

O14. The use of forensic mRNA analysis to determine stain age

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Research in to the use of mRNA analysis in forensic investigations is making significant progress with the use of body fluid identification being the current focus. One other use of the mRNA analysis may be in stain age determination. One question frequently asked by investigating officers and the courts is 'can you tell when the stain was deposited?' with the answer always being negative.

One of the features of RNA is that it degrades rapidly as it is broken down by ribonucleases. It has been suggested that using a decay rate ratio, derived from two endogenous controls differentially expressed within the body fluid stain, should eliminate the effect of any external decomposition factors. This should be expressed as a linear change in mRNA expression over time. The aim of the study was to try and demonstrate proof of principle and explore any limitations.

Blood and saliva samples have been collected on a regular basis over the past year. Blood samples were collected using the pin prick method and depositing stains on to a sterile filter paper. Saliva samples were collected in the form of buccal swabs. Samples were extracted using Qiagen RNeasy Kit and Oligo dT coated magnetic beads, with the appropriate modifications for each body fluid. The extracted samples then underwent reverse transcription using MMLV and random hexamers. The resulting cDNA was then quantified using real-time PCR and Taqman probes and targeting two housekeeping genes, GAPDH and β -Actin. The two values from quantifying GAPDH and β -Actin were then expressed as a ratio. The proof of principle would be demonstrated by a linear downward expression of GAPDH and β -Actin over time.

Future work will involve optimising the protocols, identifying the shortest stain age per body fluid as well as exploring the use of more housekeeping genes.