

# Upfront, Comprehensive Genetic Testing in Advanced Lung Cancer Is Cost-Effective

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## **ASCO Perspective**

*“Precision medicine is driving the most exciting and powerful advances in cancer care today, particularly in lung cancer. It’s encouraging to see that next-generation genetic testing tools can help physicians and their patients get the crucial genomic information they need to make treatment decisions, at a faster pace and lower cost than with other approaches,” said ASCO President Bruce E. Johnson, MD, FASCO.*

ALEXANDRIA, Va. – An economic model comparing different types of genetic testing in metastatic non-small-cell lung cancer (NSCLC) found that using next-generation sequencing (NGS) to test for all known lung cancer-related gene changes at the time of diagnosis was more cost-effective and faster than testing one or a limited number of genes at a time.

The model included Medicare and commercial health plans with 1 million hypothetical members. In the model, NGS saved as much as \$2.1 million for Medicare, and more than \$250,000 for commercial insurance providers. The study will be presented at the upcoming [2018 ASCO Annual Meeting](#) in Chicago.

“The field of lung cancer treatment is moving at a rapid pace, and we need to fully characterize genomic changes to determine the best treatment for patients shortly after they are diagnosed,” said lead study author Nathan A. Pennell, MD, PhD, co-director of the Cleveland Clinic Lung Cancer Program. “Today, many treatment decisions are guided by the presence or absence of certain genetic changes in a patient’s tumor, and I expect that several more genes will be identified

in the near future. Therefore, it becomes even more imperative to find a cost-effective gene test that can quickly identify a large number of gene mutations that can be targeted with treatments.”

Genetic testing of the tumor is crucial to guide optimal treatment for NSCLC. Many different tests are available today, but there is no accepted standard for when and how the testing should be performed. The authors designed their model to determine which gene testing approach is most cost-effective and time-efficient. The model uses data from the Center for Medicare and Medicaid Services (CMS) and U.S. commercial health plans to estimate costs for each modality.

### **About the Study**

The known genes that are altered in NSCLC include *EGFR*, *ALK*, *ROS1*, *BRAF*, *MET*, *HER2*, *RET*, and *NTRK1* (of those, *EGFR*, *ALK*, *ROS1*, and *BRAF* can be targeted with approved treatments). The other genetic changes can be targeted with investigational agents that are being tested in clinical trials. Newer tests also look at PD-L1 expression to predict if a tumor is likely to respond to immunotherapy.

In the model, patients with newly diagnosed metastatic NSCLC received PD-L1 testing and testing for the known lung cancer-related genes using one of four different approaches:

- Upfront NGS (all eight NSCLC-related genes and *KRAS* were tested at once)
- Sequential tests (one gene at a time was tested)
- Exclusionary *KRAS* test, followed by sequential tests for changes in other genes if *KRAS* was not mutated (if *KRAS* mutations were found, the tumor was not tested for other mutations because it is rare to have more than one of these genes mutated in an individual lung cancer)
- Panel test (combined testing for *EGFR*, *ALK*, *ROS1*, and *BRAF*), followed by either single-gene or NGS testing for changes in other genes

The model assumed that some participants who did not receive upfront-NGS might need to have another biopsy to test for additional genes (due to insufficient amount of tissue from the first biopsy) and that the need for re-biopsy would be lessened with upfront, comprehensive NGS testing. It also accounted for the time it took to get test results back after biopsy samples were sent to the lab, costs for each type of gene testing, and the estimated number of people with metastatic NSCLC in the U.S. that could be tested.

### **Key Findings**

Based on the number and age of people with metastatic NSCLC in the U.S. annually, the researchers estimated that for 1 million-member health plans, 2,066 tests would be paid for by CMS and 156 would be paid for by commercial insurers. The model also estimated that it would take two weeks for the NGS and panel results to be processed, while it would take 4.7 or 4.8 weeks to process the exclusionary and sequential tests, respectively.

Applying economic factors to CMS payments, NGS testing would save about \$1.4 million

compared to exclusionary testing, over \$1.5 million compared to sequential testing, and about \$2.1 million compared to panel testing. For commercial health plans, NGS would save \$3,809 compared to exclusionary testing and \$250,842 compared to panel testing.

### Next Steps

A limitation of this study is that the model is based on several assumptions. The authors' next step is to look at actual health systems and evaluate these differences, testing cost-efficiency in a real-world setting.

This study received funding from Novartis.

### Study at a Glance

<b>Disease</b>	Metastatic Non-Small Cell Lung Cancer
<b>Study Type</b>	Modeling economic benefits of genotyping
<b>Number of People in the Model</b>	2,221 patients
<b>Modality Modeled</b>	Gene sequencing for lung cancer
<b>Primary Finding</b>	Cost of single gene or sequential vs. up-front, comprehensive, next-generation gene sequencing
<b>Secondary Finding(s)</b>	Time to return of genetic results

[View the full abstract.](#)

### For your readers:

- [Tumor Marker Tests](#)
- [Guide to Non-Small Cell Lung Cancer](#)

[View the disclosures](#) for the 2018 ASCO Annual Meeting News Planning Team.

**Disclosures for Bruce E. Johnson, MD, FASCO:** Stock and Other Ownership Interests with KEW Group; Honoria from Merck and Chugai Pharma; Consulting or Advisory Role with Novartis, AstraZeneca (Inst.), KEW Group, Merck, Transgene, Clovis Oncology, Genentech, Lilly (Inst.), Chugai Pharma, Boehringer Ingelheim and Amgen; Research Funding with Novartis; Patents, Royalties and Other Intellectual Property with royalties from Dana-Farber Cancer Institute; Expert Testimony with Genentech.

**ATTRIBUTION TO THE AMERICAN SOCIETY OF CLINICAL ONCOLOGY ANNUAL MEETING IS REQUESTED IN ALL COVERAGE.**

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<sup>1</sup>American Cancer Society. Cancer Facts & Figures 2018.

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