Casework Experience with the GlobalFiler STR Kits
Saint Louis County Police Crime Laboratory
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Master Mix Additive (MMA) Update

- Customers reported seeing elevated NED™ peak heights as well as a reverse ski slope in the purple channel (GD™)
- Suspected cause is the old MMA formulation which used a phosphate buffer - phosphate likely forming a precipitate (Mg2PO4)x which reduces the available Mg2+ in the reaction
- Higher input DNA samples (>4ng) have a more pronounced effect due to the balance of primers and the excess DNA using up more of the Mg2+
- Updated kit uses BSA in a Tris buffer and MMA is no longer in a separate tube
- Only applies to the Casework kit, no changes to the Express kit

Performance check needed!

Sensitivity Series:

<table>
<thead>
<tr>
<th>Sample ID</th>
<th>Phase (average)</th>
<th>Plasmid</th>
<th>Adjusted Quant (ng)</th>
<th>AFC added/removed</th>
<th>Total DNA (ng)</th>
<th>Rinse in Tris (ng)</th>
</tr>
</thead>
<tbody>
<tr>
<td>pEF BLAK1</td>
<td>5.85</td>
<td>0.61</td>
<td>3.60</td>
<td>3</td>
<td>10.05</td>
<td></td>
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<tr>
<td>pEF BLAK2</td>
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<td>3.60</td>
<td>2</td>
<td>7.05</td>
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<tr>
<td>pEF BLAK3</td>
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<td>3.60</td>
<td>15</td>
<td>5.25</td>
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<td>pEF BLAK4</td>
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<td>3.60</td>
<td>10</td>
<td>5.30</td>
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<tr>
<td>pEF BLAK5</td>
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<td>3.60</td>
<td>10</td>
<td>3.90</td>
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</tr>
</tbody>
</table>

Known/non-probative:

<table>
<thead>
<tr>
<th>Sample ID</th>
<th>Source</th>
<th>Body Fluid/Substrate</th>
<th>Mix 1</th>
<th>Mix 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>F1/F2/SEr</td>
<td></td>
<td>Bloodstain card extract</td>
<td></td>
<td></td>
</tr>
<tr>
<td>NED</td>
<td></td>
<td>Bloodstain card extract</td>
<td></td>
<td></td>
</tr>
<tr>
<td>KFR</td>
<td></td>
<td>Whole blood (EDTA extraction)</td>
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</tr>
<tr>
<td>5-MNA</td>
<td></td>
<td>Blood</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Performance Check Results – MMA Update

- No significant differences were noted between the two kit formulations
- All controls correct, no contamination indicated
- The “old” kit had been thawed 4 days prior to amplification
- Data indicates the level of precipitation formation may be related to the length of time the kits are refrigerated after MMA is added

Interesting Case #1 – 1990 Homicide

Scenario:
- Female maintenance worker was found stabbed and strangled in the men’s restroom of a local seminary. Original suspect was the victim’s boss - a glove with a bloodstain (Q11) was located in a gym bag at the suspect’s residence

Evidence:
- Q14: Perfect 2 male mixture with ~2:1 ratio, major is correlated with the swab from GF (purple channel not shown)

GlobalFiler was just being brought online (waiting for NYS approval)

These samples were the first run with GlobalFiler once it came online

Interesting Case #2 – “Yahoo”

Scenario:
- Suspect broke into an unoccupied home (resident had recently passed away - relatives had been packing up belongings). Suspect steals a TV and other items, then steals the victim’s car. He is found in the city passed out in the stolen car (high on heroin)

Evidence:
- Q1: swabs of blood from bathroom wall
- Q3: swabs from mouth of “Yahoo” bottle

Possible Explanations:
- Officer collected swabs at same time (or used contaminated swabs?) – no. Per officer, he collected the Yahoo bottle swabs but the bucal swab was collected at the city jail the following day...
- Chimera?
- CODIS hit to a multi-allelic offender solves the mystery. The suspect is a bone marrow recipient!

- Interesting that one saliva sample has a mixture ratio of 12:1 (buccal swab) and the other 2:1 (Yahoo)
- The MD Highway Patrol has 7 multi-allelic offenders (out of 263,755 offenders (0.0002%) as of 3/5/15)

Summary
- Overall we are very pleased with the GlobalFiler kits.
- The significantly reduced processing/amplification times has improved our throughput and allowed for expedited analysis.
- The 15ul input volume allows for dramatically increased sensitivity.
- The additional loci provide more definitive information with respect to the number of contributors and the gender of contributors.
- The additional loci provide an amazing power of discrimination - Random Match Probabilities are routinely in the nonillion-decillion range (10^{39})