biopsy to get sample tissue, but that’s a surgical procedure that we would prefer to avoid for this purpose, if possible,” explained Virtua thoracic surgeon Matthew Puc, MD.

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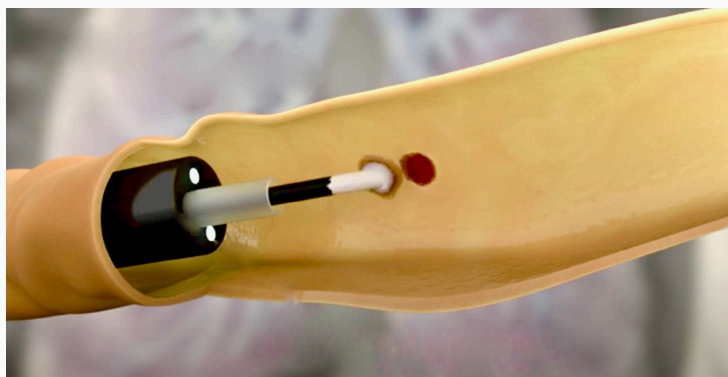
**Cryobiopsy has emerged as a technique** for obtaining larger and better-preserved samples of lung tissue **to aid diagnosis of chronic lung conditions characterized by pulmonary fibrosis.**

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Surgical lung biopsy for diffuse parenchymal lung diseases poses a serious risk of complications, including a significant mortality rate. Instead, the Virtua team now takes advantage of transbronchial lung cryobiopsy, an emerging technique for obtaining larger and better-preserved tissue from lung parenchyma, yielding a sample similar to a frozen section.

Specialists use a bronchoscope to first inspect and then lavage the lung. They then advance the flexible cryoprobe through the scope to freeze and extract a sample from an optimally representative section of the lung. The tissue is more likely to contain alveolar tissue without crush artifacts, enabling the addition of immuno-histochemistry and thus an increased diagnostic value.

“Treatments are often limited, depending on the cause of ILD. But combining the clinical, radiological, and histological pattern gives us the best chance of intervening with appropriate medication and caring for the patient,” said Virtua pulmonologist Mark Weir, MD.



Still image from animation shows bronchoscope positioned in lung airway, with cryoprobe extended, removing tissue sample for biopsy.