

PARTIAL PROFILE RECOVERY: AMPLICON Rx

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The success of DNA-multiplex STR profiling in criminal investigation is now practically a cliché. The success of this laboratory technique coupled with searchable DNA databases has not only increased the number of samples that are submitted to forensic DNA laboratories for DNA profiling, but has also been the driving force for attempting to obtain DNA profiles from more diverse evidentiary items with less biological material, *i.e.*, smaller and smaller samples including handled items with knurled surfaces (*e.g.*, firearms, flashlights), handled items with smooth surfaces, (*e.g.*, door knobs, tool handles), touched items (*e.g.*, light switches, zipper pulls) and even items that may have been touched or handled only once (*e.g.*, fingerprints, pocket interiors). As can be expected, the less biological material on an item, the more likely that an incomplete DNA profile will be observed after forensic DNA processing. Here we present one possible solution to repairing partial profiles.

Every forensic DNA laboratory has observed partial profiles (defined here as a DNA profile with at least one locus with data below the laboratory's analysis threshold) from the processing and analysis of evidentiary items. There are several possible reasons for partial profiles including insufficient amount of genomic DNA, poor quality DNA (*e.g.*, due to DNA damage), PCR inhibition, PCR primer binding site sequence variants or inadequate electrokinetic injection of PCR amplicons. Obvious solutions to the problem of partial profiles (using more DNA, repurifying the DNA, or using another commercial kit) may not be possible; however given current forensic protocols, increasing the efficiency of electrokinetic injection is always available to the laboratory as >90% of the multiplex PCR reaction is not currently being used for CE analysis. **Amplicon Rx** can increase the observed amplicon signal more than 20 fold, depending on the PCR conditions and the kit used. This signal boost is usually more than sufficient to increase amplicon peak height above both analytical and 'stochastic' thresholds.

Amplicon Rx is a simple (three step), rapid (< 10 min) post amplification purification kit that removes the bulk of the electrokinetic inhibitors present in multiplex DNA-STR kit amplification reactions. Purified amplicons are eluted in formamide + size standards from the **Amplicon Rx** column and are immediately ready for capillary electrophoresis.

Any and all partial DNA profiles can benefit from **Amplicon Rx**: the method has been extensively tested with a variety of commercial multiplex kits (both somatic and sex chromosome kits) and does not alter amplicon peak ratios seen on either simple or complex mixtures. Final RFU boost is dependent on the original PCR amplification reaction volume, with the largest boost seen from full sized PCR reactions.