FORENSIC EVALUATION OF THE QIASHREDDER/QIAMP DNA EXTRACTION

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Forensic genetic laboratories have to analyze different types of biological material (e.g. saliva, blood or epidermal cells) that are present on a wide range of supports (e.g. biological tissues, clothes, food or cotton swab). Unfortunately, there is no “universal” DNA extraction protocol. Some methods seem to be efficient to remove inhibitors, but may reduce the amount of recovered DNA (e.g. phenol-chloroform). Others, enabling to recover substantial amount of DNA, may be relatively inefficient to remove inhibitors (e.g. chelex). In the laboratory of Lausanne, several modified chelex and phenolchloroform based protocols have been designed to analyze specific categories of samples.

Preliminary extractions of stamps with the QIAshredder/QIAamp Kit showed that this method performed better than our phenol-chloroform based extraction. Consequently, we decided to compare this QIAshredder/QIAamp with those used in routine. Several series of stains were prepared (diluted blood and saliva on swabs, muscles, bones, stamps, cigarette butts, saliva on foods and epidermal cells on clothes) and extracted in parallel with different protocols. For each category of material, we compared the extraction protocols in terms of the amount of DNA recovered using the Quantiblot (Applied Biosystems) and the quality of the SGM Plus profile obtained (Applied Biosystems) after the application.

Overall, DNA yields >200 pg were obtained from 76.7% of the samples extracted with the QIAshredder/QIAamp, whereas this proportion dropped to a mean of 47.8% with the other protocols (QIAamp alone, phenol-chloroform and chelex based protocols). The same tendency was observed with the SGM Plus profiles. In general, more loci were obtained after a QIAshredder/QIAamp extraction. The exception concerned bones, diluted blood and saliva on swabs, for which a full genetic profile was obtained with all the protocols tested. Nevertheless, the DNA extracted with the QIAshredder/QIAamp protocol was amplified with standard PCR conditions, whereas a LCN strategy was used for the other extracts.

In conclusion the QIAshredder/QIAamp extraction method seems to be optimal for the typing of various evidence samples. In our routine laboratory, it successfully replaced the chelex and phenol-chloroform protocols for the categories of specimens presented in this poster. Details concerning DNA yields and SGM Plus profiles as well as some illustrative examples are also presented.