POSTER 20

9th EUROPEAN MEETING ON MOLECULAR DIAGNOSTICS

October 14 – 16, 2015

Frimley Health NHS Foundation Trust

# Evaluation of the Virocult® viral transport swab for the detection of Herpes Simplex Virus using the BD Max™ and Smartcycler®

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## Abstract

Herpesviridiae, the herpes family of viruses that infect humans, consists of 8 separate species, all have double stranded linear DNA genomes enclosed in an icosahedral capsid and lipid envelope.

Herpes simplex virus-1, (HSV-) and Herpes simplex virus-2, (HSV-2) cause common, self-resolving infections of the skin or mucosa. Classic HSV-1 and HSV-2 clinical findings are described as painful grouped vesicles on an erythematous base, usually with ulcerated and crusted lesions. Both viruses may subsequently reactivate to cause recurrent disease in the face of existing immunity. Generally, HSV-1 has been associated with oro-labial disease, and HSV-2 with genital disease, however, it is possible for HSV-2 to cause oro-labial herpes and HSV-1 to cause genital herpes.

The aim of this study was to assess the compatibility of the Virocult® viral liquid transport swab for the detection of HSV-1 and HSV-2 on both the BD Max™ and Smartcycler® automated platforms. An updated method of using 200ul of sample on the BD Max was used for this study instead of the recommended 400ul volume.

A total of 31 clinical samples and one negative control (molecular biology grade water) were included in this study. The clinical samples were collected for the purpose of detection of the presence of HSV-1 and HSV-2 and comprised swabs from various sites, including labial swabs, genital ulcer swabs, urethral swabs, etc.).

Of the 31 samples tested on the BD Max™ the specificity and sensitivity was 100% when compared with the SmartCycler®.

## Introduction

Herpesviridiae, the herpes family of viruses which infect humans, consists of 8 separate species, all have double stranded linear DNA genomes enclosed in an icosahedral capsid and lipid envelope.

Herpes simplex virus-1, (HSV-) and Herpes simplex virus-2, (HSV-2) cause common, self-resolving infections of the skin or mucosa. Classic HSV-1 and HSV-2 clinical findings are described as painful grouped vesicles on an erythematous base, usually with ulcerated and crusted lesions. Both viruses may subsequently reactivate to cause recurrent disease in the face of existing immunity. Although separate species, these viruses cause similar histologic and clinical findings, and speciation relies on laboratory investigation. Generally, HSV-1 has been associated with oro-labial disease, and HSV-2 with genital disease, however, it is possible for HSV-2 to cause oro-labial herpes and HSV-1 to cause genital herpes.

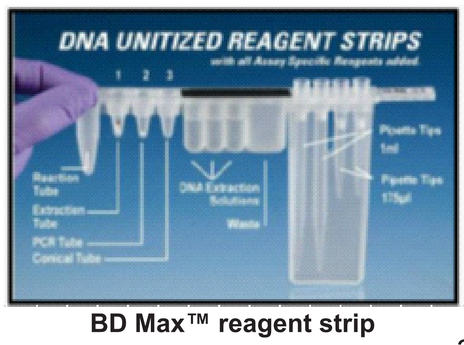
The aim of this study was to assess the compatibility of Sigma-Virocult® viral transport swab (Medical Wire and Equipment) for the detection of HSV-1 and HSV-2 on both the BD Max™ and Smartcycler® automated platforms. An updated method of using 200ul of sample on the BD Max was used for this study instead of the recommended 400ul volume. This smaller volume allowed us to perform follow up tests should they be required or to re-run the sample if needed.


**Sigma-Virocult®**

**Cepheid SmartCycler® System**

## Method

A total of 31 clinical samples and one negative control (molecular biology grade water) were included in this study. The clinical samples were collected for the purpose of detection of the presence of HSV-1 and HSV-2 and comprised Sigma-Virocult® swabs from various sites, including labial swabs, genital ulcer swabs, urethral swabs, etc.).




**BD Max™ reagent strip**

All clinical samples were analysed using the Cepheid SmartHSV® assay on the Cepheid SmartCycler® (Fig. 1), which is the diagnostic assay currently used by the department for HSV detection from swabs in VTM (virus transport medium). In brief, once the swab sample in Sigma-Virocult® medium was received it was vortexed. 200µl of the Sigma-Virocult® medium was transferred to a labelled Eppendorf tube and centrifuged at 6,000 g for 10 minutes. 20µl of a prepared MasterMix reagent was dispensed into each appropriately labelled SmartCycler® tube. In another laboratory, 5ul of VTM supernatant was added to each correspondingly labelled SmartCycler® tube.

***Acknowledgement***

*This presentation was supported by Medical Wire & Equipment, UK*

## Results

| Sample | Volume (ul) | SmartHSV ct | | BD Max HSV ct | |
|---|---|---|---|---|---|
| | | HSV-1 | HSV-2 | HSV-1 | HSV-2 |
| 1 | 200 | 0.0. | 24.3 | Neg | 21.0 |
| 2 | 200 | 0.0. | 24.3 | Neg | 21.3 |
| 3 | 200 | 0.0. | 25.3 | Neg | 22.8 |
| 4 | 200 | 24.1. | 0.0 | 16.1. | Neg |
| 5 | 200 | 0.0. | 28.5 | Neg | 26.1 |
| 6 | 200 | 0.0. | 29.8 | Neg | 26.8 |
| 7 | 200 | 0.0. | 30.1 | Neg | 25.7 |
| 8 | 200 | 0.0. | 30.8 | Neg | 25.7 |
| 9 | 200 | 0.0. | 32.6 | Neg | 23.9 |
| 10 | 200 | 0.0. | 32.6 | Neg | 24.3 |
| 11 | 200 | 27.4. | 0.0 | 19.5. | Neg |
| 12 | 200 | 27.7. | 0.0 | 14.5. | Neg |
| 13 | 200 | 28.4. | 0.0 | 14.3. | Neg |
| 14 | 200 | 35.8. | 0.0 | 21.7. | Neg |
| 15 | 200 | 35.8. | 0.0 | 22.7. | Neg |
| 16 | 200 | 36.7. | 0.0 | 25.7. | Neg |
| 17 | 200 | 29.4. | 0.0 | 21.1. | Neg |
| 18 | 200 | 0.0. | 29.3 | Neg | 22.2 |
| 19 | 200 | 45.4. | 0.0 | 25.4. | Neg |
| 20 | 200 | 0.0. | 32.9 | Neg | 27.0 |
| 21 | 200 | 0.0 | 28.9 | Neg | 25.9 |
| 22 | 200 | 27.2. | 0.0 | 23.7. | Neg |
| 23 | 200 | 0.0. | 24.9 | Neg | 25.5 |
| 24 | 200 | 29.6. | 0.0 | 21.2. | Neg |
| 25 | 200 | 0.0. | 36.4 | Neg | 34.4 |
| 26 | 200 | 0.0. | 28.0 | Neg | 28.9 |
| 27 | 200 | 0.0. | 32.6 | Neg | 32.4 |
| 28 | 200 | 24.9. | 0.0 | 19.3. | Neg |
| 29 | 200 | 0.0. | 32.9 | Neg | 28.1 |
| 30 | 200 | 0.0. | 23.1 | Neg | 22.3 |
| 31 | 200 | 32.3. | 0.0 | 28.2. | Neg |

Of the 31 samples tested on the BD Max™ the specificity and sensitivity was 100% when compared with the SmartCycler®. (Fig. 3)

## Conclusion

The results of this evaluation of the Sigma-Virocult® viral liquid transport swab for the detection of Herpes Simplex Virus using the BD Max™ and SmartCycler® demonstrated 100% sensitivity and specificity between both methods. Within our trust we now exclusively use the Sigma-Virocult® viral transport swabs with the BD Max™ system. These swabs have proven to be effective and an easy to use transport system.

Whilst the BD Max™ assay had been validated for use with a 400µl input volume, we found that a 200µl input volume gave good results using the Sigma-Virocult® viral swab with little change in the Ct value, allowing any remaining sample to be used for further testing if required.