THE NAVIGATION SCIENCES OPPORTUNITY

Entering the Era of "Precision Cancer Surgery"

Recent studies and trends suggest we are at the beginning of a sea change in the management of lung cancer. These trends include a shift in early diagnoses and the growing use of Video-Assisted Thoracoscopic Surgery (VATS), a minimally invasive surgical technique, underlie the increasing opportunity for precision soft tissue cancer surgery.

The standard of care for early-stage lung tumors is rapidly changing from lobectomy to tissue sparing segmentectomy to preserve greater lung function. The emergence of tissue-sparing techniques[1,2] underscores the critical importance of:

- Reliably localizing the small, non-palpable nodules, and
- Resection of nodules with sufficient margins (distance between the edge of the nodule and the resection line) to prevent local recurrence.

In one major clinical trial comparing segmentectomy with lobectomy, local recurrence was also significantly higher in the tissue-sparing group (10.5% vs 5.4%), although long term survival was comparable [2].

The NaviSci System is the first to address this challenge by enabling real-time inter-operative measurement to enhance precision in tissue resection with the potential to preserve function and improve clinical workflow. The System has potential across a range of soft tissue tumors, including, lung, liver, head and neck, thyroid, and brain.

Table of Contents

Significant growth in early-stage lung cancer diagnoses 2

Minimally Invasive Surgery Becoming Predominant for Early-Stage Tumor Resection 3

Adequate Tumor Margins Key for Resections of Early-Stage Tumors 3

NaviSci System's Revolutionary Technology for inter operative Measurement 4

Market Opportunity for Precision Surgery in soft tissue cancers 4

Significant growth in early-stage lung cancer diagnoses

In the US, nearly 230,000 new lung cancer cases are diagnosed each year, with an estimated total healthcare cost burden of $12.1 billion. With recent advances in low-dose CT-based screening, more sub-centimeter lung nodules are being identified at an early stage. According to a recent study in *Clinical Lung Cancer*, the number of lung cancer cases diagnosed at Stage 1 or 2 has been increasing to the point where surgical treatment can produce long-term, positive outcomes.

In 2017, 40 percent of cases diagnosed were Stage 1 and 2. Based on industry and Navigation Sciences data, Stage 1 and Stage 2 diagnoses are expected to grow to 67% of diagnosed nodules by 2028, representing a compound growth rate of 6.5%. See Figure 1.

Expanded use of CT X-ray screening and favorable CMS reimbursement will partly drive the increase. Until recently, most of these diagnoses occurred in the absence of screening.

According to a NORC at the University of Chicago study, in 2021, only three percent of lung cancers were detected by screening, and an American Lung Association study found that screening was performed in only 16 percent of eligible patients. The screening numbers for lung cancer stand in sharp contrast to those of other common cancers, such as prostate, breast, and colorectal, for which screening is standard practice.

The impact of annual screening on patient outcomes is dramatic. A major international study published November 7, 2023, in *Radiology* estimated a 20-year survival rate of 81% among participants undergoing annual CT scanning. For patients diagnosed with Stage 1 disease the survival rate was even higher, at 95%. This contrasts with an average five-year survival rate of 25%, according to the American Lung Association.

Increased screening, favorable reimbursement driving increase in early stage diagnoses and expanding market opportunity.

There are signs that awareness of CT scanning for lung cancer is growing among clinicians and patients, with the potential to increase the addressable market. In November of 2023, the American Cancer Society (ACS) published updated guidelines for lung cancer screening that recommended a significant increase in the population of asymptomatic individuals who should be screened annually with low dose CT scanning. The new guidelines, published in *CA: A Cancer Journal for Clinicians*, newly cover an estimated five million people and 19 million people overall.

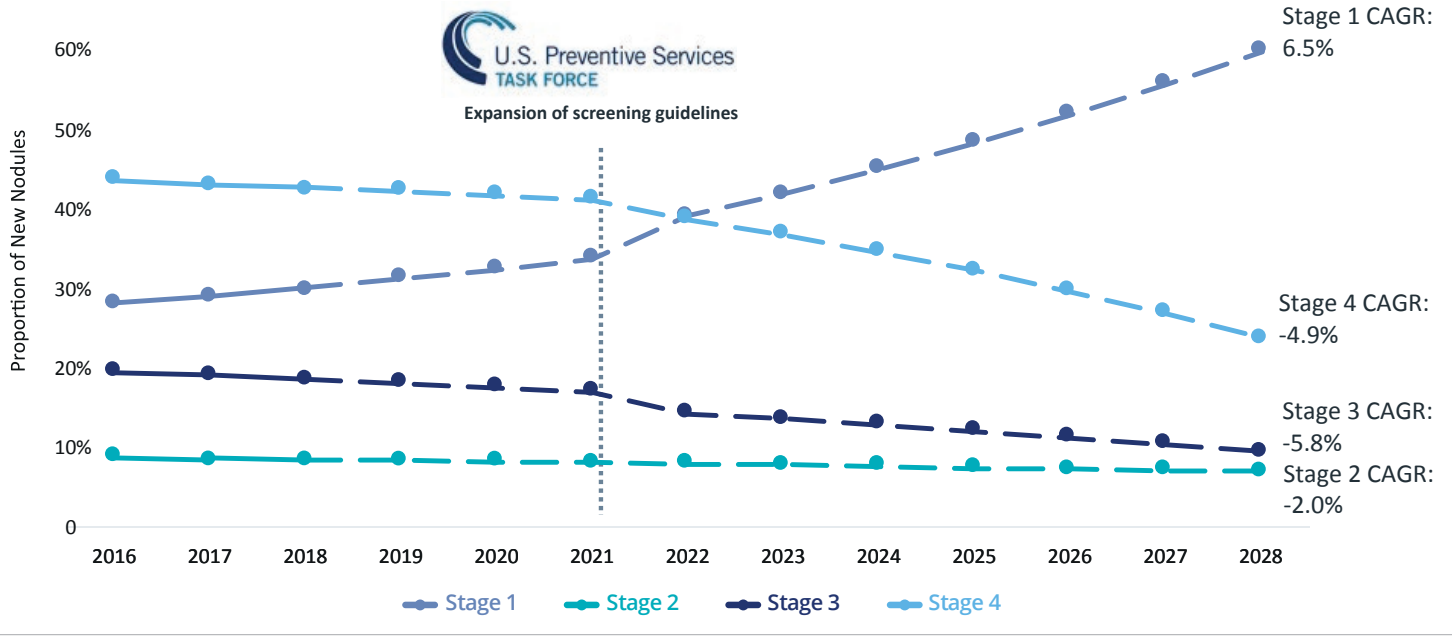
The principal changes from previous guidance issued in 2013 are:

- An expansion of the age range for screening to 50-80 years
- Inclusion of persons who currently smoke or who quit, regardless of how long ago they stopped
- A lightening of the requirement of smoking frequency to 20 or more packs/year.

The updated guidelines received extensive media coverage in publications such as the *Washington Post*, *CNN*, and the online healthcare journal, *STAT*.

The Wall Street Journal covered the ACS study in a consumer health-focused article in the June 1, 2023, edition highlighting the potential patient impact of CT screening. Carrying a headline, "*More People Should Get this Test to Detect a Deadly Cancer*," the article begins, "There is a test that could diminish the toll of the nation's top cancer killer – if people would use it. Doctors are pushing harder to make that happen."

Figure 1



The ACS guidelines generally align with previous recommendations by the US Preventative Task Force and a National Coverage Determination by CMS that in February 2022, effectively expanded the number of individuals eligible to be reimbursed for CT lung cancer screening by 6.4 million, bringing the total number of eligible screenings to 14.2 million per year. The coverage determination followed a report by the US Preventative Task Force that lowered the recommended age for screening from 55 to 50 years old and reduced the smoking history from 30 to 20 years.

Minimally Invasive Surgery Becoming Predominant for Early-Stage Tumor Resection

As more early-stage cancers are diagnosed, a growing proportion of surgical procedures are projected to employ the VATS minimally invasive, tissue-sparing approach. These procedures can reduce both procedure time and length of stay and improve patient outcomes. By 2028, VATS procedures are expected to reach 82 percent (~113,000) of lung cancer surgical resections in the US. According to Navigation Sciences and industry data. See Figure 2.

The growth will be driven in part by recent large prospective clinical trials that, for many Stage 1 lung cancers, show outcomes with tissue-sparing resection are comparable to lobectomy, which has been the standard of care for early-stage tumors. For example, a study published in the Feb. 9, 2023 issue of the *New England Journal of Medicine (NEJM)*[1] found long-term survival in patients undergoing tissue-sparing wedge resections or segmentectomies was comparable to patients who received full lobectomies. Similar results were reported in a large clinical trial in Japan, published in *The Lancet, (April 2022)* which compared lobectomy to segmentectomy.[2]

In the *NEJM* trial, which involved 697 patients with lung tumors 2 cm in size or less that had not spread to lymph nodes, after a median follow up of seven years, disease free survival in the sublobar group was similar (non-inferior) to lobectomy. Five-year overall survival was 80.3% (95% after sublobar resection and 78.9% after lobar resection). In addition, six months post-surgery, there was a two percentage point difference between groups favoring the sublobar resection group of in a standard measure of lung function, forced expiratory volume inone second (FEV1).

"... the era of 'precision' surgery for Non-Small Cell Lung Cancer... has arrived." — *New England Journal of Medicine editorial*

An editorial accompanying the *NEJM* study essentially declared "the era of 'precision' surgery for Non-Small Cell Lung Cancer (NSCLC) has arrived". This commentary went on to state that "these two landmark trials are practice changing as they establish sublobar resection as the standard of care for a select group of patients with NSCLC."

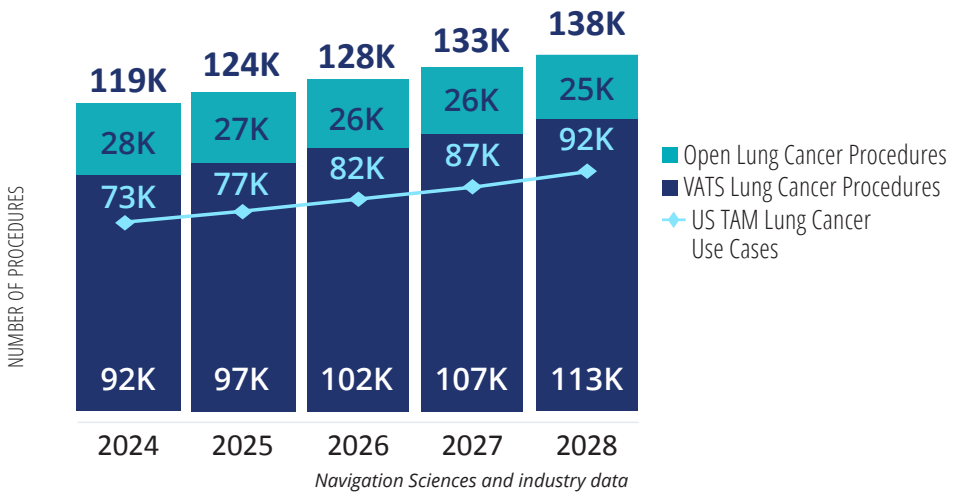
Adequate Tumor Margins Key for Sub-lobar Resections of Early-Stage Tumors

The emergence of these tissue-sparing techniques underscores the critical importance of:

- Reliably localizing the small, non-palpable nodules, and
- Resection of nodules with sufficient margins (distance between the edge of the nodule and the resection line) to prevent local recurrence.

In fact, in *The Lancet* clinical trial comparing segmentectomy with lobectomy, local recurrence was also significantly higher in the tissue-sparing group (10.5% vs 5.4%). The long-term survival of the two groups was comparable, suggesting that those patients with local recurrence underwent additional treatment, with surgery, radiation or drug therapy. Currently, there is no device or method on the market that is capable of accurately localizing the nodule and measuring the distance between the nodule and the cut margin in real-time to ensure sufficient margins.

Figure 2



Navigation Sciences and industry data

NaviSci System Benefits:

- Conserved function
- Enhanced surgical workflow

NaviSci System's Revolutionary Technology for inter operative Measurement

The NaviSci System is the first to provide real-time, in vivo measurements to improve surgical outcomes by conserving function, and enhancing surgical workflow.

The NaviSci system, which integrates augmented reality and advanced software with surgical hardware, is designed to provide a 'GPS' to enable the surgeon to know where the tumor and surrounding tissue are in relationship to the surgical instrumentation. The system consists of:

- An electromagnetic fiducial marker ("J-Bar™") that is positioned next to the tumor to localize and track its position
- A tissue marking device with a second position electromagnetic sensor
- Proprietary software that links the sensors on the J-Bar with the cutting instruments and provides visual and quantitative information on the tumor location relative to the cutting instruments in real time.

The company has developed, with support from the NIH SBIR program, methods to deploy the EndoMarker™ via a bronchoscope, which allows it to be placed adjacent to the tumor based on navigation using diagnostic CT images. This approach simplifies the clinical workflow and allows use of the *NaviSci*™ technology in hospitals without advanced intra-operative imaging capabilities.

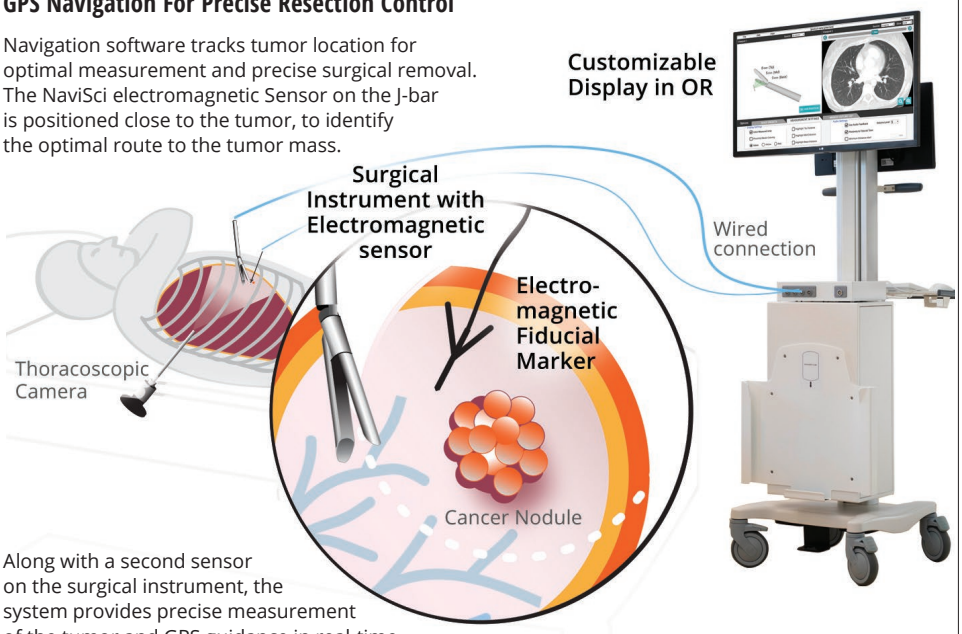
The company has conducted a 25-patient first-in-human clinical feasibility study of the NaviSci System under an Investigational Device Exemption (IDE) cleared by the FDA in patients with lung cancer. In this trial, the NaviSci System:

- was in providing real-time margin assessment for surgical resection of lung nodules;
- was safe and effective; and
- Provided distance measurements that strongly correlate with pathology outcomes.[3]

The company is currently working to complete the development of the System towards an FDA submission for US marketing clearance.

GPS Navigation For Precise Resection Control

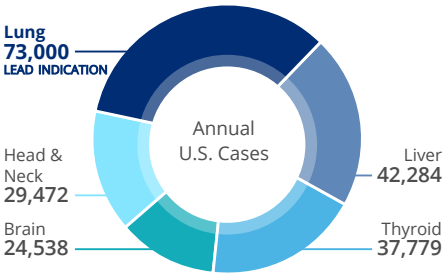
Navigation software tracks tumor location for optimal measurement and precise surgical removal. The NaviSci electromagnetic Sensor on the J-bar is positioned close to the tumor, to identify the optimal route to the tumor mass.



Along with a second sensor on the surgical instrument, the system provides precise measurement of the tumor and GPS guidance in real-time.

Market Opportunity for Precision Surgery in soft tissue cancers

The US market opportunity for the System in lung cancer is estimated at ~ $234 million. There are several other soft tissue cancers where Navigation's technology has potential to provide clinical and workflow benefits, including liver, head and neck, thyroid, and brain. Overall, in the US alone there are approximately 500,000 soft tissue cancers diagnosed annually. The addressable global market for Navigation's technology, including systems and consumables, is estimated at approximately $1.26 billion..



Potential U.S. market opportunity for the NaviSci technology is estimated at $1.26 billion including breast cancer, a longer term opportunity.

[1]*Altorki N, Wang X, Kozono D et al. Lobar or Sublobar Resection for Peripheral Stage IA Non-Small-Cell Lung Cancer. N Engl J Med. 388;6 Feb 9 2023*

[2]*Saji H, Okada M, Tsuboi M et al. Segmentectomy versus lobectomy in 2 cm, peripheral NSCLC, phase III trial. The Lancet. 399. April 23, 2022*

[3]*Jagadeesan J et al. 2023. Real-time Margin Assessment for Video-Assisted Thoracic Surgery: A Pilot Clinical Trial. Poster at Annual Meeting of the American Association for Thoracic Surgery, May 7, 2023, Los Angeles, CA*

CONTACT: Alan Lucas +1-617-834-2829 | Navigation Sciences, Inc. | alan.lucas@navigationsci.com

Copyright© 2026 Navigation Sciences, Inc. Navigation Sciences™, iVATS™, NaviSci™, NaviSci EndoMarker™, and J-Bar™ are Trademarks of Navigation Sciences, Inc. All rights reserved. U.S. and Foreign patents pending

NavigationSci.com

100726