Implications of Key Differences Across 12 KRAS Mutation Detection Technologies and Their Relevance in Clinical Practice

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Background

KRAS mutation detection is a well-established method employed to guide clinical decisions. However, different KRAS mutation detection technologies exist that are commonly used in today’s molecular clinical diagnostic setting.

Objectives

1. Compare the performance characteristics of 12 KRAS mutation detection technologies.
2. Investigate whether these technologies have an impact on the detection of minor KRAS mutations.

Materials and Methods

A total of 12 technologies were evaluated across 3 real-time quantitative PCR (RT-qPCR), 2 matrix-assisted laser desorption/ionisation time-of-flight spectrometry (MALDI-TOF), 3 real-time polymerase chain reaction (PCR) Kits, 1 droplet digital PCR (ddPCR), and 1 Sanger capillary sequencing.

KRAS Mutation Testing

The cell lines (and corresponding mutation detection technologies) are listed in Table 1. Methods

1. KRAS mutation testing is commonly employed to inform treatment decisions in colorectal cancer. However, different KRAS mutation detection technologies exist that are commonly used in today’s molecular clinical diagnostic setting.

2. There is a need for high performing, easy-to-use, affordable tests that provide robust results and can guide clinical decisions.

3. We assessed a ‘mesh-point’ of the state-of-the-art landscape of KRAS mutation detection technologies that are commonly used in today’s molecular clinical diagnostic setting.

Results

Relative sensitivity of technologies

Analysis of a KRAS Mutation Detection Technologies and Their Relevance in Clinical Practice.

1. The Table 1: Comparison of technology characteristics

Table 1: Comparison of technology characteristics

<table>
<thead>
<tr>
<th>Technology Type</th>
<th>Base of use</th>
<th>KRAS copy number</th>
<th>FFPE tissue</th>
<th>No. of reactions per sample</th>
<th>No. handling steps</th>
<th>No. of genes covered</th>
<th>Max. no. of samples per run</th>
<th>Hands on wet-lab work time</th>
<th>Turnaround time (1–4 [low to high])</th>
<th>Level of expertise required</th>
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</thead>
<tbody>
<tr>
<td>RT-qPCR</td>
<td>100 copies</td>
<td>0.5%</td>
<td>10 µL</td>
<td>3–5</td>
<td>1</td>
<td>11+</td>
<td>24–96</td>
<td>2</td>
<td>1</td>
<td>High</td>
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<tr>
<td>MALDI-TOF</td>
<td>100 copies</td>
<td>0.5%</td>
<td>10 µL</td>
<td>1–24</td>
<td>1</td>
<td>11+</td>
<td>4–256</td>
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<td>2</td>
<td>Low to medium</td>
</tr>
<tr>
<td>PCR Kit</td>
<td>100 copies</td>
<td>0.5%</td>
<td>10 µL</td>
<td>1–4</td>
<td>1</td>
<td>11+</td>
<td>4–256</td>
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<tr>
<td>ddPCR</td>
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<td>10 µL</td>
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Conclusions

• KRAS mutation detection technologies and assays varied greatly in terms of technical requirements and performance characteristics.

• KRAS mutation detection technologies were compared for the purpose of improving clinical outcomes.

• KRAS mutation detection is a well-established method employed to guide clinical decisions. However, different KRAS mutation detection technologies exist that are commonly used in today’s molecular clinical diagnostic setting.

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