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## Comparison of Two Automated Nucleic Acid Extraction Systems For Bone DNA Extraction

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### Introduction

DNA extraction from bone samples remains a significant challenge for forensic scientists worldwide, particularly in cases of mass disasters, criminal cases, missing persons, or historical war crimes. Factors such as UV exposure, heat, and microbial activity affect sample preservation. As degradation progresses, it becomes difficult to type STR profiles. Samples may also be structurally damaged, including cross-linkage or contamination. This study compares HiMedia's iVista NP<sup>®</sup> Mag32 Automated Nucleic Acid Extractor and Applied Biosystems<sup>™</sup> AutoMate Express Forensic DNA Extraction System in bone samples.

### Objective

The objective of the study was to compare two automated nucleic acid extraction systems for bone samples i.e., HiMedia's iVista NP<sup>®</sup> Mag32 Automated Nucleic Acid Extractor and Applied Biosystems<sup>™</sup> AutoMate Express Forensic DNA Extraction System.

### Materials and Methods

- Six test pieces were selected from the study.
- Bone samples were cleaned and dried.
- Bone samples were powdered using Qiagen's Tissue Lyser.
- Bone powder incubation at 38°C for 24-28 hrs (single).
- Bone powder incubation at 38°C for 2 hrs (single) (pre-treated).
- 200 mg bone powder.
- Overnight incubation at 38°C for 24-28 hours.
- HiPur<sup>®</sup> Multi Sample Bone Wash Buffer for iVista NP<sup>®</sup> Mag32 (Himedia Laboratories).
- Applied Biosystems<sup>™</sup> Quantiplex Kit and Quantiplex PCR Reagent System for Human Identification.
- Applied Biosystems<sup>™</sup> Quantifiler<sup>™</sup> PCR Amplification Kit for STRs, 70 treatment.

### Results

**Figure 1:** Average concentration of small subunit target identified from bone samples.

**Figure 2:** Average concentration of large subunit target identified from bone samples.

**Figure 3:** Total DNA amplified in bone samples.

**Figure 4:** qPCR amplification of human DNA samples from different extraction systems.

### Conclusion

1. HiMedia's iVista NP<sup>®</sup> Mag32 Automated Nucleic Acid Extractor showed high DNA yield as compared to Applied Biosystems<sup>™</sup> AutoMate Express Forensic DNA Extraction System.
2. The quality of DNA extraction was assessed by analyzing the qPCR cycle of the samples.
3. Except for sample 13, all the replicates in the samples 11 to 14 were removed using iVista's iVista NP<sup>®</sup> Mag32 Automated Nucleic Acid Extractor. However, sample 14 exhibited qPCR cycle from Applied Biosystems<sup>™</sup> AutoMate Express Forensic DNA Extraction System.
4. This proves that HiMedia's iVista NP<sup>®</sup> Mag32 Automated Nucleic Acid Extractor yields DNA with high quality.
5. In samples 14 and 15, very low yield was obtained from Applied Biosystems Forensic DNA Extraction System which indicates it either failed or its results were 200 amplification. For the same samples, HiMedia's iVista NP<sup>®</sup> Mag32 Automated Nucleic Acid Extractor showed good DNA concentration that amplified by 20-25 cycles from 270 amplification.
6. The results showed that the HiMedia's iVista NP<sup>®</sup> Mag32 Automated Nucleic Acid Extractor provides the highest yield and purity of DNA from bone samples and that the system is suitable for use within forensic laboratories.

### References

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