

THE SCREENING OF BUCCAL COLLECTOR SAMPLES WITH NINHYDRIN SOLUTION RESULTS IN IMPROVED CELL COLLECTION AND STR SUCCESS RATES

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Based on the use of ninhydrin solution, we present a method to rapidly screen and locate the highest concentration of buccal cells on the Bode buccal collector. The occasional failure of buccal collector samples to amplify and generate complete STR profiles is a commonly encountered problem for forensic DNA databanking laboratories. One reason for buccal collector samples to fail is due to incorrect collection from the inner cheek, which results in a non-uniform cell collection and lack of DNA sample.

Another reason for the buccal collector sample to fail is the punching of buccal collectors from areas that do not contain any or very few buccal cells because areas of high concentration of cells cannot be seen. Both of these failures would lead to the need to repeat the extraction and amplification process. Currently there are no methods in the field that allow for a quick screening to determine where the highest concentrations of cells are located on a Bode buccal collector, other filter paper or cotton swab. Ninhydrin sprays are commonly utilized in the development of latent fingerprints by detecting the amino acids left on paper substrates. It was theorized that the areas of the swiped Bode buccal collectors containing high concentrations of buccal cells and therefore, amino acids, would exhibit darker staining patterns than other areas of the collector when sprayed with this chemical. Random selections of buccal sample collectors were sprayed with a ninhydrin solution to test for the presence and location of buccal cells on the collectors. A total 1,425 buccal collectors were tested during this study, and with this new method of ninhydrin screening the overall first time amplification success rate was improved from 88% to 96%. Samples sprayed with ninhydrin have shown stain intensity variations throughout the length of the collector. The vast majority of the collectors have shown the darkest purple color on the tip and edges of the collector and it is from these areas that sample punches were taken. The application of ninhydrin solution to buccal samples has not only allowed us to better estimate where to punch on the collector, but has also given us a presumptive method by which we can test failed samples for inconsistent collecting. Six month storage tests have shown no long term deleterious consequences from ninhydrin spraying. Comparison tests of identical swabs have also demonstrated no inhibition due to ninhydrin spraying.

Serial dilution tests of saliva have shown positive correlations between color intensities and the amount of DNA present on the collector. The darker a collector region stains, the greater the chance there will be substantial amounts of buccal cells/DNA in that area. These results suggest that the spraying of buccal samples with a ninhydrin solution is an effective, efficient, and inexpensive method for the screening and future processing of problem buccal collector samples.