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As DNA technology has become more sensitive over the years, there has been an increase in the number of samples that laboratories are receiving with requests for DNA analysis on “touch” DNA samples. “Touch” DNA samples refer to samples where biological fluid cannot be detected, however there may be skin cells left behind due to contact with an item. In cases where the scientist is attempting to collect “touch” DNA for analysis, it is often difficult to collect a sufficient amount of DNA to generate a profile suitable for comparison. In the past, the accepted collection method has been to vigorously swab a sample with a cotton swab and forward the swab for DNA analysis. Last year, the M-Vac® collection system was validated at DNA Labs International (DLI) in an attempt to improve results from “touch” DNA samples.



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The M-Vac® collection system utilizes the same principles as a wet vacuum. First, a DNA-free buffer is sprayed onto the surface of the sample using the M-Vac®’s sampling head. Then, a vacuum pressure is applied over the sprayed area of the sample, so that the buffer can be re-collected. The re-collected buffer now contains suspended particles including the DNA contained on the sample. The buffer is then poured through a sterile filter where the biological material binds to the filter and becomes concentrated. The filter can then be sent forward to the extraction process in the laboratory.

Over the past year, DLI has utilized the M-Vac® system on a wide variety of samples including items such as clothing, ropes, and even a car. One of the most common problems that forensic scientists encounter when screening clothing items for DNA is that there is often a great amount of DNA from the wearer, but very little from individuals that came into contact with the wearer. This is a situation where the M-Vac® collection system can be very helpful.

Recently, the M-Vac® collection system was instrumental in solving a homicide. The victim was murdered and the suspect emptied the victim's pant pockets. The pants pockets were swabbed and the swabs were submitted for DNA testing. The DNA profile obtained from the sample after swabbing was performed contained a mixture that could not be interpreted due to its complexity. The pants were then submitted to DLI for testing in order to see if the suspect's DNA could be found on the pants pocket. The interior pocket of the pants was sampled using the M-Vac® and the filter was extracted. The DNA profile obtained from the pocket was a mixture of two individuals consisting of a major and a minor DNA Profile. The major DNA profile was consistent with the victim and the minor DNA profile was consistent with the suspect. The chance that an individual chosen at random from the general population would have a profile consistent with the minor profile was more than one in a trillion individuals.

In another case where the M-Vac® collection system was useful for collecting DNA from an article of clothing, the victim was attacked and died of blunt force trauma over a decade ago. Due to the brutality of the attack, there was blood present on a great portion of the victim's clothes. Since it appeared that a struggle had taken place between the victim and the attacker, the M-Vac® was used to collect a sample from the unstained portion of the victim's pant legs. A mixed major DNA profile was obtained from the pant legs as a result. Assuming that there are two contributors to the mixed major DNA profile and that one of them was the victim, a foreign DNA profile was deduced that could be compared to any suspects in the case.

Finally, although DLI has had a great deal of success using the M-Vac® for the collection of DNA on clothing, it has also proven to be successful for other types of samples as well. It was recently used in a burglary case where an employee entered his store in the morning and found two males attempting to rob the store. After the suspects burglarized the store and had left, the employee found a rope hanging from the ceiling of the store. The crime scene unit swabbed the rope for "touch" DNA and sent the samples to a laboratory for testing. No DNA profiles were obtained from these swabs. The entire rope was then sent to DLI for testing using the M-Vac®. The 9ft. length of the rope was sampled and forwarded for DNA analysis. The DNA profile obtained was a mixture with a partial major male profile and a minor DNA profile. The partial major male profile can be used for comparison to the suspects in the case as a result.

Overall, the M-Vac® collection system is a very useful tool while screening evidence, especially in cases where very minor amounts of DNA are present over a large surface area. Using this system, DNA profiles have been generated that were not possible to obtain when previously generally swabbing the evidence.



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Cristina Rentas is a Senior DNA Analyst at [DNA Labs International](http://www.dnabioscience.com), an accredited private DNA forensic testing laboratory in South Florida. As a member of the DLI team, she processes criminal casework for hundreds of law enforcement agencies in twenty-seven states and seven Caribbean nations. In addition to casework, she is in charge of the Direct Amplification validation, which will be used to streamline the processing of database samples.

She received her B.B.E. and M.S. in Biomedical Engineering from the Catholic University of America, as well as her M.F.S. in Forensic Molecular Biology from the George Washington University. Prior to working at DLI, she worked at the Armed Forces DNA Identification Laboratory (AFDIL) in the past accounting section identifying the remains of fallen soldiers from military conflicts such as World War I, World War II, the Korean War, and the Vietnam War.

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