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COMPARISON OF DIFFERENT FORENSIC SPECIMENS FOR DNA YIELD IN FUNCTION OF PCR FEASIBILITY

Gitte Leijnen, Els Jehaes, Steven Rand, Kristien Van Brussel and Werner Jacobs
Dept. of Forensic Medicine – University Hospital Antwerp, Belgium

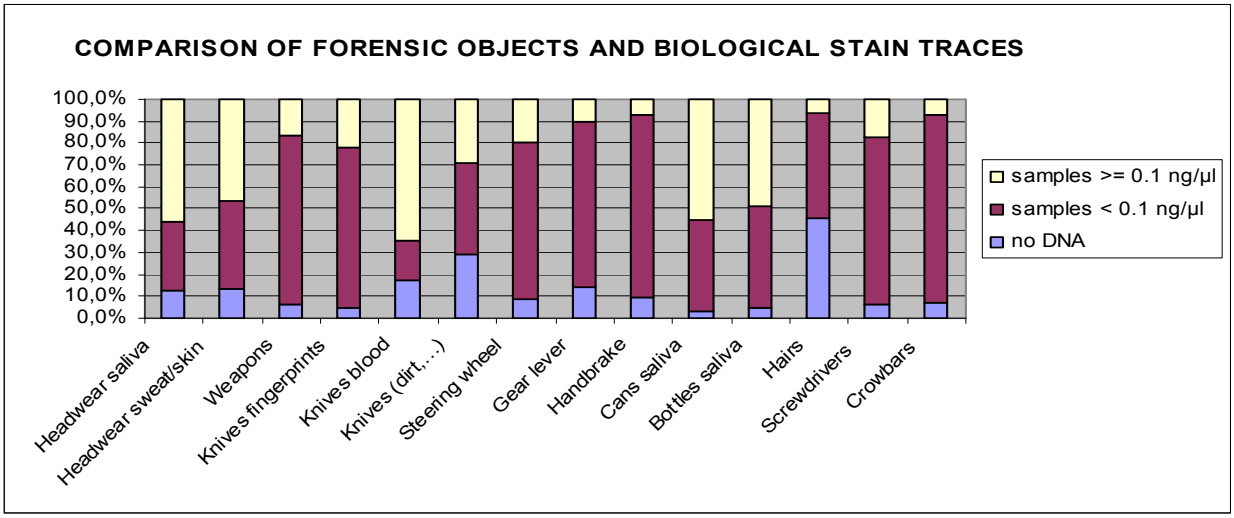
DNA extraction from different types of forensic specimens shows an extremely variable yield of DNA quantity and quality. In this study different forensic samples were compared for DNA yield as a function of PCR feasibility.

826 crime scene objects were classified based on object type and type of biological traces and subjected to appropriate DNA extraction followed by quantification (Quantifiler™, Applied Biosystems, Ca.) and subsequent PCR analysis with the AmpF/STR® SGM Plus™ and AmpF/STR® Profiler™ PCR amplification kits (Applied Biosystems, Ca.).

Overall, 27.85 % of the samples yielded a DNA extract ≥ 0.1ng/µl, which was set as the threshold for PCR feasibility. 87.29 % of the specimens had a concentration ≥ 0.002 ng/µl, which is the internally validated value where it is worthwhile to analyse further. However, it is not a guarantee for reproducible and reliable DNA profiles.

As expected, the success rate of body fluids on forensic objects, which were visible or chemically detected, was higher than the success rate of those samples where DNA traces where deposited on objects by a touch or contact mechanism, e.g. blood on knives showed a significantly higher DNA yield than fingerprints on knives. Nevertheless, it is useful to analyse samples with low success rates, such as hairs, because in certain cases they can contribute to solving forensic cases, even when it only excludes suspects. Some skin contact objects did result in an unusually high yield of DNA which can be explained by interindividual differences.

The intensity and nature of the contact with the crime scene object determined the success rate of extraction of amplifiable DNA. The variability of DNA yield and subsequent PCR feasibility for different forensic samples underlines the importance of an improvement of DNA extraction techniques, reliable quantification methods and sensitive PCR detection, which are crucial to guarantee consistent DNA profiles.


COMPARISON OF FORENSIC OBJECTS AND BIOLOGICAL STAIN TRACES
100,0%
90,0%
80,0%
70,0%
60,0%
50,0%
40,0%
30,0%
20,0%
10,0%
0,0%
Headwear saliva
Headwear sweat/skin
Weapons
Knives fingerprints
Knives blood
Knives (dirt,...)
Steering wheel
Gear lever
Handbrake
Cans saliva
Bottles saliva
Hairs
Screwdrivers
Crowbars
samples >= 0.1 ng/µl
samples < 0.1 ng/µl
no DNA