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# Robotic Navigation with Ion and Monarch Systems

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# Lung Endoscopic Therapies/Ablation

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# Disclosures

**Research:**

Intuitive Research Grant

**Consulting:**

Noah Medical, Elucent Navigation, Vergent, Peyent

# Evolution of treatment for lung cancer

- THE PAST

  Surgery only available for early stage lung cancer

  Advanced disease routed to definitive nonsurgical therapies

- THE PRESENT

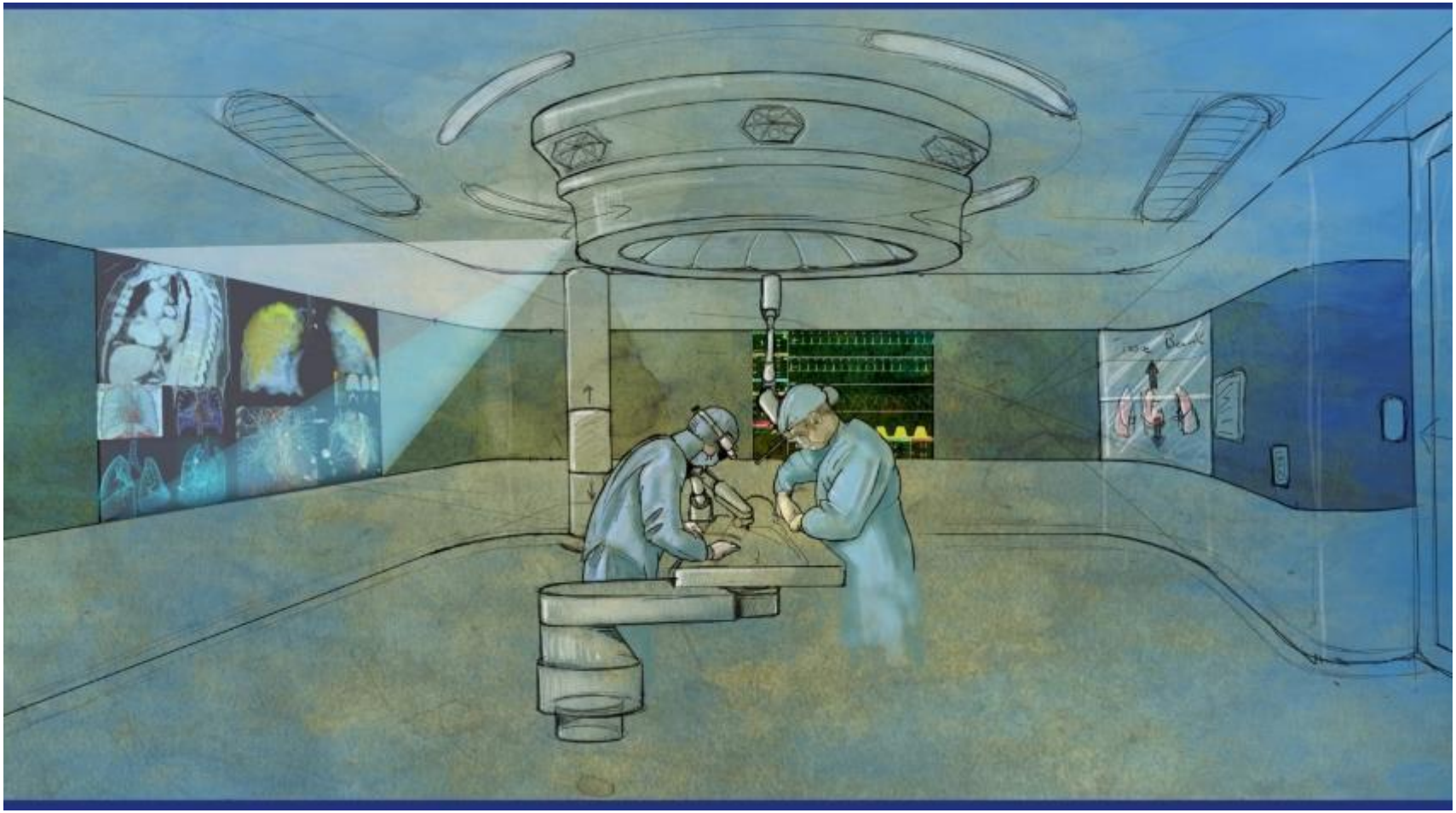
  Surgery (MIS, parenchymal sparing)

  SABR

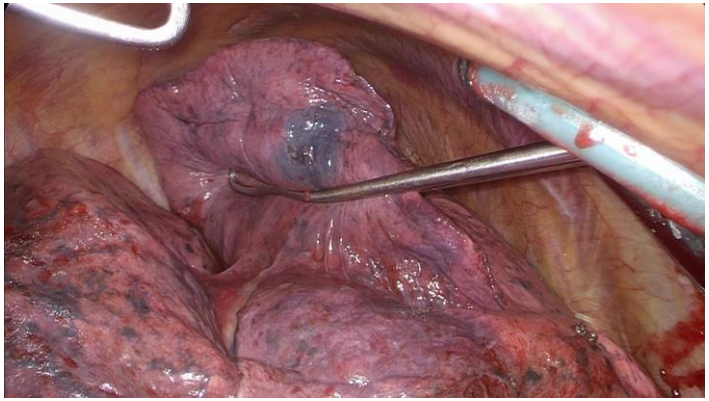
  Percutaneous ablation

  Early Endoluminal trials

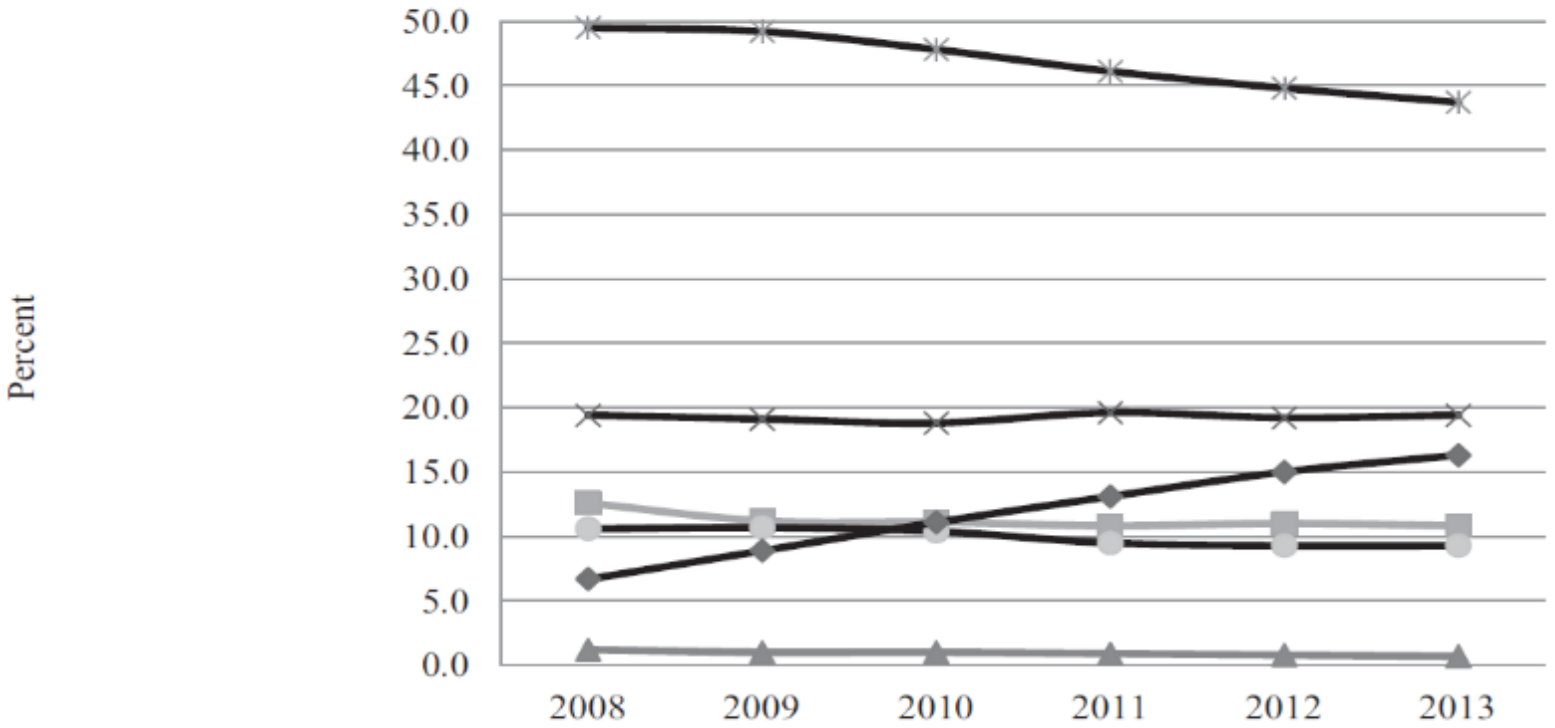
# THE FUTURE



# Current and Future State

## Treatment for stage IA NSCLC over time




| | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 |
|---|---|---|---|---|---|---|
| Lobe/Pnuemonectomy, % | 49.5 | 49.2 | 47.8 | 46.1 | 44.8 | 43.7 |
| Wedge resection, % | 19.4 | 19.1 | 18.8 | 19.6 | 19.2 | 19.4 |
| Conventional EBRT, % | 12.6 | 11.2 | 11.1 | 10.8 | 11.0 | 10.8 |
| No treatment, % | 10.6 | 10.7 | 10.4 | 9.5 | 9.3 | 9.3 |
| SBRT, % | 6.7 | 8.9 | 11.1 | 13.1 | 15.0 | 16.3 |
| Ablation, % | 1.2 | 1.0 | 1.0 | 0.9 | 0.8 | 0.7 |



Holmes, Jordan A., Timothy M. Zagar, and Ronald C. Chen. "Adoption of stereotactic body radiotherapy for stage IA non–small cell lung cancer across the United States." *JNCI cancer spectrum* 1.1 (2017): pkx003.

# Potential Advantages of Endoluminal Tx

- Minimally Invasive, potential to reduce complications of pneumothorax, BPF
  - No penetration of chest wall or lung pleura, limits air leaks
- Potential to diagnose and treat in same session
  - Diagnose, stage and treat in same session may eliminate additional procedures, time and anxiety
- Viable treatment in population with limited options
  - Compromised patients may benefit from target ablation
- Repeatable treatment opportunity
  - Potentially repeatable procedure
- Previously struggled with reach, stability, and safety

# FLEX 1

# 2019

- Two robotic bronchoscopes approved by the FDA
  - ION
  - Monarch

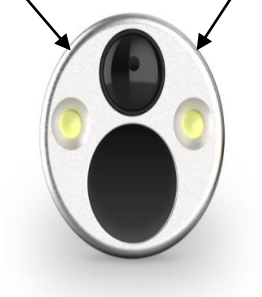
# Navigation Bronchoscopy Technology

## Electromagnetic Navigation Bronchoscopy

**Super D Manual ENB**

**Veran Spin Manual ENB**

**2018 Auris Monarch Robotic – Assisted ENB[3]**



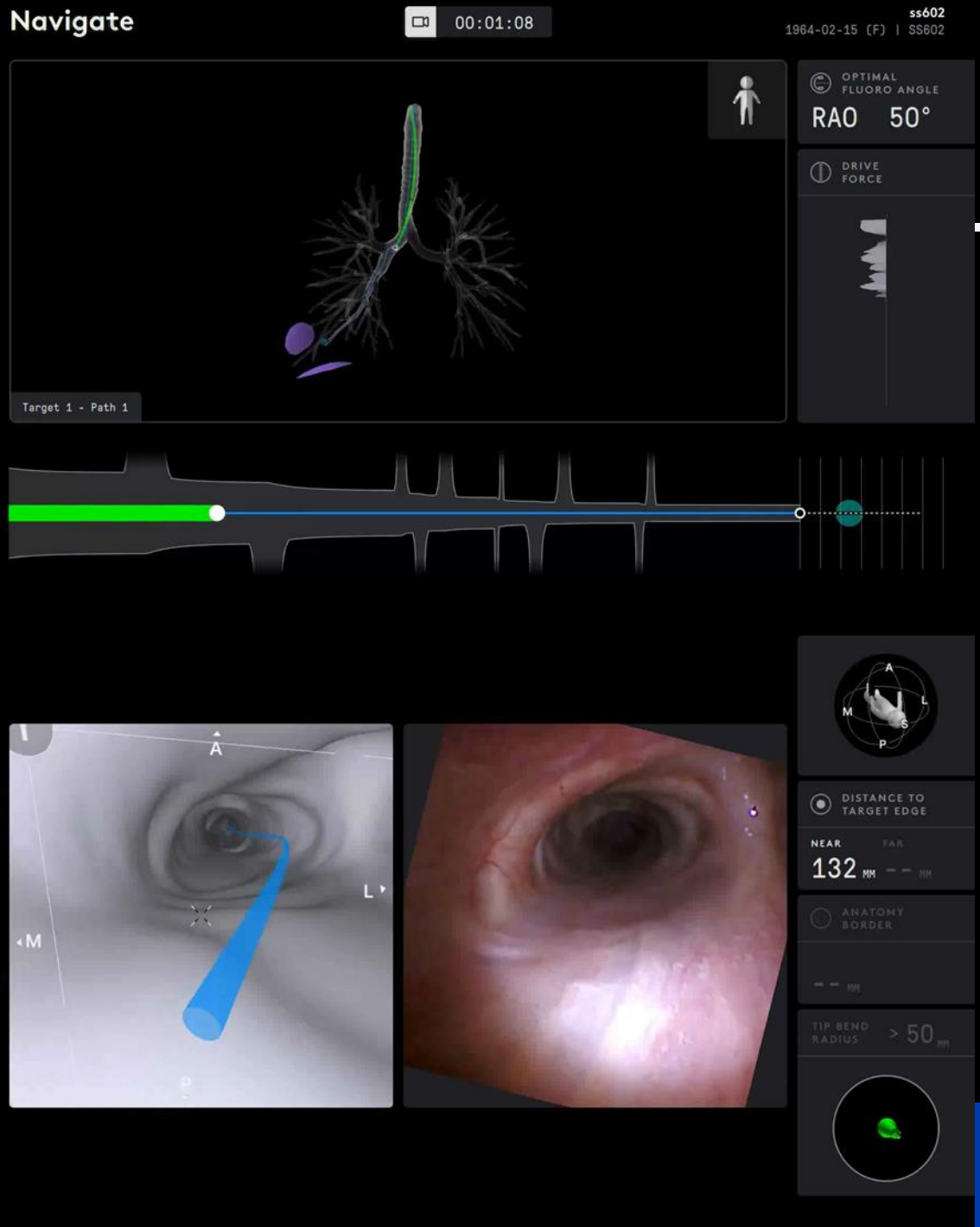
Olympus BF1-TH19[2]
OD = 6.2 mm
WC = 2.8 mm

Monarch bronchoscope sheath: OD = 6.0 mm
Monarch bronchoscope: OD = 4.4mm
WC = 2.1 mm

## Shape-sensing Robotic-Assisted Bronchoscopy (SRAB)

**2019 Ion by Intuitive Robotic – Assisted Shape-sensing Bronchoscopy**

Ion Fully Articulating Catheter: OD =3.5mm
WC = 2.0mm


Navigate
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OPTIMAL FLUORO ANGLE
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ANATOMY BORDER
TIP BEND RADIUS
> 50 MM

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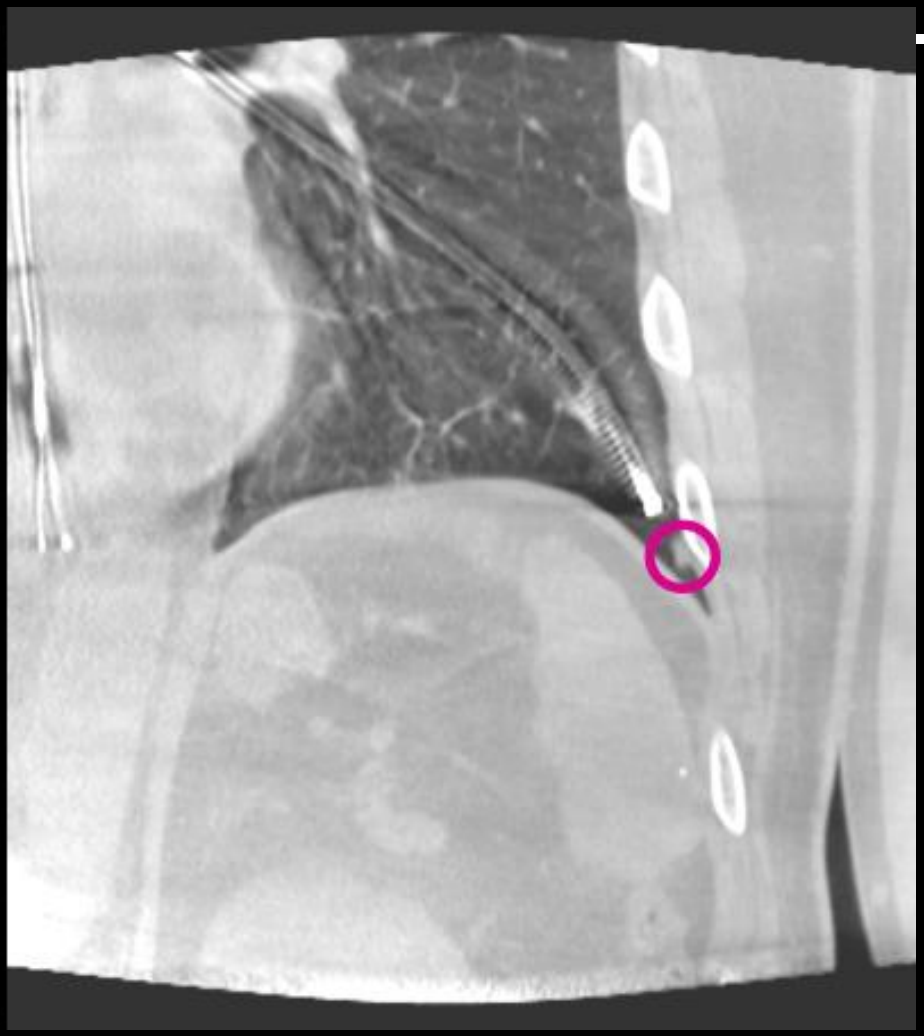

# Thermal Ablative Therapies

- Radiofrequency ablation (RFA)
  - Most published data
  - Probably better for smaller lesions (T1)
  - **About 27% 5 year survival in a few studies for stage I NSCLC[1]**
- Cryoablation (Cryo)
  - Theoretically more safe, less collateral damage
  - Easier to visualize ablation zone and zone growth as the ablation progresses
  - Interim analyses of largest trial shows 94% local control at 1 year for secondary lung cancer
- Microwave ablation (MWA)
  - Higher frequencies than RFA, faster and hotter ablation zone
  - **Only tech with bronchoscopic probes available**

# Stage I NSCLC after PERC Microwave & Cryoablation

| Author (n) | Modality Ablation | Median Follow-up | 1-yr Overall Survival | 2-yr Overlall Surviva; | 3-year Overall survival |
|---|---|---|---|---|---|
| Wolf (50) | Microwave | 10months | 65% | 55% | 45% |
| Yang (47) | Microwave | 30months | 89% | 63% | 43% |
| Yamauchi (22) | Cryoablation | 23months | N/A | 88% | 88% |
| Zemlyak (27) | Cryoablation | 33months* | N/A | N/A | 77% |

*3 Yr survival ranging from 43-88%*
**median follow-up included patients treated with RFA and surgery*

# Calvin Ng



Chan JWY, Lau RWH, Ngai JCL, Tsoi C, Chu CM, Mok TSK, Ng CSH. Transbronchial microwave ablation of lung nodules with electromagnetic navigation bronchoscopy guidance-a novel technique and initial experience with 30 cases. Transl Lung Cancer Res. 2021 Apr;10(4):1608-1622.

# Kazhu Yasufuku



Motooka, Yamato, et al. "Endobronchial ultrasound-guided radiofrequency ablation of lung tumors and mediastinal lymph nodes: a preclinical study in animal lung tumor and mediastinal adenopathy models." *Seminars in Thoracic and Cardiovascular Surgery*. Vol. 32. No. 3. WB Saunders, 2020.

# Pulsed Electric Field

# INCITE-ES

- Endoluminal and Percutaneous Approaches
- 40 patients with early Stage NSCLC (1-4 cm)
- Treat and resect study
- 3 sites in Europe recruiting

# Kinzie Vermont

# LUKT02

# Future Directions

- Cryotherapy
- Vapor Therapy
- PDT

# Conclusions

- With the evolution of technology and technique, treatment of early stage lung cancer has progressed from open to VATS/RATS
- Time will tell if this will progress to endoscopic surgery
  - To replace surgery as the standard of care, have to demonstrate feasibility and adequate locoregional control with minimal complication risk

Multiple trials are underway/being drafted for various ablative technologies

Its only a matter of time before the technique is becoming a wide spread treatment option → as surgeons, we have to stay relevant

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6. Fan, Jiang, et al. "Sublobectomy versus lobectomy for stage I non-small-cell lung cancer, a meta-analysis of published studies." *Annals of surgical oncology* 19.2 (2012): 661-668.

7.

# Comments and Questions