

A METHOD TO ESTIMATE THE AGE OF BLOODSTAINS USING QUANTITATIVE PCR

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The value of RNA analysis in the forensic laboratory as one means of identifying the nature of biological evidence of forensic relevance has been well established. The degradation of RNA in dried body fluid stains has also been an area of forensic interest because of the potential to estimate the age of a stain recovered from a crime scene. Here we describe a somewhat novel qPCR assay that demonstrates it is possible to estimate the age of bloodstains with reasonable accuracy. The 5'-3' qPCR assay exploits the observation the 5' end of an mRNA transcript degrades in dried stains faster than the 3' end. This differential degradation pattern can be followed with a qPCR assay that quantifies ~90 bp amplicons produced from the 5' and 3' ends of a panel of 4 transcripts chosen from the transcriptome of blood because of their degradation kinetics determined initially using RNA sequencing. Statistical analysis of degradation curves suggests, depending upon the age of the sample, the window of accuracy in age estimates is about 2-4 weeks for stains less than 6 months of age and 4-6 weeks for stains 6 months to 1 year old.