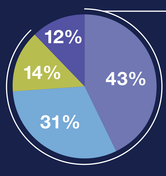
Tumor content limits some NGS-based NSCLC tests

Clinical practice guidelines recommend broad genetic profiling by next-generation sequencing (NGS) for advanced non-small cell lung cancer (NSCLC) to guide first-line treatment. Yet, small biopsies and low-tumor content samples pose challenges to testing. The data below, from laboratories across the world, show how limited many of these samples are. While NGS is generally seen as a tissue-saving method given its ability to deliver multiple biomarker results with a single sample, it is important to understand that the sample size and content requirements are not equal for all NGS-based methods. Some NGS-based methods can test smaller samples and deliver results for more patients.

Cancer Genetics, Inc., New Jersey[1]

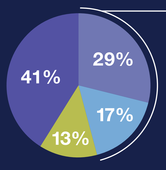
1,791
lung samples

88% of all samples had less than 25 mm² tumor area



Tumor area
- ≤1 mm²
- >1 mm² and ≤5 mm²
- >5 mm² and ≤25 mm²
- >25 mm²

46% of all samples had less than 20% tumor content

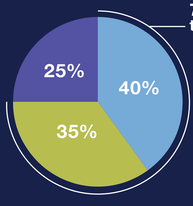


Tumor content
- ≤10%
- >10% and ≤20%
- >20% and ≤30%
- >30%

Life Lab, California[2]

627
lung samples

75% of all samples had less than 25 mm² tumor area

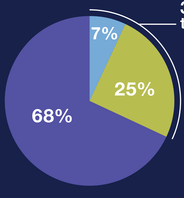


Tumor area
- ≤5 mm²
- >5 mm² and ≤25 mm²
- >25 mm²

Sarah Cannon Molecular Diagnostic Laboratory, London[3]

2,796
lung samples

32% of all samples had less than 20% tumor content



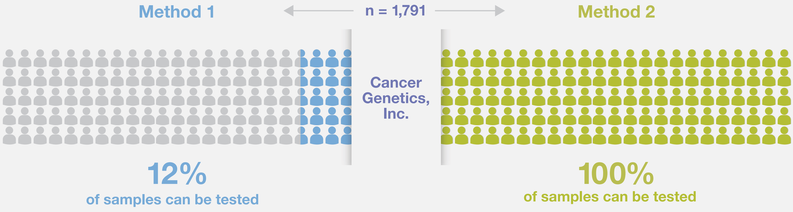
Tumor content
- ≤5%
- >5% and ≤20%
- >20%

Sample requirements can differ greatly from one test to the next

Method 1	20% minimum, 30% optimum tumor content	5 mm² minimum sample surface area, entire block or 10 slides required[2]	50 ng–1,000 ng minimum input
Method 2	10% minimum tumor content	No minimum surface area requirement; 2 slides for resection, 9 for CNB required	10 ng minimum input required

NGS-based testing input requirements are typically expressed as X ng of nucleic acid, and can differ significantly between different NGS-based tests. The figures below explain the practical implications of these different requirements in terms of tissue, tumor area, and content. Even if similar numbers of slides are required for both tests, the tumor area and percent tumor content required are significantly higher for Method 1, in order for testing to be successful.

Potential impact of different sample requirements on patients



12%
of samples can be tested

100%
of samples can be tested

The difference in the ability of each method to accommodate small samples can have a direct impact on patients' outcomes. Based on the tumor area alone, only 215 out of 1,791 patient samples submitted to Cancer Genetics, Inc. could be tested using Method 1, while all 1,791 samples could be tested using Method 2.

References
1. NGS to take top spot as cancer biomarker testing broadens. *CAP TODAY*, June 2018
2. Life Lab Internal Audit data on file
3. Tissue is still the issue, David Moore; *The Pathologist*, May 2018

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