Optellum

Whitepaper

Finding Lung Cancer Earlier

Where Eligibility-based Lung Cancer Screening Misses and Opportunistic Screening of Incidental Lung Nodules Succeeds

Highlights

Incidental Lung Nodule Program *vs* Eligibility-based Lung Cancer Screening

45%
more lung masses & nodules identified

19 days
faster time to diagnosis

71%
more early-stage lung cancers diagnosed

Help us solve lung cancer

Why eligibility-based lung cancer screening won't close the gap

Lung cancer remains the leading cause of cancer-related deaths in the US, with **around 125,000** in 2025.[1] Randomized controlled trials (RCTs) demonstrate significant mortality benefit from eligibility-based lung cancer screening (LCS) with low-dose computed tomography (LDCT). Real-world studies estimate they prevent around **3,000 deaths per year**.[2] This is a **fraction of what is needed**. However, the real-world feasibility of LCS closing the gap in a heterogeneous system like the US is limited due to the following:

The two early diagnosis pathways[a]

Eligibility-based lung cancer screening (LCS)
Low-dose CT (LDCT) performed to look for lung cancer in a targeted but narrow population

Opportunistic screening for incidental lung nodules (ILN)
CT performed for other clinical reasons, which incidentally detect lung nodules across populations

Ineligibility of many former smokers and all never-smokers

Current LCS recommendations from the US Preventive Services Task Force (USPSTF) apply to adults aged 50-80 with a ≥20 pack-year smoking history who currently smoke or quit within the past 15 years.[3] However, 20–25% of lung cancers occur in never-smokers.[4] National modeling further highlights that many preventable lung cancer deaths occur in former smokers who quit >15 years ago and are ineligible for screening.[2]

Low participation among those eligible

In the US, only about 19% of screening-eligible individuals undergo LCS. This ranges from 31% in Rhode Island down to 9.7% in Wyoming.[5] These are all far below levels seen in RCTs and other theoretical modeling studies. This limits population-level mortality reduction.[2,6] Low participation stems from limited public awareness, access barriers, and behavioral factors including stigma and fear of false positives.

Low adherence to repeat screening

LCS requires annual follow-up to sustain benefit. However, real-world studies report that 50–60% of individuals return for recommended repeat screening after their baseline scan, with adherence declining further over time.[7] Missed follow-up scans erode the cumulative mortality benefit demonstrated in trials, increasing the gap between theoretical screening benefit and real-world outcomes.

Cost-effectiveness of lung cancer screening

Although LCS is considered cost-effective in modeling studies, real-world value is highly dependent on implementation costs and low participation. Screening programs require infrastructure for patient identification and coordinated follow-up. Furthermore, overall cost-effectiveness is sensitive to participation, adherence, false positives, and potential overdiagnosis.[8]

With <20% of eligible individuals attending LCS, and 50-60% returning for repeat annual scans, the real-world impact is important, but limited. This is compounded by many lung cancer patients being ineligible. Even with 100% uptake and follow-up adherence, eligibility-based LCS would potentially prevent **up to 13,000 deaths annually**, representing only around **10% of annual deaths** due to lung cancer in the US.[2] As a result, **80-90% of lung nodules are detected incidentally** on CTs performed for other clinical indications.[9,10] This underscores a huge structural gap in early detection pathways that rely on eligibility-based LCS alone.[5,6]

The incidental lung nodule pathway for opportunistic screening

With the vast majority of lung nodules detected incidentally, opportunistic screening programs can catch more lung cancers early.[9] An **incidental lung nodule (ILN) program** that is formalized for **opportunistic screening** can help detect lung cancer earlier and more frequently using routinely acquired imaging. This turns most everyday CT scans performed for other clinical reasons into a reliable opportunity to catch lung cancer earlier and **move patients toward care faster**.

Evidence also shows ILN programs can be strengthened with **artificial intelligence (AI)** tools.[6,11] With such AI tools, identification, tracking, and risk stratification of patients with indeterminate lung nodules is performed in near real time, routing at-risk patients to the appropriate care team earlier, and enabling **timely guideline-based follow-up**.[6] This combination of automation and human support shortens the time to diagnosis and ensures that fewer patients fall through the cracks.[11]

What does the literature say?

A mini-literature review was conducted to identify peer-reviewed studies that directly or indirectly examined how opportunistic ILN programs perform relative to eligibility-based LCS programs in the US.[b]

Osarogiagbon R., et al., 2022 (DELUGE study)

Prospective cohort study showed an ILN program found almost 3 times as many lung nodules and 5 times as many lung cancers than an LCS program at the same health system.[9]

Journal of Clinical Oncology

Pinsky P., et al., 2023

An ILN program accounted for a much larger share of localized or early-stage lung cancers than LCS in a Medicare cohort.[12]

CHEST

Akinbobola O., et al., 2024

Among patients undergoing curative-intent lung resection, an ILN program contributed over three times as many surgical cases as LCS.[13]

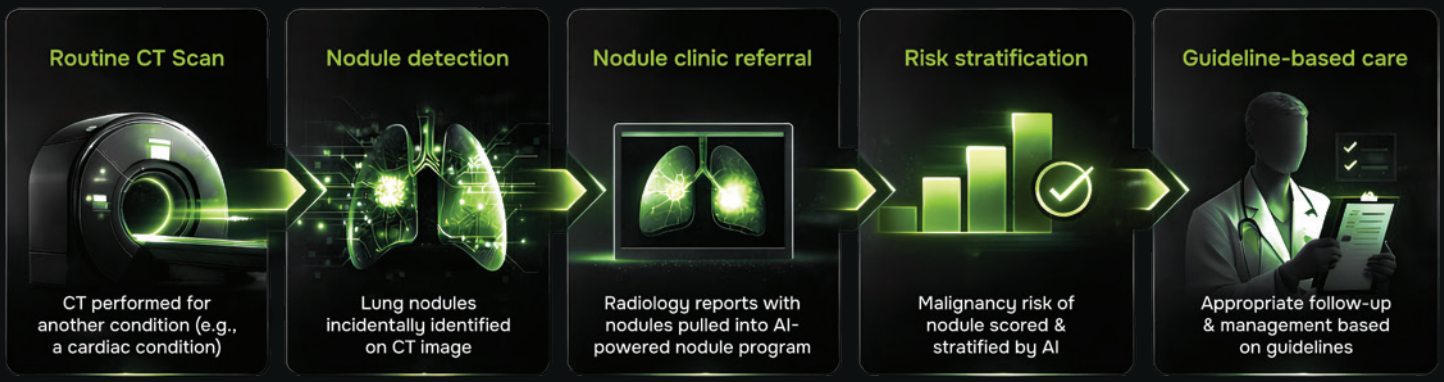
JTO CLINICAL AND RESEARCH REPORTS

Liao W., et al., 2025

An ILN program filled gaps in an LCS program, by capturing >40% of lung cancer patients who either did not participate or were ineligible.[14]

Journal of Thoracic Oncology

Figure 1: Workflow of an AI-enabled opportunistic screening program for incidental lung nodules



Can an AI-enabled ILN program outperform eligibility-based lung cancer screening?

How they compare

A **prospective study** conducted at Atrium Health Wake Forest Baptist (part of Advocate Health) by Dr Heideman and others compared an AI-enabled **opportunistic screening for ILN program** run in parallel with but separate to an **eligibility-based LCS program** over a seven-month period (April to October 2024).[11]

The AI-enabled ILN program identified **45% more patients with lung masses or nodules** ≥6mm compared to LCS (527 vs 363), leading to **twice as many confirmed lung cancers** (38 vs 19) (Figure 2). Lung cancers were found at various stages for both the ILN and LCS programs (early-stage lung cancers [I & II]: 12 for ILN vs 7 for LCS; late-stage lung cancers [III & IV]: 22 vs 9; Staging unknown: 10 vs 3) (Figure 3).

The ILN program also showed a **49% faster time to diagnosis**, with a median time of 20.5 days vs 40 days for LCS.

Figure 2: Number of lung lesions and cancers found

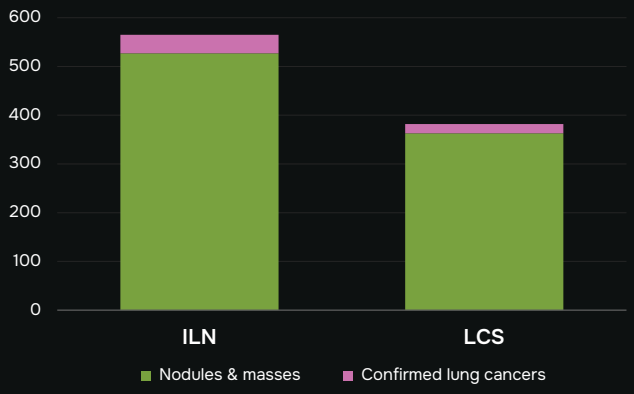
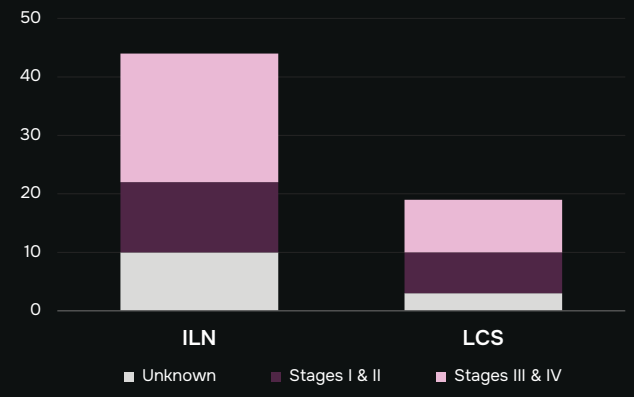


Figure 3: Stage distribution of lung cancers found



The implications for health systems

The Atrium Health Wake Forest Baptist study and other papers such as that by Dr Purohit and colleagues at the Memorial Cancer Institute in Florida show that **centralized ILN programs detect more lung cancers** and **more early-stage lung cancers** compared with traditional eligibility-based screening programs.[6, 11] When nodules are identified earlier through routine imaging, and nurses can follow up with patients sooner, health systems can reduce delays and ensure timely diagnosis. Earlier diagnosis of lung cancer is consistently associated with **earlier treatment initiation**. Therefore, together with targeted eligibility-based LCS, opportunistic screening of incidental lung nodules broadens the funnel through which this earlier diagnosis can occur.

Moreover, both the Purohit and Heideman papers support the **significant clinical and potential financial value** (from increased downstream procedures) that AI can bring to these opportunistic ILN programs. For health systems, this offers a practical, scalable way to improve lung cancer care beyond eligibility-based screening by identifying patients who might otherwise not be diagnosed and improving outcomes at a population level.

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Abbreviations used

AI: artificial intelligence; CT: computed tomography; ILN: incidental lung nodule; LCS: lung cancer screening; LDCT: low-dose computed tomography; RCT: randomized controlled trial; USPSTF: United States Preventive Services Task Force

Notes

a. Excludes care pathways for patients who are diagnosed because they present with lung cancer symptoms.

b. To find relevant studies, a PubMed search was conducted on March 2, 2026 using the following search term: ("pulmonary nodule program" OR "lung nodule program" OR "incidental program" OR "incidentals program") AND ("screening" OR "LDCT" OR "low dose CT" OR "screen-detected") AND ("lung cancer") AND ("United States" OR US OR U.S.) NOT (Review[Publication Type] OR Editorial[Publication Type] OR Comment[Publication Type] OR News[Publication Type]). Reference lists were reviewed and forward citation tracking was performed to identify further eligible studies.

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