



Government
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Forensic Science SA

Drying Swabs: Nipping Moisture in the Bud

A comparison of two different self drying swabs for sampling of biological stains

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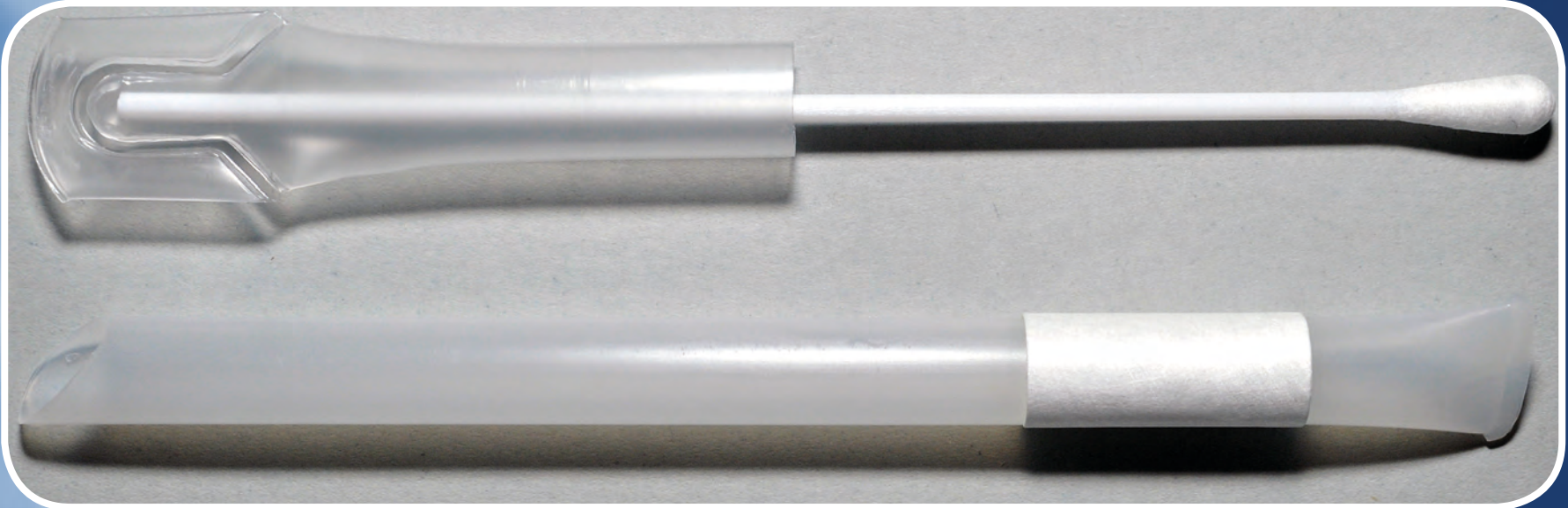
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Introduction

The Filtered Air Breathable FAB-SWAB™ (Abacus Diagnostics®) and the Forensic Swab XL (Sarstedt) are two swabs that have holders with membranes that enable air flow to dry the swab. This allows the swab to be sealed whilst still wet, which is a potential advantage at crime scenes where no drying facilities are available. The self drying feature eliminates the need for a separate drying process that increases the risk of DNA contaminations and the faster a swab is dried, the less potential there is for DNA degradation to occur. The drying capability of these two swabs was assessed and the DNA recovery was compared to a non self drying Copan cotton swab.

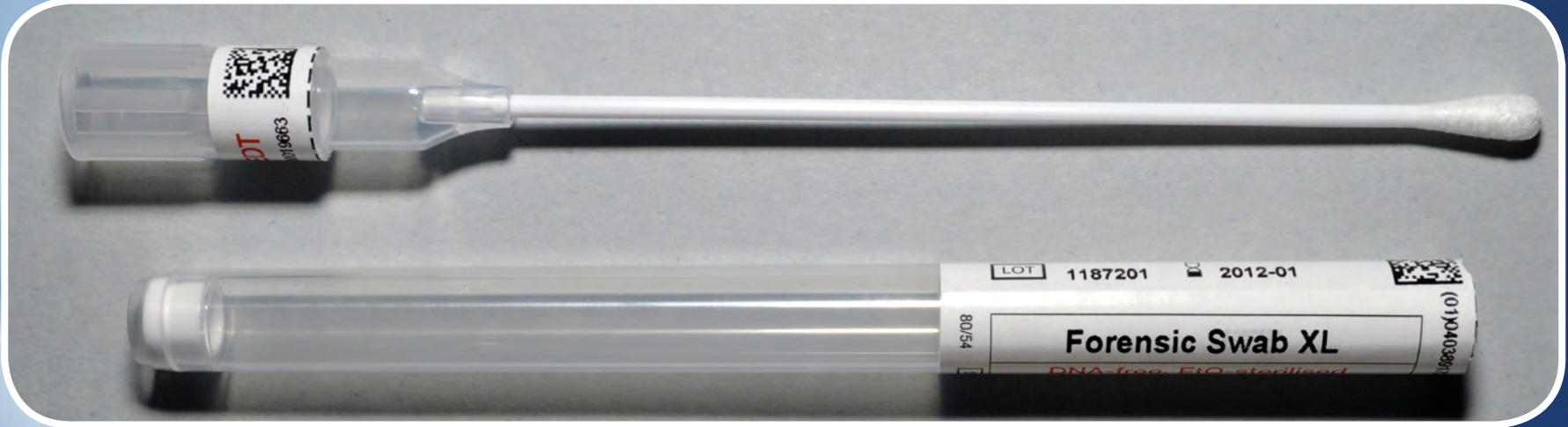
The FAB-SWAB™

- The plastic holder has several holes covered with a paper membrane surrounding the swab head
- The swab head measures 17mm x 5mm and consists of firmly wound cotton
- Cost : \$1.40



The Forensic Swab XL

- The Forensic Swab XL has a Gortex ventilation membrane located in the base of the protective holder
- The swab head measures 14mm x 5mm and consists of firmly wound viscose
- Cost: ~\$2.00



The Copan Swab

- The swab is supplied in a sealed, sterile plastic holder with a paper label
- The swab head measures 13mm x 5mm and consists of tightly wound cotton
- Cost: \$0.38 each



Drying Time Assessment

Swabs stored at room temperature (22°C)

The dry weight of ten self drying swabs of each type was recorded, then each swab was wetted with 170µl of water, sealed, stored at room temperature and periodically weighed until they had returned to their dry weights.

Swabs stored in evidence envelopes at room temperature (22°C)

To simulate crime scene collection and storage, the above was repeated, but with ten self drying swabs of each type placed in separate paper evidence envelopes, stored at room temperature and periodically weighed until they had returned to their dry weights.

Swabs stored in evidence envelopes at 4°C

To investigate the effect of refrigeration, a second set of ten swabs of each type was placed in separate paper evidence envelopes, stored at 4°C and periodically weighed until they had returned to their dry weights.

DNA Recovery

5µl of blood, 10µl of semen and 10µl of saliva were deposited onto a glass slide, allowed to dry overnight and then sampled using each swab type. Twenty replicates of each swab/body fluid combination were tested.

All swabs were dried and then extracted using the Perkin Elmer Multiprobe II 8-tip Liquid Handling Platform (LHP) and a modified DNA-IQ System from Promega. Extracts were quantitated using the Quantifiler™ Human DNA Quantification Kit in conjunction with the ABI PRISM® 7500 Sequence Detection System.

Statistical analysis of the quant results for each swab/body fluid combination was performed and the average amount of DNA recovered for each combination compared.

Results: Drying Times

	FAB-SWAB™	Forensic Swab XL
Swab at Room Temperature (22°C)	23hrs, 42mins	29hrs, 36mins
Swab in envelope (at 22°C)	26hrs, 20mins	33hrs, 10mins
Swab in envelope (at 4°C)	After one month, the swabs had not dried	6.2days

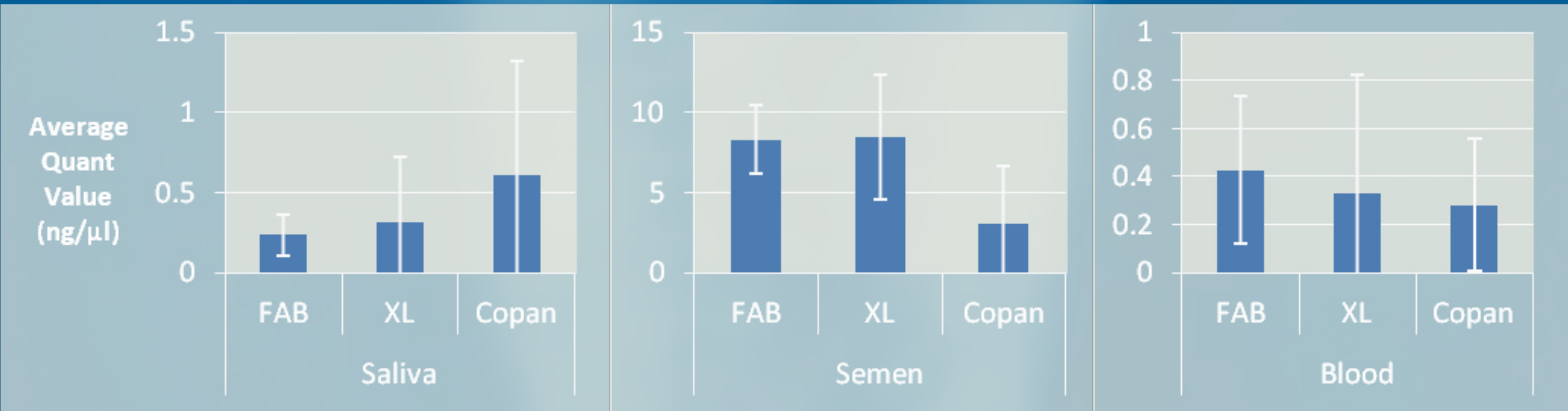
Results: DNA Recovery

There was no statistical difference between the Copan swab, FAB-SWAB™ and Forensic Swab XL for recovery of DNA from blood and saliva.

There was increased DNA yield from semen for both the FAB-SWAB™ and Forensic Swab XL, when compared to the Copan swab. There was no statistical difference between the FAB-SWAB™ and the Forensic Swab XL for recovery of DNA from semen.

The Copan swab yielded the highest average amount of DNA from saliva, however showed the greatest variation in the amount of DNA recovered over the twenty replicates.

DNA recovery from the swabs from different body fluids Quant values (ng/ml)



Conclusions

1. Based on DNA recovery, both self drying swabs are suitable for sampling biological stains located at crime scenes, but due to the shorter drying time and lower cost, the FAB-SWAB™ may be the preferred sampling device.
2. The Forensic Swab XL is the preferred sampling device for use in Sexual Assault Investigation Kits due to its ability to dry while refrigerated.