VALIDATION OF POWERPLEX®16 HS FOR LOW DNA CONTENT SAMPLES

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For low DNA content samples it's difficult to establish, by common PCR-based quantification method, a concentration threshold below which a profile cannot be determined. In a previous study we determine that all samples giving negative or partial profile with PowerPlex S5 will result in negative profile with Identifiler. Only samples giving a complete PowerPlex S5 profile result in a partial or complete Identifiler profile. Taking the advantage of these results, we now routinely use PowerPlex S5 for screening low DNA content samples like skin contacts samples as an alternative to quantification method: Only samples giving a full PowerPlex S5 profile are further analyzed.

In this study, we compared the sensitivity of PowerPlex16 HS and Identifiler on low DNA content samples using 89 skin contact samples purified by Phenol chloroform method. We found out:

- 9 of these samples were totally negative with PowerPlex S5. No profile was obtained with Identifiler nor with Powerplex16 HS for these samples.
- For 44 samples we obtained a partial profile with PowerPlex S5. All these 44 samples also gave a partial profile with Powerplex16 HS (30 or 32 cycles) but a negative -80 %- or partial -20%- profile with Identifiler.
- 36 samples gave a complete PowerPlex S5 profile. All these samples gave also a complete Powerplex16 HS profile but a partial-36 %- or complete -64%- Identifiler profile.

In terms of STR loci determined, we obtained among the samples giving at least a partial profile:

- 23% of the samples giving the same number of loci determined with both Identifiler and PowerPlex16 HS
- 77% of samples giving an increased number loci identified with PowerPlex16 HS (30 cycles PCR)

We also did further comparison study of PowerPlex16 HS profiles with 10 plus 18, 20 or 22 PCR cycles, in order to define our routine amplification protocol. We found out:

- Amplification with 10+18 cycles showed low intensity profiles for most of our samples (about 60%) resulting in less STR loci identified.
- Amplification with 10+20 and 10+22 cycles showed identical STR loci determined.
- Nevertheless we noticed some drop in for amplification with 10+22 cycles.

In conclusion, we found out Powerplex16 HS shows a better sensitivity than Identifiler and enable determination of larger number of STR loci for low DNA content samples. Finally we established our default amplification protocol with 10+20 cycles as this number of cycles gives the best balance between number of STR loci identified and low pics drop in.