Expended DNA Analysis and Demographic Comparison of Evidentiary Samples from 1,785 Property Crime Cases

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Abstract

Property crime cases from Miami-Dade, Florida; Charleston, South Carolina; and Huntington, West Virginia were sent to the Marshall University Forensic Science Center (MUFS). DNA testing was performed and the CODIS hits were recorded. The forensic science community will be impacted by this poster because it will provide the community with patterns and trends related to this property crime study.

Introduction

In 2010, there were an estimated 8 million property crime offenses that occurred in the United States. The overall loss from the 2010 property crimes is estimated at 15.7 billion dollars. The National Institute of Justice (NIJ) identified a need for additional research to be conducted regarding Property Crimes. This project sought to identify the best practices for sample collection, processing of samples and identification of perpetrators. It was developed to aid in the processing of property crimes, if often under-prosecuted category of crime. As a result, the intentions of this study also included examining the resultant data and extrapolate any apparent trends that occurred.

Materials and Methods*

**Table 1: Results of DNA Analysis**

<table>
<thead>
<tr>
<th>Miami-Dade, FL</th>
<th>Charleston, SC</th>
<th>Huntington, WV</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cases Received: 1,785</td>
<td>Questioned Samples: 382</td>
<td>Questioned Samples: 220</td>
</tr>
<tr>
<td>Questioned Samples: 382</td>
<td>Questioned Samples: 220</td>
<td>Questioned Samples: 220</td>
</tr>
<tr>
<td>City Population: 418,052</td>
<td>City Population: 85,158</td>
<td>City Population: 52,376</td>
</tr>
</tbody>
</table>

**Figure 2: The Charts Representing Biological Evidence Categories**

- **Figure 3: Aerial View of Each Region Involved in the Property Crime Project**

**Figure 4: Bar Graph Depicting Percentage of Obtained DNA Profiles for Each Sample Type**

**Figure 5: Technical Specifications According to Site Location**

**Table 2: Sample Results**

<table>
<thead>
<tr>
<th>Blood</th>
<th>Saliva</th>
<th>Touch</th>
<th>Hair</th>
<th>None</th>
</tr>
</thead>
<tbody>
<tr>
<td>91%</td>
<td>77%</td>
<td>93%</td>
<td>65%</td>
<td>62%</td>
</tr>
</tbody>
</table>

**Discussion**

It was hypothesized that the number of blood, saliva and touch samples would be similar across each collection site. Figure 8 shows that blood and saliva samples were over represented across all sites, with over 80% of the total number of samples reported representing the largest category of biological evidence. Upon additional analysis, it is important to note that the number of saliva samples was significantly greater at Charleston compared to Miami-Dade and Huntington. Both Miami-Dade and Huntington had a higher number of blood samples than saliva samples.

**Literature Cited**

4. Marshall University Forensic Science Center, 1401 Forensic Science Drive, Huntington, WV 25701

**Acknowledgements**

MUFSC would also like to thank the following organizations for their cooperation:

- Marshall University Forensic Science Center
- Miami-Dade, Florida
- Charleston, South Carolina
- Huntington, West Virginia

**Figure 1: Background Facts Regarding the Property Crimes Project Location**

**Figure 6: Typical Forensic Crime Site Location**

**Figure 7: Stochastic Threshold (RFU)**

**Figure 8: DNA Amplification Parameters**

- Amplification: PowerPlex® HS AMD Applied Biosystems® Quantifier® Human on Applied Biosystems® 7500 Real-Time PCR System
- Capillary Electrophoresis: Applied Biosystems® 3130xl Genetic Analyzer, GeneMapper® ID (YL1)

**Figure 9: Results from Sample Types**

- Amplification: PowerPlex® HS AMD Applied Biosystems® Quantifier® Human on Applied Biosystems® 7500 Real-Time PCR System
- Capillary Electrophoresis: Applied Biosystems® 3130xl Genetic Analyzer, GeneMapper® ID (YL1)

**Figure 10: Results from Sample Types**

- Amplification: PowerPlex® HS AMD Applied Biosystems® Quantifier® Human on Applied Biosystems® 7500 Real-Time PCR System
- Capillary Electrophoresis: Applied Biosystems® 3130xl Genetic Analyzer, GeneMapper® ID (YL1)

**Figure 11: Results from Sample Types**

- Amplification: PowerPlex® HS AMD Applied Biosystems® Quantifier® Human on Applied Biosystems® 7500 Real-Time PCR System
- Capillary Electrophoresis: Applied Biosystems® 3130xl Genetic Analyzer, GeneMapper® ID (YL1)

**Figure 12: Results from Sample Types**

- Amplification: PowerPlex® HS AMD Applied Biosystems® Quantifier® Human on Applied Biosystems® 7500 Real-Time PCR System
- Capillary Electrophoresis: Applied Biosystems® 3130xl Genetic Analyzer, GeneMapper® ID (YL1)

**Figure 13: Results from Sample Types**

- Amplification: PowerPlex® HS AMD Applied Biosystems® Quantifier® Human on Applied Biosystems® 7500 Real-Time PCR System
- Capillary Electrophoresis: Applied Biosystems® 3130xl Genetic Analyzer, GeneMapper® ID (YL1)

**Figure 14: Results from Sample Types**

- Amplification: PowerPlex® HS AMD Applied Biosystems® Quantifier® Human on Applied Biosystems® 7500 Real-Time PCR System
- Capillary Electrophoresis: Applied Biosystems® 3130xl Genetic Analyzer, GeneMapper® ID (YL1)

**Figure 15: Results from Sample Types**

- Amplification: PowerPlex® HS AMD Applied Biosystems® Quantifier® Human on Applied Biosystems® 7500 Real-Time PCR System
- Capillary Electrophoresis: Applied Biosystems® 3130xl Genetic Analyzer, GeneMapper® ID (YL1)

**Figure 16: Results from Sample Types**

- Amplification: PowerPlex® HS AMD Applied Biosystems® Quantifier® Human on Applied Biosystems® 7500 Real-Time PCR System
- Capillary Electrophoresis: Applied Biosystems® 3130xl Genetic Analyzer, GeneMapper® ID (YL1)

**Figure 17: Results from Sample Types**

- Amplification: PowerPlex® HS AMD Applied Biosystems® Quantifier® Human on Applied Biosystems® 7500 Real-Time PCR System
- Capillary Electrophoresis: Applied Biosystems® 3130xl Genetic Analyzer, GeneMapper® ID (YL1)

**Figure 18: Results from Sample Types**

- Amplification: PowerPlex® HS AMD Applied Biosystems® Quantifier® Human on Applied Biosystems® 7500 Real-Time PCR System
- Capillary Electrophoresis: Applied Biosystems® 3130xl Genetic Analyzer, GeneMapper® ID (YL1)

**Figure 19: Results from Sample Types**

- Amplification: PowerPlex® HS AMD Applied Biosystems® Quantifier® Human on Applied Biosystems® 7500 Real-Time PCR System
- Capillary Electrophoresis: Applied Biosystems® 3130xl Genetic Analyzer, GeneMapper® ID (YL1)

**Figure 20: Results from Sample Types**

- Amplification: PowerPlex® HS AMD Applied Biosystems® Quantifier® Human on Applied Biosystems® 7500 Real-Time PCR System
- Capillary Electrophoresis: Applied Biosystems® 3130xl Genetic Analyzer, GeneMapper® ID (YL1)

**Figure 21: Results from Sample Types**

- Amplification: PowerPlex® HS AMD Applied Biosystems® Quantifier® Human on Applied Biosystems® 7500 Real-Time PCR System
- Capillary Electrophoresis: Applied Biosystems® 3130xl Genetic Analyzer, GeneMapper® ID (YL1)

**Figure 22: Results from Sample Types**

- Amplification: PowerPlex® HS AMD Applied Biosystems® Quantifier® Human on Applied Biosystems® 7500 Real-Time PCR System
- Capillary Electrophoresis: Applied Biosystems® 3130xl Genetic Analyzer, GeneMapper® ID (YL1)

**Figure 23: Results from Sample Types**

- Amplification: PowerPlex® HS AMD Applied Biosystems® Quantifier® Human on Applied Biosystems® 7500 Real-Time PCR System
- Capillary Electrophoresis: Applied Biosystems® 3130xl Genetic Analyzer, GeneMapper® ID (YL1)

**Figure 24: Results from Sample Types**

- Amplification: PowerPlex® HS AMD Applied Biosystems® Quantifier® Human on Applied Biosystems® 7500 Real-Time PCR System
- Capillary Electrophoresis: Applied Biosystems® 3130xl Genetic Analyzer, GeneMapper® ID (YL1)

**Figure 25: Results from Sample Types**

- Amplification: PowerPlex® HS AMD Applied Biosystems® Quantifier® Human on Applied Biosystems® 7500 Real-Time PCR System
- Capillary Electrophoresis: Applied Biosystems® 3130xl Genetic Analyzer, GeneMapper® ID (YL1)

**Figure 26: Results from Sample Types**

- Amplification: PowerPlex® HS AMD Applied Biosystems® Quantifier® Human on Applied Biosystems® 7500 Real-Time PCR System
- Capillary Electrophoresis: Applied Biosystems® 3130xl Genetic Analyzer, GeneMapper® ID (YL1)

**Figure 27: Results from Sample Types**

- Amplification: PowerPlex® HS AMD Applied Biosystems® Quantifier® Human on Applied Biosystems® 7500 Real-Time PCR System
- Capillary Electrophoresis: Applied Biosystems® 3130xl Genetic Analyzer, GeneMapper® ID (YL1)

**Figure 28: Results from Sample Types**

- Amplification: PowerPlex® HS AMD Applied Biosystems® Quantifier® Human on Applied Biosystems® 7500 Real-Time PCR System
- Capillary Electrophoresis: Applied Biosystems® 3130xl Genetic Analyzer, GeneMapper® ID (YL1)

**Figure 29: Results from Sample Types**

- Amplification: PowerPlex® HS AMD Applied Biosystems® Quantifier® Human on Applied Biosystems® 7500 Real-Time PCR System
- Capillary Electrophoresis: Applied Biosystems® 3130xl Genetic Analyzer, GeneMapper® ID (YL1)

**Figure 30: Results from Sample Types**

- Amplification: PowerPlex® HS AMD Applied Biosystems® Quantifier® Human on Applied Biosystems® 7500 Real-Time PCR System
- Capillary Electrophoresis: Applied Biosystems® 3130xl Genetic Analyzer, GeneMapper® ID (YL1)

**Figure 31: Results from Sample Types**

- Amplification: PowerPlex® HS AMD Applied Biosystems® Quantifier® Human on Applied Biosystems® 7500 Real-Time PCR System
- Capillary Electrophoresis: Applied Biosystems® 3130xl Genetic Analyzer, GeneMapper® ID (YL1)