Evaluation of a non-hazardous urine DNA preservative suitable for at-home collection

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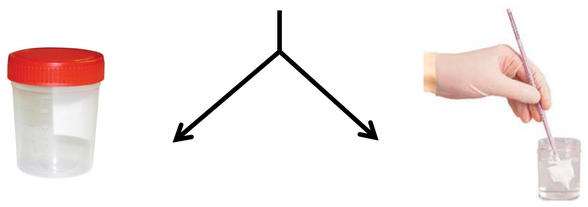
OBJECTIVE

Hazardous preservatives for liquid based cytology samples have been used to preserve Human Papillomavirus (HPV) DNA in urine but are not suitable for self-collection at-home. In this study, we **compared the performance** of a non-hazardous **in-house urine conservation medium (UCM)** with a **methanol based PreservCyt® Solution** (Hologic) in first-void urine samples from women attending cervical cancer screening in Colombia.

METHODS

Paired first-void urine and cervical samples were collected at two health centers in Colombia, including **532 women** , 18 to 25 years old [1].



First-void urine samples (n=532)

Cervical samples (n=532)

2 parts urine
1 part buffer

UCM Buffer (n=532)

PreservCyt® Solution (n=188)*

**117 HPV16 and/or HPV18 DNA positive cervical and/or UCM Buffer urine samples, plus 71 randomly selected HPV16/18 DNA negatives (n=188)*

Amicon® Ultra 4ml (Merck Millipore) centrifugation of 532 UCM Buffer and 188 PreservCyt® Solution (Hologic) collected urine samples [2]

NucliSENS® easyMag® (bioMérieux) DNA extraction [2]

Ultrasensitive Luminex®-based Assay for HPV Genotyping (TS-PCR) [3]

RESULTS

- A **good agreement in HPV16/18 DNA detection** was observed between UCM Buffer and PreservCyt® Solution collected urine samples (Kappa-value=0.721; $CI_{95\%}$=0.539-0.903) from women with an HPV16 and/or 18 DNA positive cervical sample, i.e. 88 out of 532 women (**Figure 1**).

		UCM Buffer		Total
		negative	positive	
PreservCyt® Solution	negative	14	5	19
	positive	3	66	69
Total		17	71	88

Figure 1. HPV16 and/or HPV18 DNA prevalence in UCM Buffer and PreservCyt® Solution collected urine samples in a set of 88 cervical HPV16 and/or 18 DNA positive samples.

- From the 17 cervical positive/UCM Buffer urine negative samples, 3 tested positive in PreservCyt® Solution urine. Out of 29 UCM Buffer urine positive/cervical negative (not displayed in **Figure 1**), 21 tested positive in PreservCyt® Solution urine. None of the 71 randomly selected PreservCyt® Solution urine samples from cervical and UCM Buffer HPV16/18 DNA negative women tested positive for HPV16/18 DNA.

- There is a **positive correlation in HPV16 and HPV18 DNA MFI values between both preservatives** (**Figure 2**) with a correlation coefficient of respectively 0.751 and 0.883 (Spearman's rho correlation, IBM SPSS Statistics 22 Software).

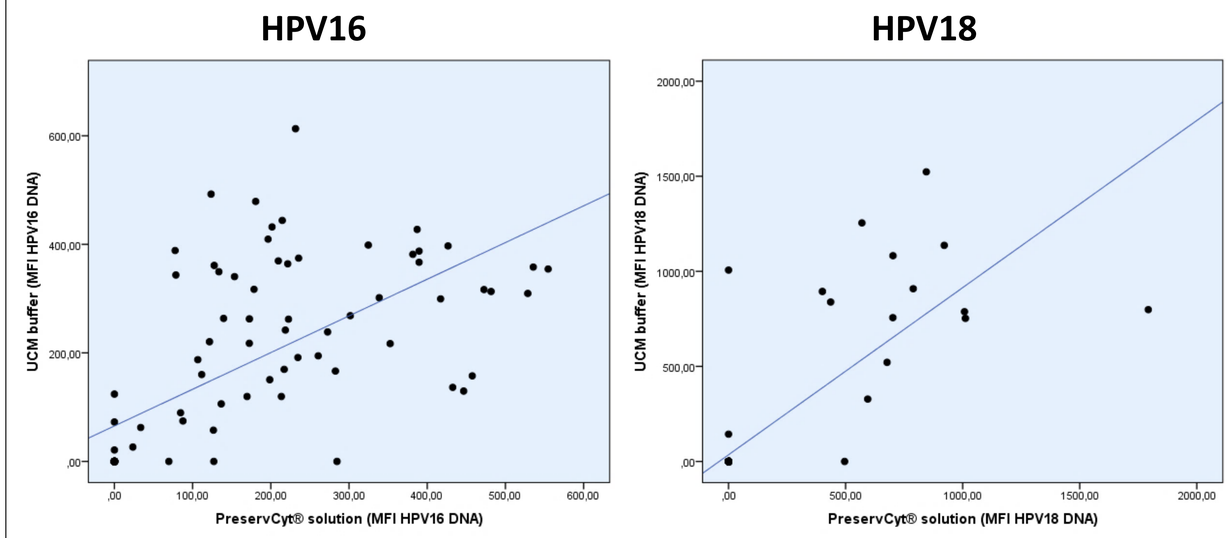


Figure 2. HPV16 (left) and HPV18 (right) DNA MFI (Median Fluorescence Intensity) values in UCM Buffer versus PreservCyt® Solution collected urine samples from HPV16 and/or 18 DNA cervical positive women.

DISCUSSION

The non-hazardous in-house developed UCM Buffer had similar performance to the methanol based PreservCyt® Solution in detecting HPV16/18 DNA in first-void urine samples, using the Luminex-based HPV Genotyping Assay. Despite that this assay is ultrasensitive and highly specific, its semi-quantitative character limits interpretation of the results. Also, since the primary objective of this study was not to compare the performances of two HPV DNA preservatives using urine, but to compare the accuracy of cervical and urine samples in detecting HPV DNA infections, only a selection of the PreservCyt® Solution urine samples were analyzed. Hereto, no sensitivity, specificity, positive, and negative predictive values could be calculated and should be determined in future studies.

CONCLUSION

Performances of both preservatives were concordant for detecting HPV16/18 DNA in first-void urine samples from young women attending cervical cancer screening at two health centers in Colombia. **The availability of a non-hazardous preservative offers opportunities for safe urine self-sampling at-home**. Focus of future work will include comparison of different HPV DNA preservatives with urine, irrespective of cervical HPV DNA outcome.

References

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