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# Molecular Testing in Lung Cancer for Determination of Patient Eligibility for Targeted Therapies



testing at ARUP Laboratories



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A diagram of a pair of lungs with various genetic alterations listed on either side. The left lung has a vertical list of alterations: AKT1, ALK, BRAF, EGFR, EGFR T790M, ERBB2, and ERBB4. The right lung has a vertical list of alterations: KRAS, NRAS, PIK3CA, ALK Fusions, RET Fusions, and ROS1 Fusions. Each alteration is in a colored pill-shaped box.

| Genetic Alteration |
|--------------------|
| AKT1               |
| ALK                |
| BRAF               |
| EGFR               |
| EGFR T790M         |
| ERBB2              |
| ERBB4              |
| KRAS               |
| NRAS               |
| PIK3CA             |
| ALK Fusions        |
| RET Fusions        |
| ROS1 Fusions       |

|  |   | Gene Mutations |     |      |      |       |       |      |      |        |                | Gene Fusions/<br>Translocations |     |      | Protein<br>Expression |      |  |
|--|---|----------------|-----|------|------|-------|-------|------|------|--------|----------------|---------------------------------|-----|------|-----------------------|------|--|
|  |   | AKT1           | ALK | BRAF | EGFR | ERBB2 | ERBB4 | KRAS | NRAS | PIK3CA | Add'l<br>Genes | ALK                             | RET | ROS1 | ALK                   | ROS1 |  |
| <b>Next-Generation Sequencing Panels</b>   |   |                |     |      |      |       |       |      |      |        |                |                                 |     |      |                       |      |  |
| 2011612  | Lung Cancer Comprehensive Mutation and Translocation Panel by NGS |                |     |      |      |       |       |      |      |        |                |                                 |     |      |                       |      | Well-suited for scant samples<br>More cost effective for detection of mutations plus fusions<br>Gene, variant, and fusion list: <a href="http://www.aruplab.com/lung-cancer-panel">www.aruplab.com/lung-cancer-panel</a> |
| 2007991  | Solid Tumor Mutation Panel by NGS                                 |                |     |      |      |       |       |      |      |        | 39             |                                 |     |      |                       |      | Detections mutations in 48 genes, covering >2,400 variants<br>Gene and variant list: <a href="http://www.aruplab.com/ngs-oncology-mutations">www.aruplab.com/ngs-oncology-mutations</a>                                  |
| <b>Bundled Assays</b> —Concurrent testing is performed on multiple single gene assays to reduce turnaround time and required tissue. |   |                |     |      |      |       |       |      |      |        |                |                                 |     |      |                       |      |  |
| 2008894  | Lung Cancer Limited Panel   |                |     |      |      |       |       |      |      |        |                |                                 |     |      |                       |      | EGFR mutation detection by pyrosequencing; ALK and ROS1 by IHC; tests are performed concurrently.  |
| 2008895  | Lung Cancer Limited Panel with KRAS                               |                |     |      |      |       |       |      |      |        |                |                                 |     |      |                       |      | EGFR and KRAS mutation detection by pyrosequencing; ALK and ROS1 by IHC; tests are performed concurrently.   |
| <b>Point Mutation</b> —Digital droplet PCR   |   |                |     |      |      |       |       |      |      |        |                |                                 |     |      |                       |      |  |
| 2012868  | EGFR T790M Mutation Detection in Circulating Cell-Free DNA        |                |     |      |      |       |       |      |      |        |                |                                 |     |      |                       |      | Plasma or CSF sample type<br>Guides clinical treatment decisions about acquired resistance to early generation TKIs and decision to switch to EGFR T790M-specific TKIs   |
| <b>Single Gene Assays</b> —Mutation detection by pyrosequencing  |   |                |     |      |      |       |       |      |      |        |                |                                 |     |      |                       |      |  |
| 2002498  | BRAF Codon 600 Mutation Detection                                 |                |     |      |      |       |       |      |      |        |                |                                 |     |      |                       |      | Covers codon 600 (exon 15)   |
| 2002440  | EGFR Mutation Detection   |                |     |      |      |       |       |      |      |        |                |                                 |     |      |                       |      | Covers exons 18–21   |
| 0040248  | KRAS Mutation Detection   |                |     |      |      |       |       |      |      |        |                |                                 |     |      |                       |      | Covers codons 12 and 13 (exon 2) and codon 61 (exon 3)   |
| 2003123  | NRAS Mutation Detection   |                |     |      |      |       |       |      |      |        |                |                                 |     |      |                       |      | Covers codons 12 and 13 (exon 2) and codon 61 (exon 3)   |
| <b>Immunohistochemistry (IHC)</b>  |   |                |     |      |      |       |       |      |      |        |                |                                 |     |      |                       |      |  |
| 2007324  | ALK (D5F3) with Interpretation                                    |                |     |      |      |       |       |      |      |        |                |                                 |     |      |                       |      | More cost effective than FISH testing  |
| 2011431  | ALK (D5F3) with Relfex to FISH                                    |                |     |      |      |       |       |      |      |        |                |                                 |     |      |                       |      | If IHC is positive or equivocal, the sample is reflexed to FISH for confirmation.  |
| 2008414  | ROS1 with Interpretation with Reflex to FISH                      |                |     |      |      |       |       |      |      |        |                |                                 |     |      |                       |      | If IHC is equivocal, the sample is reflexed to FISH.   |
| <b>Fluorescent In Situ Hybridization (FISH)</b>  |   |                |     |      |      |       |       |      |      |        |                |                                 |     |      |                       |      |  |
| 2006102  | ALK Gene Rearrangements by FISH                                   |                |     |      |      |       |       |      |      |        |                |                                 |     |      |                       |      |  |
| 2008418  | ROS1 by FISH  |                |     |      |      |       |       |      |      |        |                |                                 |     |      |                       |      |  |