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Research article

# Internal validation of the AmplFlSTR MiniFiler kit

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**Abstract**

Using their five-dye chemistry and mobility modifier technology, Applied Biosystems have developed a miniSTR kit capable of amplifying eight core STR loci and amelogenin with reduced PCR product sizes relative to current commercial kits.

In this study, we present the results of some forensic validation studies including the following aspects: sensitivity, performance with simulated inhibition and degradation, analysis of known and non-probative evidence samples and selectivity.


*Keywords:* Validation; MiniFiler; Mini STRs

## 1. Introduction

With the aim of generating genetic profiles from aged, compromised or damaged DNA samples, a validation study of the AmplFlSTR® MiniFiler™ PCR Kit was performed.

Using their five-dye chemistry and mobility modifier technology, Applied Biosystems have developed a miniSTR kit capable of amplifying eight core STR loci and amelogenin with reduced PCR product sizes relative to current commercial kits.

In this study, we present the results of some forensic validation studies including the following aspects: sensitivity, performance with simulated inhibition and degradation, analysis of known and non-probative evidence samples and selectivity.

## 2. Materials and methods

The PCR amplification was carried out following the amplification conditions recommended by the manufacturer. The amplified products were detected using an ABI Prism 3130xl Genetic Analyzer and GeneMapper ID v 3.2 software.

## 3. Results and discussion

The detection threshold of the MiniFiler kit was determined by analyzing dilutions of the 007 kit control (from 1 ng to 40 pg of DNA). Robust and reproducible amplification results were obtained for the eight loci (+amelogenin) for DNA template input of as low as 40 pg (30 cycles), clearly more sensitive than when using the SGM Plus kit (28 cycles).

Degradation of buccal swabs (several hours at 120 °C) was performed. The extracted DNA was then amplified with SGM Plus and compared with the MiniFiler results. For the SGM Plus kit information was typically missing for several loci. As expected, the larger DNA fragments were the first to disappear (Fig. 1). The same DNA produced a full profile when using the MiniFiler kit (Fig. 2).

We used 0.5 ng of male DNA (positif control 007) and added nicotine at different concentrations to simulate inhibition. This inhibitor titration experiment showed no signal for either the SGM Plus or the MiniFiler kit at a high level of nicotine. At a lower level of nicotine (two-fold dilution) a complete inhibition was still observed using the SGM Plus kit in contrary to the MiniFiler kit where a full profile could be obtained. At a four-fold dilution, partial inhibition of large alleles was observed with the SGM Plus kit. No such inhibition was observed, at the same concentration, for the MiniFiler kit.

The selectivity of the kit was tested by preparing male/female mixtures in the proportions 1:0, 15:1, 7:1, 3:1, 1:1 and 0:1. At 15:1 most of the minor female alleles could not be

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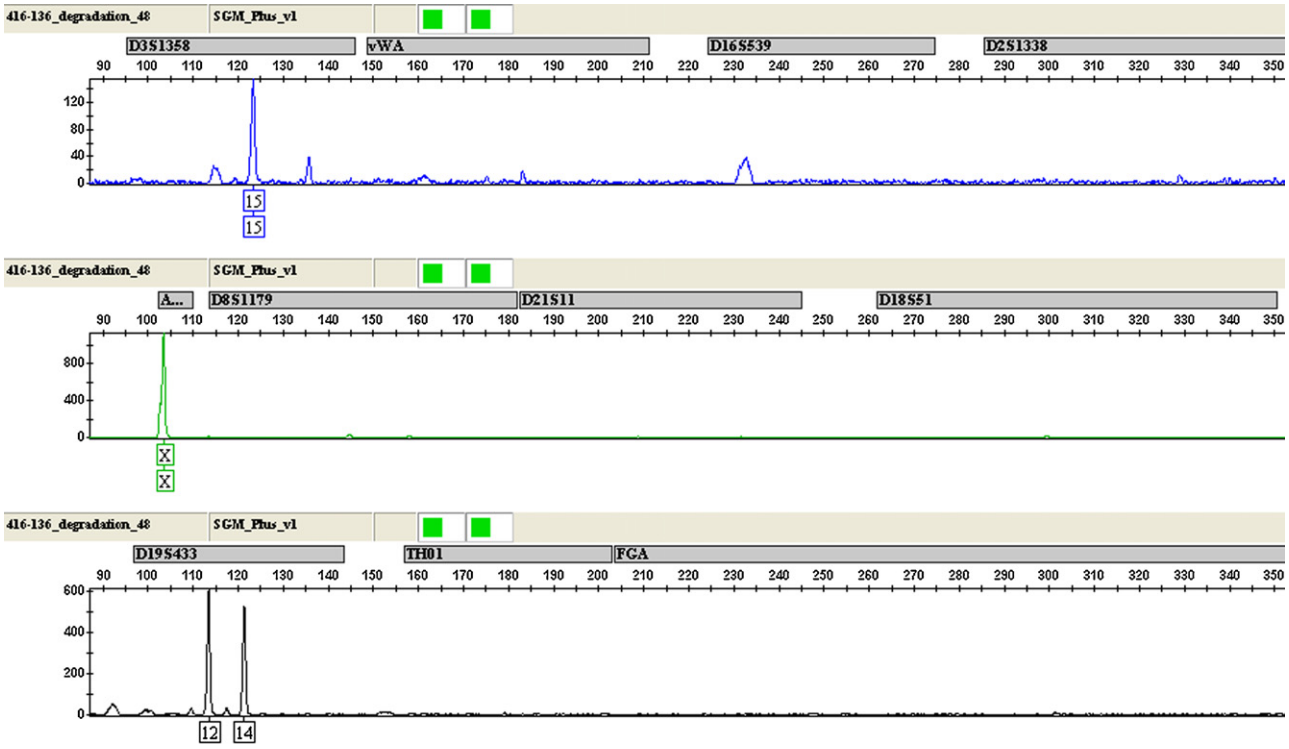


Fig. 1. SGM Plus DNA profile of a heat degraded buccal swab.

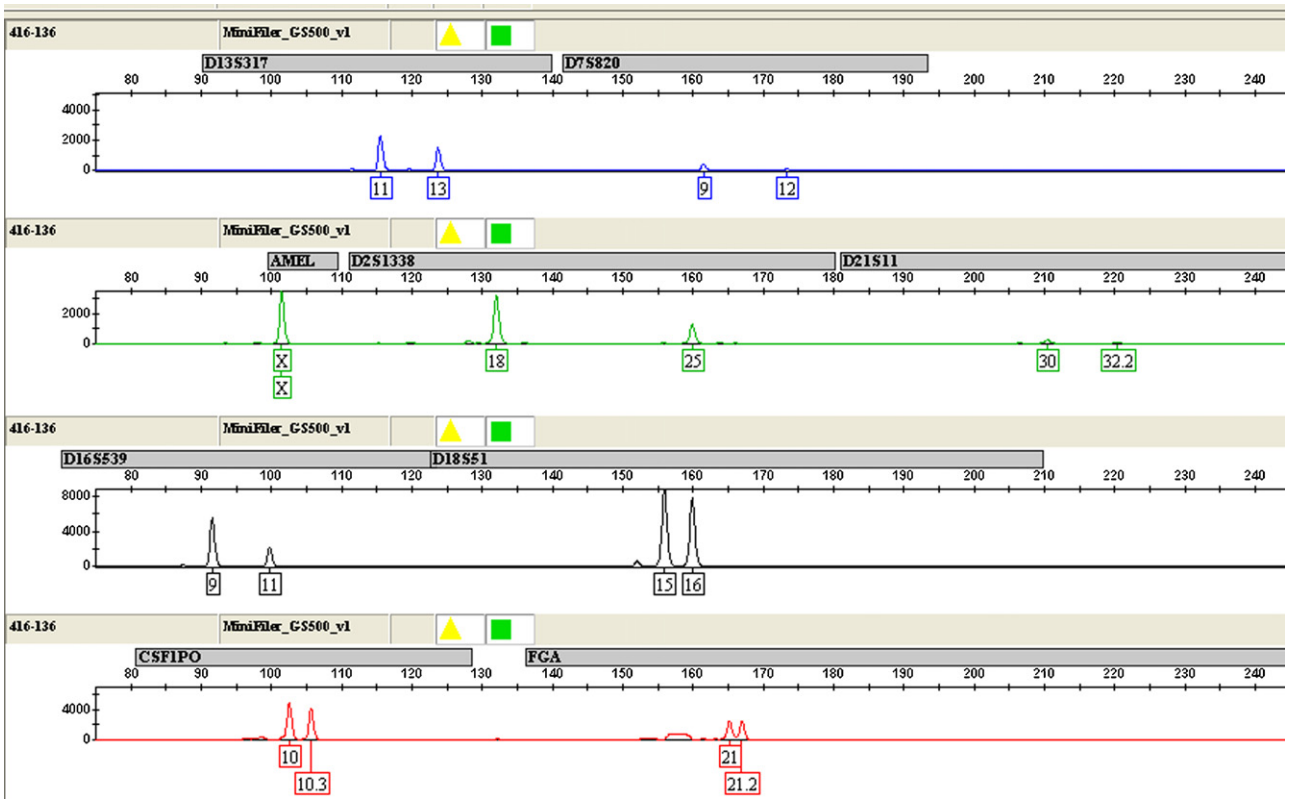


Fig. 2. MiniFiler DNA profile of a heat degraded buccal swab.

identified. A full female profile could be detected in a male/female mixture of 7:1.

Known samples and simulated case samples from the German DNA Profiling group—Stain Commission (GEDNAP) were tested using the MiniFiler kit. DNA profiles obtained from the known and questioned items (GEDNAP 28, 29, 32 and 33) were compared with those already obtained for the SGM Plus kit [1]. The typing results were consistent

between the two kits and with those of the other participant laboratories.

## 4. Conclusion

The MiniFiler kit can provide additional information on samples that are degraded and/or inhibited. The MiniFiler kit can be used as an adjunct kit to the SGM Plus (loci chosen for the Swiss national DNA Database). Therefore, missing SGM Plus information for the following five loci (D2S1338, D21S11, D16S539, D18S51 and FGA), which are in common to the two kits, can be obtained through the use of the MiniFiler kit.

## Conflict of interest

None.

## Reference

[1] C.R. Hill, M.C. Kline, J.J. Mulero, R.E. Lagace, C.-W. Chang, L.K. Hennessy, J.M. Butler, Concordance study between the AmpFlSTR MiniFiler PCR Amplification Kit and conventional STR typing kits, J. Forensic Sci. 52 (4) (2007) 870–873.