EVALUATION OF THE ANTIMICROBIAL ACTIVITY OF COPAN 4N6FLOQSWABS™ USED FOR CRIME SCENE EVIDENCE COLLECTION

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Introduction and aims: Cotton swabs are often used to collect DNA evidence at crime scenes and in forensic laboratories. While highly absorbent, the dense inner core can trap cellular materials. An alternative type of swab, called 4N6FLOQSwabs™ (4N6FS) (Copan Italia, Brescia, Italy), is made of parallel short nylon strands that are flocked onto a plastic stick lacking an inner core that can trap cellular materials. The 4N6FS swabs are packaged in sterile sample tubes that are also used for storage after sample collection. The swab is also treated with an antimicrobial agent that works to neutralize microbial contaminants that may be collected with the sample. With traditional cotton swabs, contamination by microbes makes it necessary to dry the cotton swab before sample storage in order to avoid nucleic acid degradation by microbial nucleases. However, with the antimicrobial treatment, the 4N6FS swab can be stored in its airtight plastic sample tube immediately after collection without the need to dry the swab, physically protecting the sample while preserving the integrity of the nucleic acids. Thus, the antimicrobial activity of the 4N6FS swabs must be confirmed.

Materials and methods: In this study, known volumes of buccal epithelial cell suspensions were spotted on plastic substrates in multiple replicas simulating forensic evidence. Samples were then collected with cotton and flocked swabs in parallel. To test the antimicrobial activity of the swabs, swabs were wetted with a concentrated bacterial suspension grown from bacterial colonies collected from different surfaces (door handles, fingers, etc). The samples were stored for 1 week and 2 week intervals at either room temperature or 37˚C. The samples were also varied by drying the sample swab and not drying the sample swab before storage. Extraction was performed with the PrepFiler® Forensic DNA Extraction Kit (Life Technologies) with the use of a Nucleic Acid Optimizer (NAO) (Copan Italia, Brescia, Italy), a semi-permeable basket, which retains fluid until placed in a centrifuge. Extraction yield was determined with Quantifiler® Human DNA Quantification Kit (Life Technologies) on an ABI PRISM® 7000 Sequence Detection System.

Results and discussion: The nuclease activity of the bacterial suspension was confirmed. For cotton samples that were not dried, quantifiable amounts of DNA were not recovered after an incubation of less than a week. However, for 4N6FS swabs that were not dried, DNA was recovered after 2 weeks that could be used for further downstream DNA applications.