

PERFORMANCE OF DNA IQ™ CASEWORK BETA KIT FOR MAXWELL® 16 FOR DNA EXTRACTION FROM DIFFICULT SKELETAL REMAINS: A FIRST APPROACH

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The Guatemalan civil war (1960 – 1996) left more than 300,000 victims, which include 50,000 forced disappearances. In order to contribute to historical clarification and the search of justice, the Forensic Anthropology Foundation of Guatemala (FAFG) is working on the recovery and identification of human remains left in mass graves for more than three decades.

FAFG Forensic Genetics Laboratory is continuously seeking to improve the DNA recovery from low copy number samples such as human bones. Additionally to the fact that some bodies were burned, they have been exposed to microbial and chemical decomposition on a tropical soil for more than 30 years. The combination of these facts makes Guatemalan skeletal remains a very challenging substrate if the purpose is to obtain DNA in quality and quantity suitable for genetic typing applications.

To the present, FAFG Forensic Genetics Laboratory has validated procedures for DNA extraction and purification from bone powder that use different silica based commercial kits and take about 50 hours to process 32 samples. Based on the demonstrated efficacy of the DNA IQ™ magnetic bead chemistry applied in skeletal samples, FAFG Forensic Genetics laboratory aims to upgrade its efficiency by testing the automated Maxwell®16 with the DNA IQ™ Kit.

The goal of this study is to determine the suitability of the DNA IQ™/Maxwell 16® System to yield, from difficult skeletal samples, enough purified DNA useful for genotyping.

This study presents the results of FAFG's laboratory first approach on the application of the Promega DNA IQ™ Casework Sample Kit for Maxwell®16 for DNA extraction from previously analyzed powdered skeletal samples, using two different protocols (Pro and Beta).

Our results showed a superior DNA recovery with the Beta protocol compared to the Pro protocol. This highlights the importance of the Bone Incubation Buffer used in the Beta protocol (DNA yield between 0.0018 to 0.403 ng/ 0.1 g of bone powder), that in overall showed a DNA recovery up to 19 times higher.

Nine known samples with a full profile (more than 13 loci profiles) previously extracted using a silica based method, were extracted using the DNA IQ™ Beta Kit /Maxwell 16® System. No inhibition was detected by RT-PCR in any sample. Four samples failed to quantify, while five samples quantified enough for downstream genotyping applications: two samples had a complete profile obtained with the AmpFISTR®

MiniFiler™ PCR Kit (AB), and profiles of 8 and 13 loci were obtained from two samples amplified with the AmpFISTR® Identifiler™ PCR Kit (AB).

This first approach on using the DNA IQ™ Beta Kit /Maxwell 16® System demonstrated efficacy to obtain DNA extracts from bone samples, and opens the possibility of optimization and validation of a method that can allow FAFG Forensic Genetics laboratory increase the throughput of samples on fourth the time it actually uses on DNA extractions.