



## Interview

# Closing the gap: Image-guided robotic bronchoscopy speeds path to lung cancer treatment

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## Interview

# Closing the gap: Image-guided robotic bronchoscopy speeds path to lung cancer treatment

The majority of lung cancer cases begin with an unexpected discovery. "About 99 percent of our patients come to us with an incidental finding, meaning there was no organized screening program involved," says Thomas Gaisl, MD, PhD, managing consultant in the Department of Pulmonology at University Hospital Zurich. These incidental findings often occur during imaging for unrelated conditions such as cardiac diseases and back pain, highlighting the critical importance of effective nodule management programs. "In terms of symptoms, most of the patients aren't even aware that they might have lung cancer," Gaisl says.

### A breakthrough in early detection

University Hospital Zurich is one of the first sites in Europe to use robotic-assisted bronchoscopy with integrated cone beam CT (CBCT) for reliably diagnosing lung cancer. The technique combines the Intuitive Ion robotic bronchoscopy platform with the Cios Spin mobile C-arm, which offers CT-like intraoperative 3D imaging. "Since introducing this integrated solution, we've seen a sharp increase in Stage IA lung cancer diagnoses at our center," says Gaisl. Data from a study conducted at the hospital's Department of Pulmonology supports his

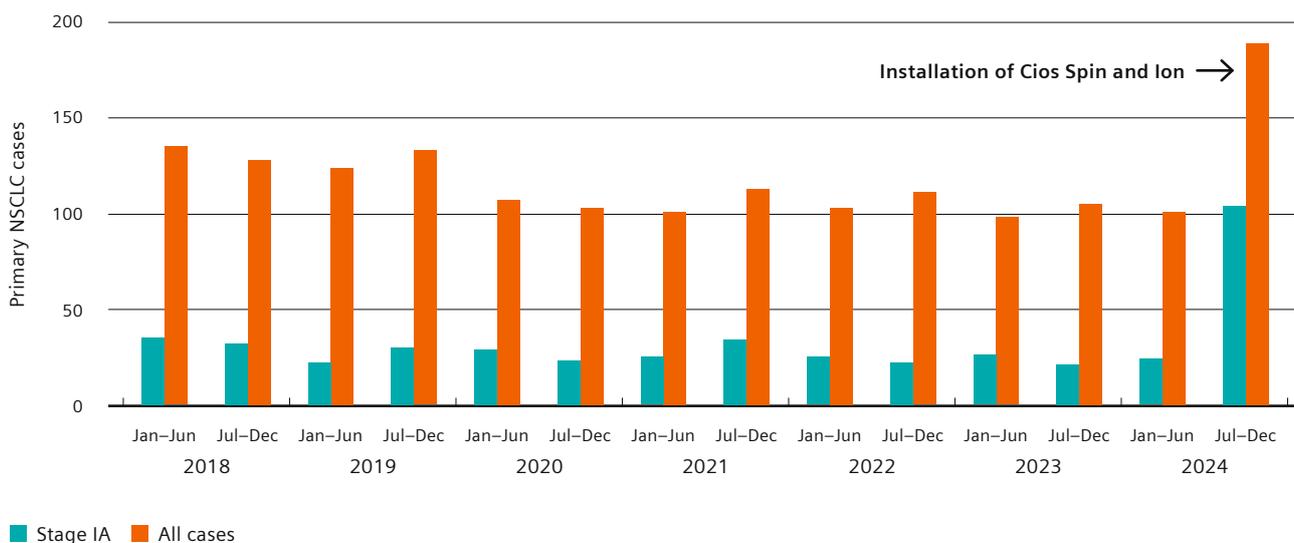


*"Since introducing this integrated solution, we've seen a sharp increase in Stage IA lung cancer diagnoses at our center."*

**Thomas Gaisl, MD, PhD**

Managing Consultant in the Department of Pulmonology,  
University Hospital Zurich, Switzerland

**Stage IA and all primary non-small cell lung cancer (NSCLC) cases at the Comprehensive Cancer Center Zurich over the past 7 years: A breakthrough in early detection**



statement: In six months, center-wide Stage IA lung cancer diagnoses have almost quadrupled, while overall center-wide lung cancer diagnoses rose by 68 percent [1].

The value of early detection cannot be overstated. This is reflected in five-year survival rates, with Stage IA patients showing an 84 percent survival rate, compared to just 4–8 percent for Stage IV disease [2]. These differences underscore the life-changing potential of early diagnosis.

**Advanced technology enables precise diagnostics**

Integrating robotic assistance with cone beam CT addresses long-standing limitations in bronchoscopy procedures. “In the past, we couldn’t detect lung cancer at such an early stage because most of the peripheral nodules are in the outer third of the lung without a bronchus sign. They are small, sometimes sub-solid or pure ground-glass lesions. These lesions are usually very difficult to target with manual or conventional bronchoscopy,” says Carolin Steinack, MD, head of the Interventional Lung Center at University Hospital Zurich. “Now we can target very small peripheral lesions independently of the texture and regardless of whether there is a bronchus sign. At the moment, robotic-assisted bronchoscopy with integrated cone beam CT is the most precise minimally-invasive diagnostic tool we can have when we target small lesions.”

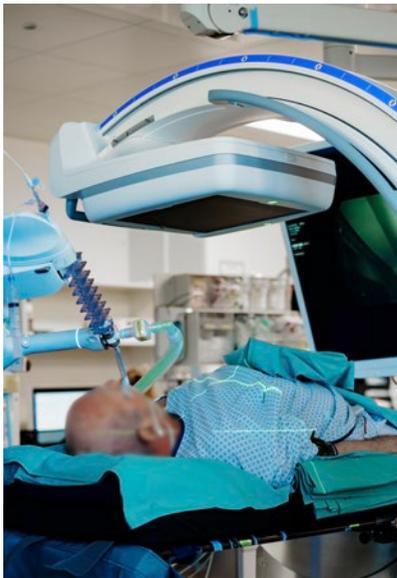
**Impressive clinical outcomes**

The solution’s precision has yielded remarkable results, with a 99 percent tool-in-lesion rate and an 89.3 percent diagnostic yield [3]. “For about 90 percent of all the patients under-going robotic-assisted bronchoscopy with integrated cone beam CT, we were able to get a diagnosis,” says Gaisl. “We basically got access to a new patient pool almost without cannibalizing our current manual bronchoscopy program.”

Combining cone beam CT with robotic-assisted bronchoscopy has several additional advantages, as Gaisl explains: “First, complexity goes down for everyone. This means we can do more procedures a day. Second, the radiation dose for each patient goes down. Third, we’re also able to see where we are in the lesion. Sometimes the integration is so helpful that we no longer need a second 3D spin.”

**Critical impact on patient pathways**

Not all patients undergoing robotic-assisted bronchoscopy receive a lung cancer diagnosis, though. “We are also much more confident in our benign biopsies, meaning that our negative predictive value has also spiked up,” says Gaisl.



Using the green laser light of Cios Spin to position the peripheral nodule in the isocenter based on the preoperative CT location.



CT-to-body divergence makes it necessary to update the target location for successful navigation. With its NaviLink 3D interface, Cios Spin makes it possible to update the target location within the Ion system.

A reliable benign diagnosis can also have a significant impact on a patient's journey. "I can remember two patients who were able to get a liver and a kidney transplant because we showed that their lung nodules were benign," says Gaisl. "We want to give the patients a reliable biopsy so we can play with open cards. If it's a benign lesion, we want to make sure that the procedure and the biopsy were diagnostic. Therefore, it's very important for biopsy success to confirm tool-in-lesion before taking the sample. This is where the integrated cone beam CT comes in really handy." A reliable diagnosis can also prevent unnecessary surgeries and enable personalized therapies.

## Comprehensive nodule management

Success with this technology requires a systematic approach. "In order to achieve a stage shift for lung cancer diagnosis, we introduced the lung nodule board at our institution," explains Gaisl. "The members of the board are dedicated thoracic radiologists, thoracic surgeons, and pulmonologists, who can then make sure that all the resources we have available are adequately allocated, and that the right patients get the right biopsy at the right time."



### Cone beam CT

Cone beam CT (CBCT) is an advanced imaging technique that creates three-dimensional images using X-ray technology. Unlike traditional CT scanners, which use a fan-shaped X-ray beam with a crescent-shaped detector, cone beam CT uses a cone-shaped beam captured by a flat-panel detector. During a typical scan, a C-arm rotates approximately 200° around the patient in about 30 seconds, capturing around 200 individual images. Sophisticated algorithms then combine these into a 3D volume image. Research shows that cone beam CT provides sufficient image quality for visualizing pulmonary lesions while maintaining a reasonable radiation dose.

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*“It’s a huge advantage if we can diagnose patients with lung cancer at an early stage, because these are patients who have potential for curative treatment.”*

**Carolin Steinack, MD**

Head of the Interventional Lung Center,  
University Hospital Zurich, Switzerland

Steinack explains the broader implications: “It’s a huge advantage if we can diagnose patients with lung cancer at an early stage, because these are patients who have potential for curative treatment.” In addition to the much better survival outcomes, earlier detection also has substantial economic implications. According to current data, monthly excess expenditures for lung cancer treatment increase significantly with disease progression, ranging from approximately €3,115 for Stage IA cancer to €8,156 for Stage IVB cancer [2].

### **Future impact on global health**

With lung cancer remaining the leading cause of cancer-related mortality worldwide, accounting for over 1.8 million deaths annually according to WHO data [4], this technological advancement represents a significant step forward. The ability to detect and diagnose lung cancer at earlier stages through robotic-assisted bronchoscopy with integrated cone beam CT could fundamentally alter the trajectory of patient outcomes in thoracic oncology.



### **Lung cancer screening in Europe**

European approaches to lung cancer screening are rapidly evolving. In 2022, the European Commission proposed updated cancer screening guidelines that recommend implementing low-dose CT screening across EU member states through a strategic, phased approach. The Swiss Cancer Screening Committee has already issued a conditional recommendation for low-dose CT screening targeting high-risk individuals. These developments signal a significant shift toward more proactive lung cancer detection, with multiple countries taking progressive steps to establish comprehensive screening programs.

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## Further reading

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