Internal Quality Controls in Forensic DNA Analyses

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Following EU requirements all forensic DNA laboratories will need to be accredited to practice within a criminal justice system [1]. In general, most forensic laboratories accredited, including the field of forensic biology and DNA profiling, are accredited according to ISO 17025. The biology department at SKL, the Swedish National Laboratory of Forensic Science, has been accredited to this standard since 1999.

Different internal quality controls play an important, even essential role, in monitoring the quality of our work. But, there is no single solution to deal with internal quality controls in forensic DNA analyses. Several different internal controls and systems are needed, in the analyses and clerical phases, to achieve and maintain high quality standards. Obviously, the use of internal quality controls needs to be kept slimmed and rational at a limited, yet acceptable level. Quality "fit-for-purpose" and "minimum quality standards" are approaches used to achieve this.

Internal quality controls within forensic DNA work aims at monitoring and maintaining evidence and sample integrity and to verify that methods used, data transfers, interpretations made etc. are correct.

For parts of these purposes so called negative and positive controls are used. Negative controls are blank samples and positive controls are samples known for instance to its trace type, DNA profile, as well as amount and quality of its DNA content.

DNA in the background environment of the forensic DNA laboratory is a potential risk marker for contamination. Its monitoring, as part of our internal quality controls, can be used to verify good working routines and cleaning procedures, as well as to follow any changes made in these. The outcome of regular monitoring events acts a general indicator of increased/decreased contamination risk.

Increased sensitivity in the DNA profiling kits used increases the need for so called elimination databases with DNA profiles from e.g. forensic staff and crime scene police. Reporting a non-relevant DNA profile could potentially confuse or mislead the police inquiry.

Non-conformance reporting is an imperative part in any accredited forensic practice. Clerical, technical, data-related and other non-conformances in the case handling and analyses processes are reported and documented in a web-based system. Logbooks are alternatively used for minor errors, often technical in nature. In addition to solving specific problems continuous reporting facilitates risk assessments, and is continuously used for experience driven improvements of our processes. Compilations from these reports are made on annual basis for follow-ups.

1. Acts adopted under title VI of the EU Treaty. Council framework decision 2009/905/JHA of 30 November 2009, on Accreditation of forensic science providers carrying out laboratory activities.