

Philips Lung suite

All-in-one diagnosis and treatment of lung cancer

- 1 · The Global Cancer Observatory, September 2018.
 - WHO Global status report on noncommunicable diseases 2014
 - National Lung Screening Trial Research Team. Reduced lung-cancer mortality with low-dose computed tomographic screening. *New England Journal of Medicine* 365.5 (2011): 395-409
 - Kanarek et al., Survival after community diagnosis of early-stage non-small cell lung cancer. *The American journal of medicine* 127, no. 5 (2014): 443-449
 - Memoli et al., Meta-analysis of guided bronchoscopy for the evaluation of the pulmonary nodule. *Chest* 142.2 (2012): 385-393.
 - Pritchett et al., Cone-beam CT with augmented fluoroscopy combined with EMN bronchoscopy for biopsy of pulmonary nodules. *Journal of bronchology & interventional pulmonology* 25.4 (2018): 274
 - Ohno et al., CT-Guided Transthoracic Needle Aspiration Biopsy of Small Solitary Pulmonary Nodules. *American Journal of Roentgenology* 180.6 (2003): 1665-1669
 - International Agency for Research on Cancer: <http://gco.iarc.fr/>
 - American Lung Association, <https://www.lung.org/>
- 2 Pritchett, Michael, et al. "Cone Beam CT-Guided Endobronchial Biopsy Assisted by Augmented Fluoroscopy." *Chest* 152.4 (2017): A887.
- 3 Abi-Jaoudeh, Nadine, et al. "Prospective randomized trial for image-guided biopsy using cone-beam CT navigation compared with conventional CT." *Journal of Vascular and Interventional Radiology* 27.9 (2016): 1342-1349.

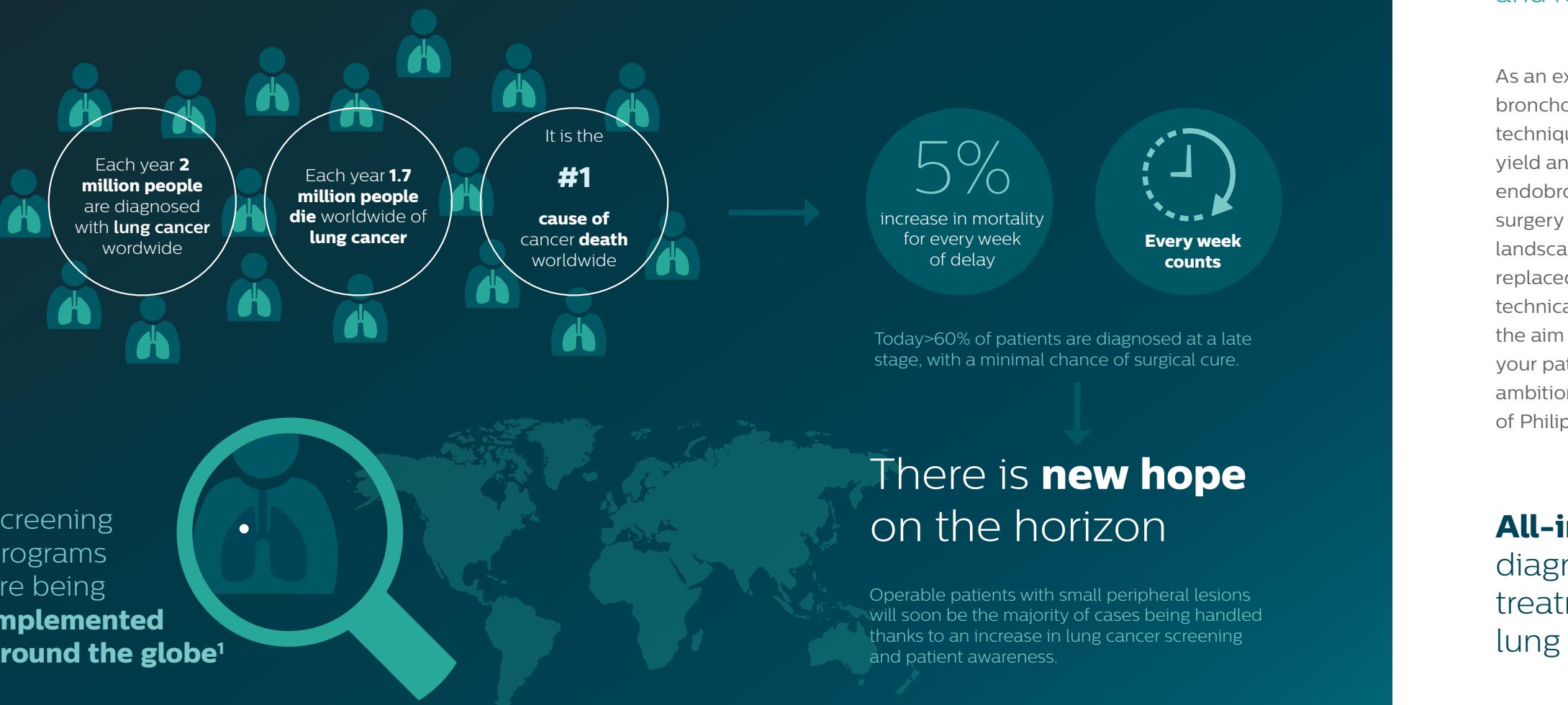
© 2019 Koninklijke Philips N.V. All rights reserved. Specifications are subject to change without notice. Trademarks are the property of Koninklijke Philips N.V. or their respective owners.

4522 991 44891 * MAR 2019



How to reach us
Please visit www.philips.com/lungsuite
healthcare@philips.com

Are you ready for a new era?



Our vision

Enable all-in-one diagnosis and treatment to improve clinical outcomes and reduce overall cost of care

As an expert in advanced bronchoscopy, you are looking for new techniques to get the highest diagnostic yield and pave the way to new endobronchial treatments. In thoracic surgery you are facing a whole new landscape as open surgery is steadily replaced by the less invasive, but more technically challenging VATS. All with the aim of providing the best care to your patients. At Philips we share your ambition. Discover the benefits of Philips Lung suite.



All-in-one diagnosis and treatment of lung cancer





Philips Lung suite solutions

As you embark upon the journey to improve the care of your lung cancer patients, it is reassuring to know you can draw upon Philips 130 years of experience and knowledge from cath labs, image guided therapy and over 800 Hybrid OR projects globally.

Our all-in-one lung cancer diagnosis and treatment platform enables you to perform biopsy, ablation, marking, and/or thoracic surgery procedures in the same room. So you can deliver same-day diagnosis and treatment to patients.

Learn more on Philips Lung suite with Cone beam CT.
Visit: www.philips.com/lungsuite

Philips Lung suite package



All-in-one diagnosis and therapy Hybrid OR

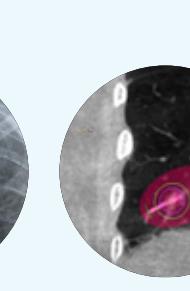
- FlexMove or FlexArm
- ClarityIQ technology
- FlexVision Pro
- TSM Pro
- FlexSpot
- Maquet Magnus OR table
- Operating room table



XperCT Dual



3D Dynamic Roadmap



XperGuide Ablation



Endobronchial biopsy & ablation



Percutaneous biopsy & ablation



Image-guided VATS



Advanced lung biopsy and ablation lab

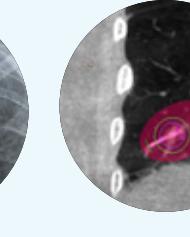
- Ceiling mounted system
- ClarityIQ technology
- FlexVision Pro
- TSM Pro
- Xper Table



XperCT Dual



3D Dynamic Roadmap



XperGuide Ablation



Endobronchial biopsy & ablation



Percutaneous biopsy & ablation

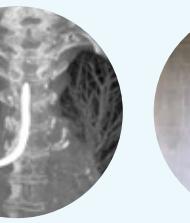


Advanced lung biopsy lab

- Floor mounted
- ClarityIQ
- Flexvision XL
- XperTable



XperCT

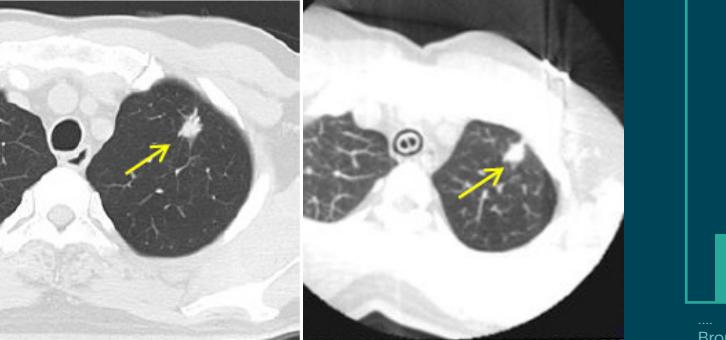


3D Dynamic Roadmap



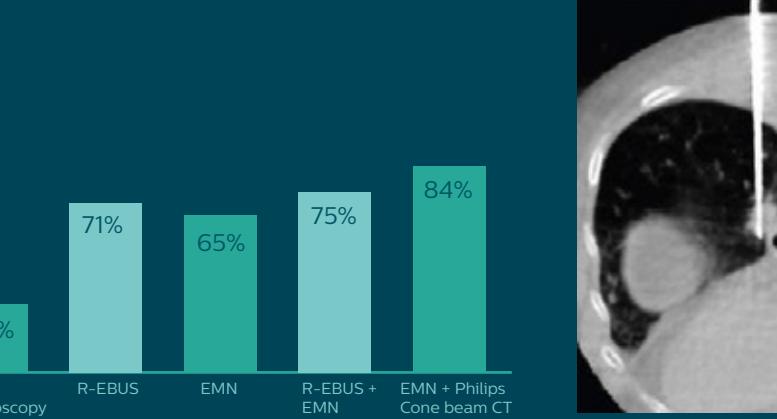
Endobronchial biopsy

Clinically proven solutions to enable you to provide superior care



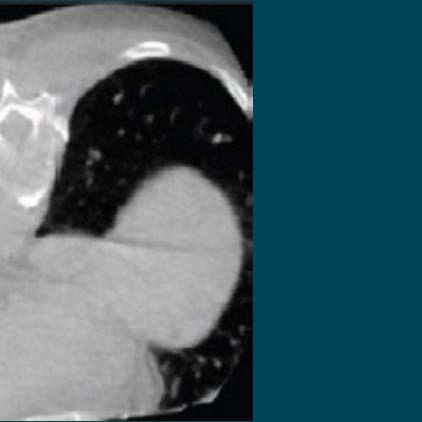
Detection accuracy of lung lesions equivalent to conventional MDCT

High quality, 5 second cone beam CT protocols with latest flat panel detector technology allow outstanding visibility of lung lesions and other anatomical structures.



Provide high diagnostic accuracy regardless of lesion location

More than 91% sensitivity for malignancy and 84% diagnostic yield for small lung nodules with bronchoscopy and Philips cone beam CT².



Diagnostic accuracy equivalent to CT-guided biopsy at low radiation dose
Percutaneous cone beam CT-guided navigation software enables high precision during needle biopsy and low patient radiation exposure compared to conventional CT-guided biopsy³.



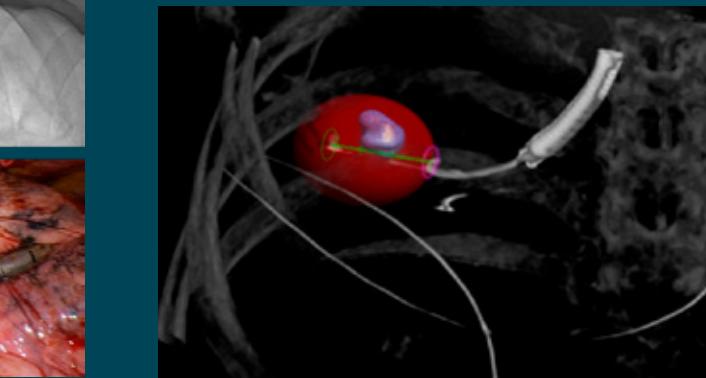
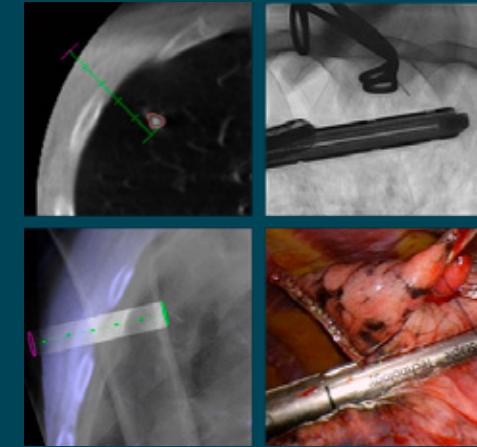
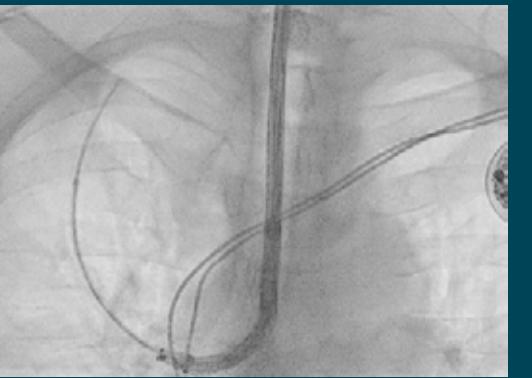
"CBCT offers the distinct advantage of intra-procedural real-time imaging; it gives us greater confidence during biopsy and is a must for future ablative technologies that use an endobronchial approach"

Michael Pritchett, DO, MPH, Pulmonologist
FirstHealth Moore Regional Hospital, Pinehurst, NC, USA



"The use of CBCT in the hybrid OR provides us with a reliable and accurate method for intraoperative localization of small pulmonary nodules. This is the next step in the evolution of thoracic surgery"

Kelvin Lau, MD, Thoracic Surgeon
St Bartholomew's Hospital London, UK



Patient and staff safety with unique low-dose X-ray technology

High image quality in fluoroscopy thanks to clinically proven low dose technology.

Smoothly combine biopsy, marking and surgery in one room

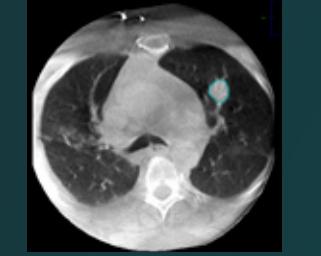
Intra-operative cone beam CT facilitates minimally invasive surgery for proximal and peripheral lesions and avoids the need to transfer patients from the operating room to a separate CT room.

Enable new minimally invasive endobronchial treatment

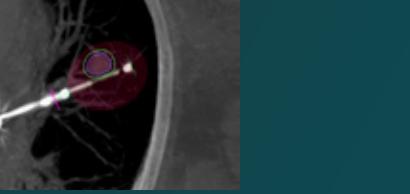
Studies have confirmed the ability of Philips cone beam CT and XperGuide Ablation planning software to guide the effective delivery of novel endobronchial microwave ablation therapy.

Bronchoscopy biopsy and ablation

A step change in higher diagnostic yields and new
minimally invasive therapy



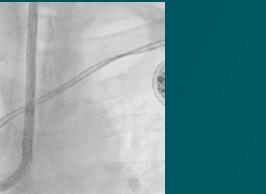
XperCT Dual
High quality intra-operative cone beam CT allows you to visualize and segment lung lesions and determine the optimal endobronchial approach.



XperGuide Ablation planning
During planning, XperGuide Ablation visualizes the specific ablation zones and distance between multiple ablation needles in 3D, based on their thermal characteristics.



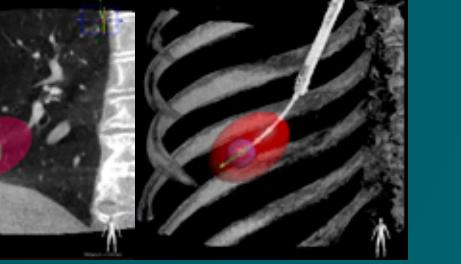
Augmented Fluoroscopy
(Dynamic 3D Roadmap with tumor segmentation)
The 3D cone beam CT image of the segmented lesion is overlaid on live fluoroscopy and automatically adapts to the position you are working in.



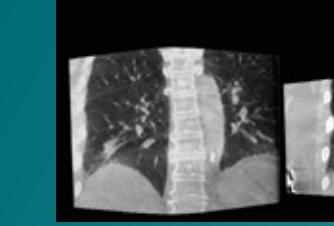
Dedicated Thoracic low dose X-ray fluoroscopy
(ClarityIQ)
Fluoroscopy navigation can be performed using dedicated X-ray processing to balance optimal device visibility and low radiation exposure.



XperCT Dual
High quality intra-operative cone beam CT allows you to localize a biopsy or ablation device in 3D.



XperGuide Ablation verification
After positioning of the ablation device, XperGuide Ablation can be used to verify tumor coverage using cone beam CT data acquired before activating the specified ablation device.



XperCT Dual side-by-side viewer
After the procedure, a cone beam CT can be taken and displayed alongside the pre-operative cone beam CT scan to confirm adequate tumor coverage and visualize any potential complication.

Decide

Guide

Treat

Confirm

Image-guided VATS (iVATS)

Streamlining biopsy, marking and surgery in one room



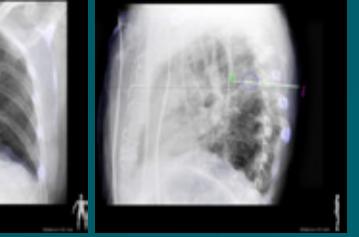
XperCT Dual
High quality intra-operative cone beam CT allows you to visualize and segment lung lesions.



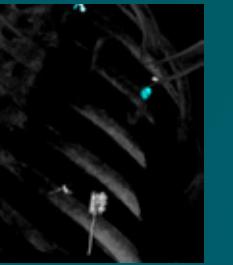
XperGuide planning
Plan the optimal percutaneous approach to reach the lesion for a biopsy and/or marker placement.



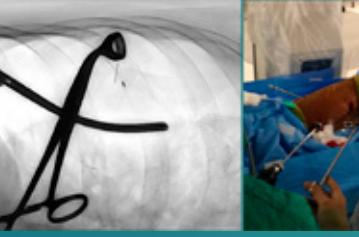
Augmented Fluoroscopy marking
Leverage the 3D orientation provided by Augmented Fluoroscopy to position a marker close to the target lesion using an endobronchial approach.



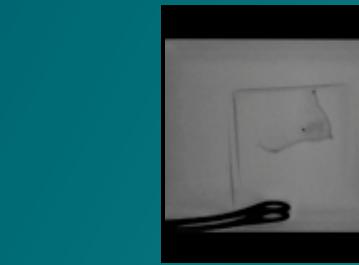
XperGuide guidance
The cone beam CT data, including the segmented lesion and planned path, are automatically overlaid on live fluoroscopy to guide needle positioning.



XperCT Dual
High quality intra-operative cone beam CT is used to verify the correct positioning of a biopsy needle and/or surgical marker.



FlexMove and FlexArm
The advanced system movements of FlexArm offer the flexibility to swiftly move the system in and out of the surgical field without disrupting staff and equipment. Dedicated low X-ray protocols can be applied to verify the correct position of the surgical staples.



confirmation Fluoroscopy

Decide

Guide

Treat

Confirm

Case: Cone beam CT guided endobronchial tumor ablation

Patient history

This is a 72 year old female presenting with a 1.6 x 1.7cm right lower lobe enlarging nodule. She had a smoking history of 45 pack-years but had quit smoking three years back. Her PET scan showed right lower lobe nodule with standardized uptake value (SUV) of 2.8 (background lung = 2.0) and a brain MRI showed negative for metastatic disease.

Procedure

Cone beam CT guided endobronchial tumor ablation assisted by 3D ablation planning and tumor segmentation overlay with live fluoroscopy.

Conclusion

As the field of advanced bronchoscopy and interventional pulmonology moves towards novel therapeutic approaches, the availability of advanced imaging will be of paramount importance to ensure safety, efficacy and to meet quality standards of care. Cone beam CT offers not only the distinct advantage of intra-procedural 3D real-time imaging for ablation probe planning and confirmation but also the necessary contrast resolution to verify treatment completeness and detect any potential minor or major intra-procedural complications. In addition, cone beam CT-based augmentation of live fluoroscopy and dedicated ablation planning software (Lung suite, Philips) helps to streamline the procedural workflow and limits the number of cone beam CT scans to achieve a satisfactory probe position. Cone Beam CT offers the required precision for performing these procedures and can be considered a must for current and future endobronchial therapies.

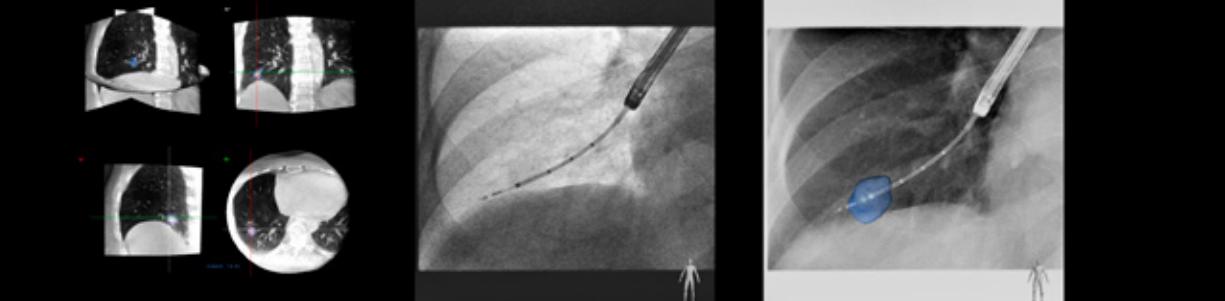


Figure 2: 3D segmentation of CBCT dataset to highlight target nodule (left). Standard 2D live fluoroscopy versus corresponding Augmented live fluoroscopy (right).

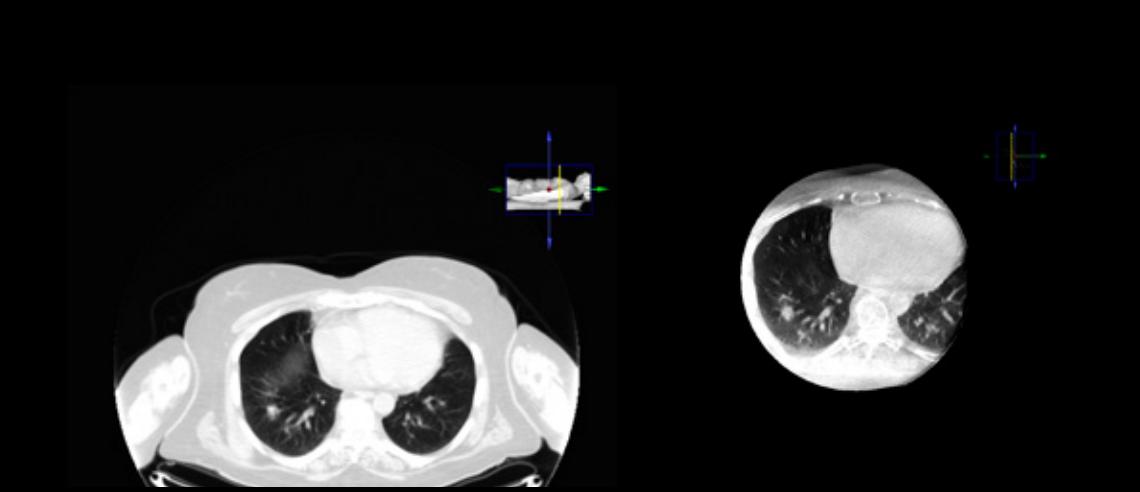


Figure 1: Pre-operative CT (left) and intra-operative cone beam CT (right) showing small right lower lobe pulmonary nodule.

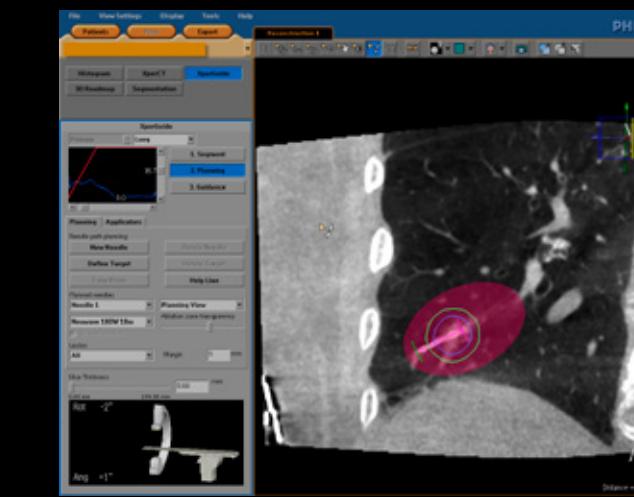


Figure 3: User interface of the ablation planning software (Lung suite, Philips) with 2D slide view of selected ablation probe (left). 3D visualization of planned ablation probe and segmented nodule (right).

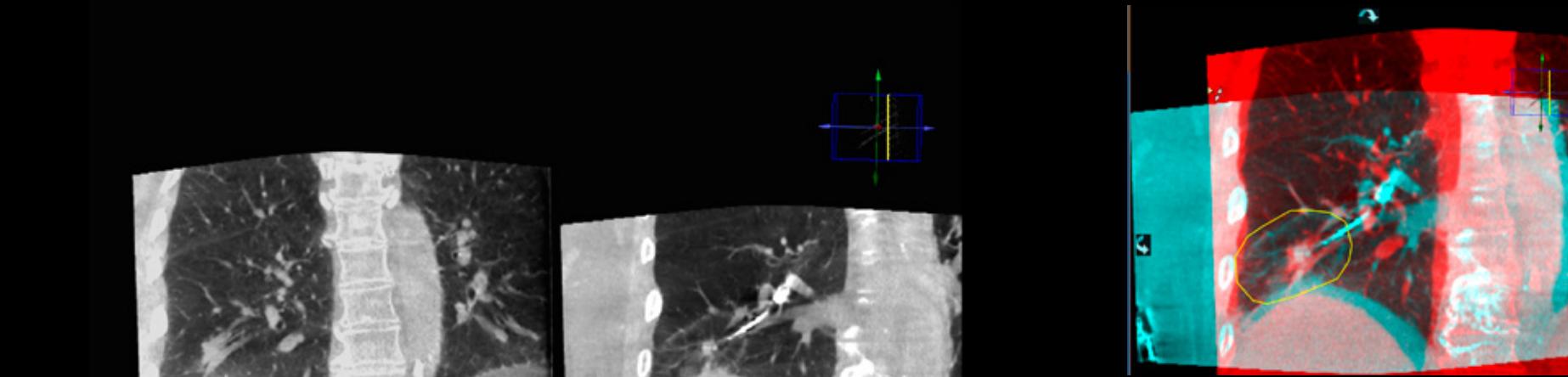


Figure 4: Comparison of pre and post-ablation cone beam CT volumes using Dual view functionality (left). Overlay viewer of the two cone beam CT volumes highlighting extent of ablated tissue in yellow (right).

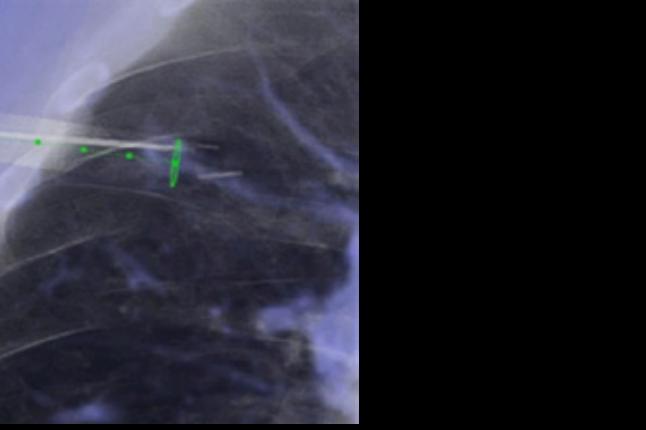
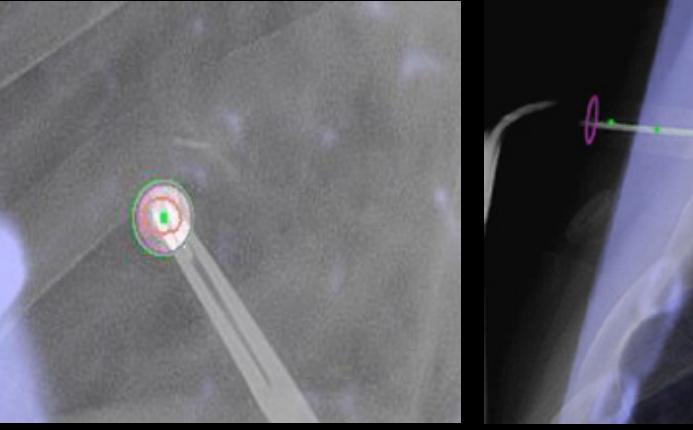


Figure 1: Fiducial marker placement. 2D live fluoroscopic overlay with 3D needle path and cone beam CT volume showing Entry Point view (middle) used to align the needle and the target nodule, and Progress view (right) used to advance the needle towards the target nodule. The fiducial markers are visible on fluoroscopy and positioned beyond the nodule.

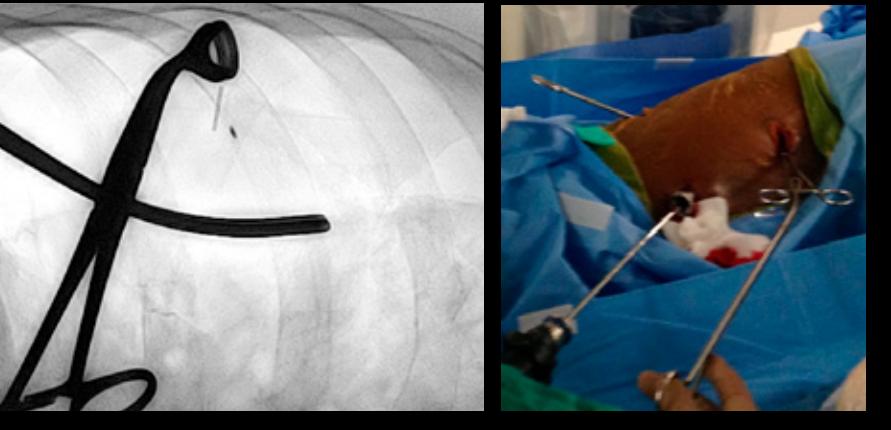


Figure 2: The VATS wedge resection was performed by following the fiducial marker string to the lesion and confirmed with on-table fluoroscopy to ensure that the non-palpable lesion was in the wedge resection specimen.

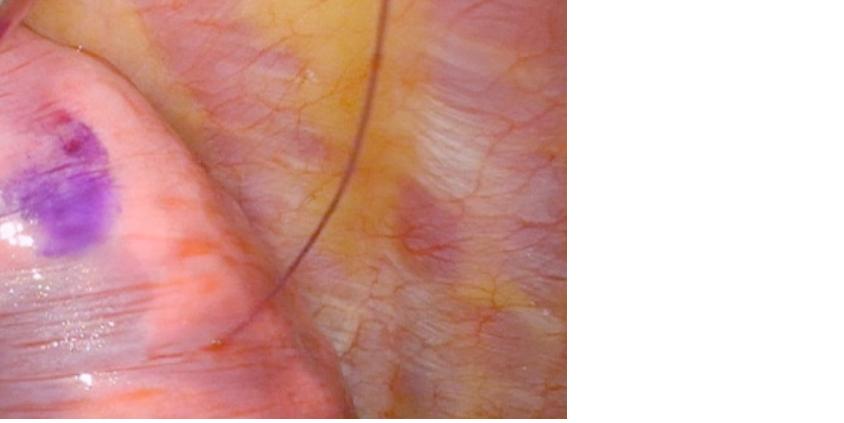
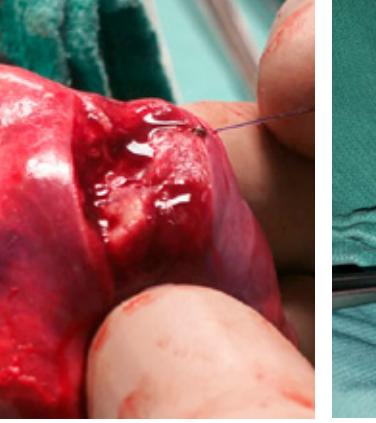


Figure 3: The fiducial marker string can be seen in the endoscopic view (left) and then the T-fastener marker is also shown within the specimen (middle, right).



“Having the hybrid OR and all of its technologies at Augusta University Health allows me to tailor the patient’s care plan in one day instead of having to schedule multiple follow-up appointments”

Dr. Carsten Schroeder, Augusta University Health

Case: Image guided Video Assisted Thoracoscopic Surgery (iVATS)

Patient history

This is a 57 year old male presenting with an increasing right upper lobe lung nodule. He was a current smoker (2 packs per day) and had a smoking history of over 100 pack years.

Over 2 years of lung screening, his nodule grew from 2 to 6 mm with a suspicion of an early lung cancer in a high risk person. His lung function was significantly diminished and his performance status was limited.

His lesion was deep in the lung parenchyma and therefore not palpable and accessible using a classical video assisted thoracoscopic surgery (VATS) approach. He was offered a limited lung resection via image guided VATS (iVATS) using intra-operative cone beam CT.

Procedure

Image guided Video Assisted Thoracoscopic Surgery (iVATS) assisted by cone beam CT and 3D live needle guidance.

Conclusion

Using the hybrid OR with cone beam CT, navigational bronchoscopy, percutaneous biopsy, fiducial placement, and iVATS can be combined into a single-stage, single-provider procedure allowing for diagnosis and treatment in one setting. Representing a paradigm shift in thoracic surgery, the hybrid OR provides one stop workflow eliminating multiple clinical visits for improved patient experience and care. This streamlined approach not only avoids the upstaging and worse prognosis associated with delayed treatment but is also a cost-effective paradigm for the institution.