Non-small Cell Lung Cancer (NSCLC) Biomarker Testing
Guide for Advanced Practice Providers

Cancer biomarkers are¹:
- Genes, proteins, and other substances on tumors that can provide information about certain cancers

Types of NSCLC biomarkers²,³:
- Gene alterations (mutations or fusions), also called driver mutations
  - ALK, BRAF, EGFR, ERBB2 (HER2), KRAS, MET, NTRK, RET, ROS1
- Immune biomarker
  - PD-L1

Biomarker testing is important because¹:
- It assists with appropriate treatment selection, including targeted therapies, that may be clinically beneficial to patients with NSCLC

Biomarker testing may be appropriate⁴:
- When lung cancer is suspected
- At diagnosis of lung cancer
- At lung cancer recurrence or progression post-treatment

Alternative names for biomarker testing⁴,⁵:
- Genomic, molecular, mutation, somatic, tumor, tumor genetic, or tumor marker testing
- Genomic or molecular profiling
- Genome sequencing, next-generation sequencing
- Tumor subtyping

Barriers to biomarker testing access⁶:
- Lack of clinician and patient awareness
- Inadequate insurance coverage
- Out-of-pocket costs

For biomarker testing and/or financial assistance resources, scan the QR code
Comprehensive biomarker testing\(^1\,^7\):
- Can simultaneously detect a broad spectrum of driver mutations
- Patients who have not undergone complete biomarker testing may receive suboptimal therapy

When feasible, biomarker testing should be performed via a broad, panel-based approach, typically done by next-generation sequencing\(^7\)

Biomarkers can be measured by\(^8\,-\,^10\):
- Tissue or liquid biopsies (eg, blood or other bodily fluids)
  - Tissue testing is recommended, but liquid biopsies can be considered when tissue sampling is unattainable or insufficient
  - Tissue and liquid biopsies can produce false-negative results, supporting the need for concurrent tissue and liquid biopsy testing to increase the likelihood of actionable alteration detection and time to treatment reduction

Biomarker test results may help to\(^5\):
- Determine whether the cancer is progressing
- Predict the likelihood of a cancer growing and spreading quickly or slowly
- Select the therapy most likely to result in a favorable response

If clinically feasible, biomarker testing results for actionable oncogenic mutations should be known before initiating immune checkpoint inhibitor therapy in eligible patients with advanced NSCLC\(^11\,^12\)

Targeted therapies for NSCLC\(^2\):
- Identify and attack specific proteins on NSCLC cells
- May also be referred to as:
  - Biomarker-driven therapies
  - Precision medicines
  - Molecularly targeted drugs or therapies

Targeted therapies have been shown to decrease tumor burden, including some symptoms, and improve the quality of life for patients with NSCLC and specific tumor biomarkers\(^13\,^14\)

**NSCLC biomarkers and approved targeted therapies\(^15\,-\,^18\)**

<table>
<thead>
<tr>
<th>NSCLC Biomarker</th>
<th>Approved Targeted Therapies</th>
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<tbody>
<tr>
<td>ALK</td>
<td>Alectinib, brigatinib, ceritinib, crizotinib, lorlatinib</td>
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<tr>
<td>BRAF</td>
<td>Binimetinib + encorafenib, dabrafenib + trametinib</td>
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<tr>
<td>EGFR</td>
<td>Afatinib, amivantamab-vmjw, dacomitinib, erlotinib, gefitinib, necitumumab, osimertinib</td>
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<tr>
<td>ERBB2 (HER2)</td>
<td>Fam-trastuzumab deruxtecan-nxki</td>
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<tr>
<td>KRAS</td>
<td>Adagrasib, sotorasib</td>
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<tr>
<td>MET</td>
<td>Capmatinib, tepotinib</td>
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<tr>
<td>NTRK1/2/3</td>
<td>Entrectinib, larotrectinib</td>
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<tr>
<td>PD-L1</td>
<td>Atezolizumab, durvalumab</td>
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<tr>
<td>RET</td>
<td>Pralsetinib, selpercatinib</td>
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<tr>
<td>ROS1</td>
<td>Crizotinib, entrectinib, repotrectinib</td>
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</tbody>
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Recommended treatment for patients with metastatic NSCLC and specific biomarkers is targeted therapy, regardless of PD-L1 levels\(^11\,^12\)
References


16. IMFINZI (durvalumab) injection, for intravenous use [prescribing information]. AstraZeneca; December 2023. Accessed March 13, 2024. https://den8dhaj6zs0e.cloudfront.net/50fd68b9-106b-4550-b5d0-12b045f8b184/9496217c-08b3-432b-abf4-538d795820bd/9496217c-08b3-432b-abf4-538d795820bd_viewable_rendition_v.pdf

