

Population-level Budgetary Implications of Increased Uptake of Next-generation Sequencing to Support Treatment of Advanced Non-small Cell Lung Cancer: A Multicountry Analysis

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Background

- Molecular testing in advanced non-small cell lung cancer (aNSCLC) identifies actionable biomarkers and informs targeted therapy selection.¹
- Single-gene testing (SGT) evaluates biomarkers individually and may require multiple sequential tests, whereas next-generation sequencing (NGS) simultaneously assesses multiple biomarkers and may improve testing efficiency and comprehensiveness.
- NGS offers broad genomic profiling with high concordance with conventional testing in NSCLC and may improve targeted therapy assignment and life-years gained while being cost-effective or cost-saving compared with multiple SGTs. Sequential SGTs may also deplete limited tumor tissue.²
- Increasing NGS uptake may change the mix and volume of molecular tests used in clinical practice, with implications for overall testing expenditures.
- Exploratory evidence across Asia-Pacific countries remains limited. This analysis estimated the 5-year budget impact of increasing NGS uptake among newly diagnosed patients with aNSCLC undergoing molecular testing in Japan, South Korea, Australia, and the Fujian province in China.

Objectives

- This study evaluated the 5-year budget impact from the payer perspective of increasing NGS uptake among newly diagnosed patients with aNSCLC undergoing molecular testing in Japan, South Korea, Australia, and the Fujian province in China.

Methods

Model Structure

- A country-specific budget impact model estimated molecular testing costs for patients with aNSCLC in Japan, South Korea, Australia, and the Fujian province in China from 2026 to 2030. A new cohort of incident patients eligible for molecular testing entered the model each year.
- For each country, a reference strategy reflecting current clinical practice and/or guideline-based testing was compared with an alternative strategy assuming 100% NGS uptake.

Patient Population

- Annual molecular testing-eligible populations for Japan, South Korea, and the Fujian province in China were estimated using country-specific epidemiologic data, including incident lung cancer cases, NSCLC prevalence, advanced-stage proportions, molecular testing rates, and market-specific assumptions.
- For Australia, real-world Medicare utilization data were used to project future molecular testing volumes.
- Future populations were generally projected using linear regression based on published historical data.

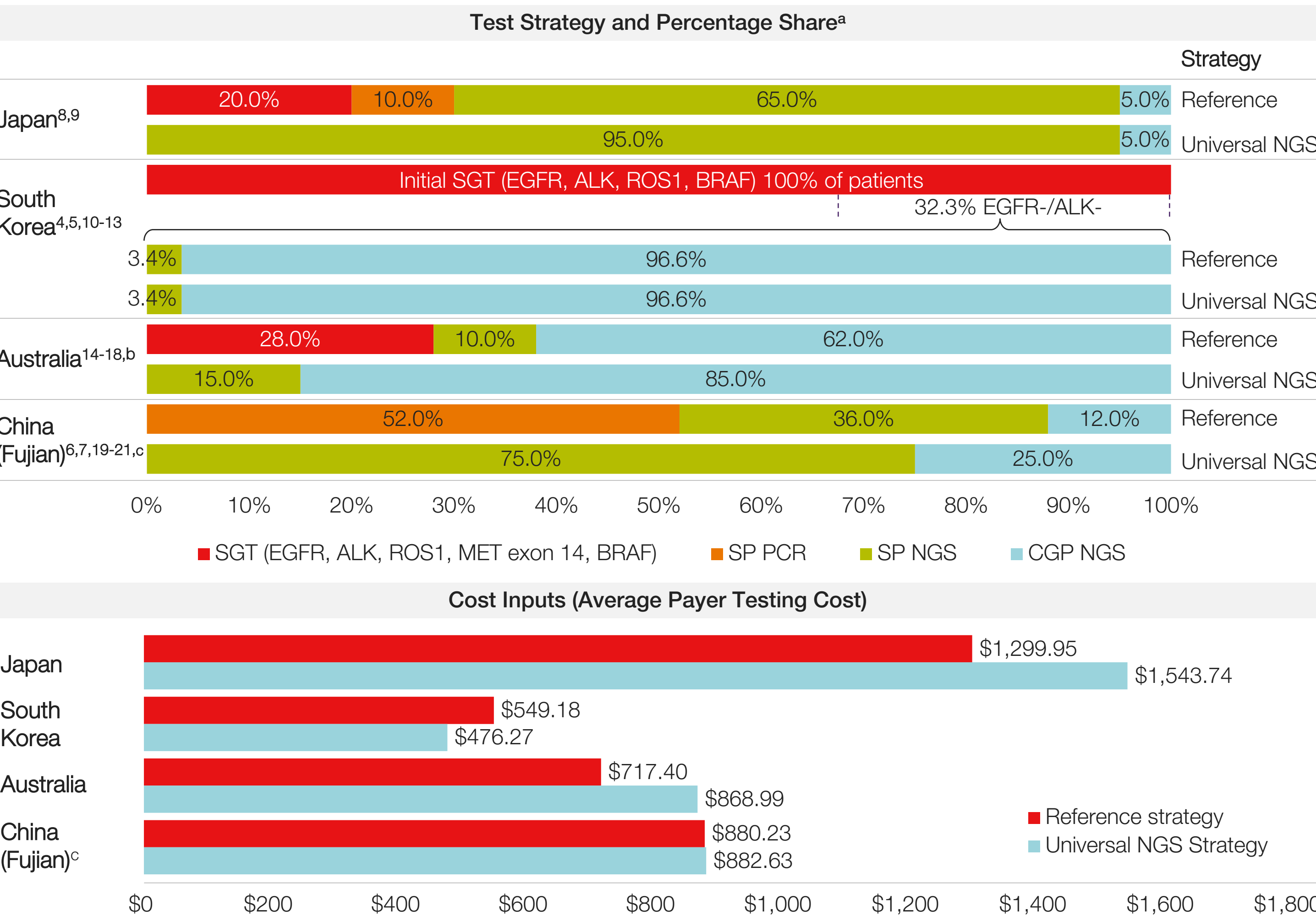
Biomarkers and Testing Strategies

- Country-specific clinical guidelines and practice patterns were reviewed to identify biomarkers used to guide treatment selection in aNSCLC, including EGFR, ALK, ROS1, BRAF, MET exon 14 skipping, and programmed death-ligand 1 (PD-L1), as applicable.
- Testing pathways were simplified representations of clinical guidelines and real-world clinical practice and included SGT, small-panel polymerase chain reaction, small-panel NGS, comprehensive genomic profiling, and PD-L1 testing.
- Genomic alterations were assessed using molecular testing, whereas PD-L1 protein expression was assessed separately using immunohistochemistry.

Testing Costs

- The model included molecular testing costs only; clinical outcomes, repeat biopsies, treatment costs, and other downstream healthcare costs were excluded.
- Annual molecular testing expenditures were calculated by multiplying the eligible population by the proportion receiving each testing strategy and its corresponding unit cost (**Figure 1**).
- Unit costs were obtained from official reimbursement schedules and other publicly available sources and reported in 2026 US dollars.
- Applicable patient cost-sharing was incorporated for Japan (20%),³ South Korea (56% for NGS and 5% for SGT),^{4,5} and the Fujian province in China (10% for small-panel NGS; cost-sharing for other tests was not reported).^{6,7} Testing costs for Australia were obtained from the Australian Medicare Benefits Schedule and did not require adjustment for cost-sharing.

Figure 1. Model Inputs and Assumptions



Abbreviations: ALK = anaplastic lymphoma kinase; BRAF = B-Raf proto-oncogene; CGP = comprehensive genomic profiling; EGFR = epidermal growth factor receptor; MET = MET proto-oncogene; NGS = next-generation sequencing; PCR = polymerase chain reaction; PD-L1 = programmed death-ligand 1; ROS1 = ROS proto-oncogene 1; SGT = single-gene testing; SP = small-panel

^aPD-L1 was assumed to be tested for all patients.

^bSP NGS represents a combination of small hotspot NGS and fusion ribonucleic acid (RNA) NGS.

^cResults for China reflect the Fujian province and may not be nationally representative; the Fujian province represents approximately 2.94% of the national population in China.

Results

- From 2026 to 2030, the annual number of patients with aNSCLC receiving molecular testing decreased from 48,563 to 48,219 in Japan, and increased from 9,466 to 10,718 in South Korea, from 6,351 to 7,459 in Australia, and from 13,147 to 13,951 in the Fujian province, China.
- Universal NGS uptake was projected to be cost-saving in South Korea but to increase molecular testing expenditures in Japan, Australia, and the Fujian province in China (**Table 1**).
- The budget impact was highly jurisdiction-specific, reflecting differences in testing pathways, panel distribution, unit costs, and patient cost-sharing.

Table 1. Yearly Patient Population and Budget Impact Over 5 Years

	Patient Population	Assumptions	Reference Strategy	Universal NGS	Incremental Costs
Japan					
Year 1	48,563	Incident lung cancer cases ²² × NSCLC proportion (90.0%) ²³ × stage III/IV proportion (48.2%) ²² × testing rate (86.1%) ²⁴	\$50,867,663	\$60,407,426	\$9,539,764
Year 2	48,200		\$50,487,100	\$59,955,493	\$9,468,393
Year 3	48,206		\$50,493,803	\$59,963,452	\$9,469,650
Year 4	48,213		\$50,500,505	\$59,971,412	\$9,470,907
Year 5	48,219		\$50,507,208	\$59,979,372	\$9,472,164
Total	241,401		\$252.9M	\$300.3M	+\$47.4M
South Korea					
Year 1	9,466	Incident lung cancer cases ²⁵⁻³² × NSCLC proportion (85.9%) ³³ × stage IIIB–IIIC/IV proportion (40.5%) ¹² × testing rate (79.3%) ¹²	\$5,198,746	\$4,508,536	-\$690,209
Year 2	10,014		\$5,499,501	\$4,769,362	-\$730,139
Year 3	10,249		\$5,628,444	\$4,881,186	-\$747,258
Year 4	10,484		\$5,757,388	\$4,993,010	-\$764,377
Year 5	10,718		\$5,886,331	\$5,104,834	-\$781,496
Total	50,931		\$28.0 M	\$24.3 M	-\$3.7 M
Australia					
Year 1	6,351	Australian Medicare expenditure data ¹⁴ were used to estimate the number of services for each biomarker or NGS panel. Real-world test utilization data were used to determine the testing volume. ¹⁸	\$4,556,409	\$5,519,187	\$962,778
Year 2	6,628		\$4,755,078	\$5,759,835	\$1,004,757
Year 3	6,905		\$4,953,747	\$6,000,483	\$1,046,737
Year 4	7,182		\$5,152,416	\$6,241,131	\$1,088,716
Year 5	7,459		\$5,351,084	\$6,481,779	\$1,130,695
Total	34,525		\$24.7M	\$30.0M	+\$5.2M
China (Fujian)					
Year 1	13,147	Incident lung cancer cases × stage III/IV proportion (74.0%) ³⁴ × NSCLC proportion (84.0%) ³⁵ × testing rate (71.4%) ³⁶ × Fujian share of the national population (2.94%) ³⁷	\$11,572,617	\$11,604,160	\$31,542
Year 2	13,348		\$11,749,491	\$11,781,515	\$32,024
Year 3	13,549		\$11,926,364	\$11,958,870	\$32,506
Year 4	13,750		\$12,103,237	\$12,136,225	\$32,988
Year 5	13,951		\$12,280,110	\$12,313,580	\$33,471
Total	67,746		\$59.6M	\$59.8M	+\$0.16M

Abbreviations: NGS = next-generation sequencing; NSCLC = non-small cell lung cancer

Conclusions

- Universal NGS uptake was projected to reduce molecular testing expenditures in South Korea but to increase expenditures in Japan, Australia, and China.
- The budget impact of NGS depends on country-specific testing patterns and reimbursement structures, the number of incident aNSCLC cases, unit costs, and policies around patient cost-sharing.
- Optimal testing strategies should reflect local mutation epidemiology and testing costs. For example, in East Asian populations, where EGFR alterations are more prevalent than in Western populations, an exclusionary strategy using EGFR/ALK testing followed by NGS may be more cost-efficient than upfront NGS testing, in contrast to US populations, where upfront NGS testing yielded substantial cost savings and shorter time to results compared with other testing modalities.^{38,39}
- NGS may become increasingly important as the molecular landscape of aNSCLC evolves and a growing number of actionable biomarkers and targeted therapies require broader, more comprehensive genomic profiling.
- Future research should assess the inclusion of additional costs and outcomes associated with repeat biopsies and downstream treatment.
- Cross-country findings are descriptive and should not be directly compared because of differences in healthcare financing, patient populations (incident patients and mutational burdens), biomarker testing guidelines, and test-pricing structures.

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