B117 How Sharing ChapStick® Influences DNA Profiles Obtained From the Rim of Ceramic Mugs

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Learning Overview: The objective of this presentation is to demonstrate the potential for simultaneous direct and indirect transfer from the lips to the rim of ceramic drinking vessels after the application of shared ChapStick®.

Impact on the Forensic Science Community: This presentation will impact the forensic science community by adding to a growing body of research that influences the understanding and interpretation of transfer DNA evidence in medicolegal investigations.

DNA introduced to a crime scene through indirect transfer has become an area of concern in the forensic science community as increasingly sensitive technology continues to improve the detection of DNA unrelated to the criminal event, thus resulting in mixed profiles. A wealth of research on transfer DNA over the past decade has sought to better understand how the DNA within a trace sample was deposited on the surface where it was collected. It is accepted by the scientific community that DNA can be deposited by direct and indirect means on surfaces. The complexity of these transfer events can result in simultaneous direct and indirect transfer. The person contacting the object may transfer their DNA through direct contact as well as act as a vector for the indirect transfer of DNA not their own.

The rims of beverage cans, bottles, and glasses are commonly swabbed for DNA profiles related to missing persons cases or criminal investigations. While it is discouraged to share cosmetics for sanitary and health-related purposes, it is still common practice for lip balms to be used by multiple individuals. This study investigates the DNA profiles obtained from ceramic coffee mugs when lips covered in shared ChapStick® contact the rim of the drinking vessel. During the study, one participant (called the primary user) opened a new tube of ChapStick® in the morning, used it three times throughout the day, then shared the tube with a second participant (called the secondary user). The primary user then reapplied the ChapStick®. Five minutes later, both participants "drank" five times from an empty ceramic coffee mug, the rim of which was subsequently swabbed for DNA profiling to test the following null hypotheses: (1) a mixed DNA profile will not be detected in samples obtained from the mug rim of the primary ChapStick® user, and (2) a mixed DNA profile will not be detected in samples obtained from the mug rim of the secondary ChapStick® user. The DNA was purified from the swabs using the QIAGEN® QIAamp® DNA Mini Kit, quantified using Life Technologies™ Quantifiler® Trio, and amplified using Life Technologies™ GlobalFiler® Amplification Kit.

DNA profiles were generated from all of the samples. One sample produced a partial DNA profile consistent with the drinker. For 18.75% of the samples, mixed profiles were detected that were consistent with both participants. Two of these samples originated from swabs of the secondary user's mug and one from the primary user's mug. Therefore, both null hypotheses can be rejected. In all cases, the major profile was consistent with the drinker. There were no patterns detected regarding length of use of the ChapStick® (primary user versus secondary user) and indirect DNA transfer.

However, the results of this scientific study do demonstrate that the simultaneous direct and indirect transfer of DNA is possible from the lips of an individual who is wearing shared lip balm. Given that lip balm is a personal item that may be shared between individuals, it is important to show that a mixed DNA profile could be obtained after shared use.

DNA Transfer, DNA Evidence, DNA Mixtures

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