Generic Study Protocol – HPV detection using the Abbott m2000sp System

INTRODUCTION

This generic study protocol offers guidance on the collection, stabilization and use of first-void urine samples for Human Papilloma Virus (HPV) detection using (1) Colli-Pee® containing UCM, FV-5000 series or Colli-Pee® Small Volumes containing UCM for sample collection, and (2) the Abbott RealTime High Risk HPV test on the Abbott m2000sp System.

CLINICAL BACKGROUND

HPV is the most common sexually transmitted infection (STI) and a major cause of cervical cancer. Estimates are that the lifetime probability of ever encountering HPV is as high as 80-90%[1]; moreover, HPV was responsible for more than 604 000 cervical cancer cases and 341 000 cervical cancer deaths in 2020[2]. Routine screening is critical for the prevention and control of STIs, particularly since many infections do not present symptoms. However, current screening methods present limitations. They can be invasive, time intensive, and require a clinician to perform. Also, many individuals often feel embarrassed or uncomfortable discussing their sexual activity and are reluctant to visit a clinic for testing[3].

As an alternative to traditional screening methods, HPV testing in first-void urine has been proposed to reach women that are not participating in cervical cancer screening programs. First-void urine has been shown to contain higher concentrations of HPV DNA, and therefore collection of this fraction is important to increase sample sensitivity[4]. In addition, several studies reported that first-void urine sampling, using a first-void urine collection device was preferred over a physician-collected cervical sample[5]. Thus, the use of first-void urine can increase the participation rates in HPV-based cervical cancer screening programs[6].

First-void urine can be collected in a user-friendly, volumetric and standardized way, using Colli-Pee® containing UCM to also allow for instant mixing with the preservative and thus stabilization of the urinary analytes. Moreover, Colli-Pee® Small Volumes containing UCM has been designed to be fully compatible with postal service transport, and as such this collection device is ideally suited for home-based first-void urine collection. Furthermore, a recent publication proved that results from Colli-Pee® collecting 20mL and 10 mL were fully comparable[7].

Next to screening, urine-based HPV testing can also be used for monitoring the impact of vaccination[8,9,10]. HPV testing also offers possibilities for the follow-up of cervical cancer treatment[11,12]. Currently, different studies are ongoing to validate the use of Colli-Pee collected first-void urine for the follow-up of cervical cancer [13,14].

In the remainder of this document, a generic study protocol is described that outlines the steps to be followed for HPV detection and analysis, using Colli-Pee® containing UCM, FV-5000 series or Colli-Pee® Small Volumes containing UCM for sample collection, the Abbott RealTime High Risk HPV test on the Abbott m2000sp System, for sample analysis.

MATERIALS AND METHODS

Sample collection

Samples can be collected with either one of the following Colli-Pee® devices

- **Colli-Pee® containing UCM, FV-5000 series.** The volume of the samples collected using Colli-Pee® containing UCM, FV-5000 series, lie in the range of 18-22 mL (20 mL nominal volume), and include a prefilled volume of 7 mL UCM preservative.

- **Colli-Pee® Small Volumes containing UCM**. The volume of the samples collected using Colli-Pee® Small Volumes containing UCM lie in the range of 8-12 mL (10 mL nominal volume), and include a prefilled volume of 3.4 mL UCM preservative.

Sample collection using either one the above listed Colli-Pee® variants should be performed as outlined in the Instructions for Use (IFU), which can be found on the Novosanis website.

As stated, the Colli-Pee® Small Volumes is fully compatible with postal services and is therefore ideally suited for use in home-based sample collection. To this end, Novosanis developed a postal kit solution that is fully customizable. For more information on the Colli-Pee® postal kit solution, please visit novosanis.com/home-collection, or read our white paper on self-sampling at home, for the detection of sexually transmitted infections (Mehta et al., 2019).

Sample storage and transportation

Due to the presence of the UCM preservative, collected samples can be stored at room temperature (21°C – 25°C) for a period of maximum of 7 days, before downstream processing. Prolonged storage of the urine samples is possible at 4°C for up to 14 days, and at -20°C for up to 90 days. Prolonged sample storage at -80°C is also possible for a period of up to 12 months; however, in this scenario, urine samples should be transferred and/or aliquoted into dedicated cryovials prior to storage. For more information, please read our white paper on sample storage and transportation on the Novosanis website (Meers et al., 2021).

Sample preparation

Novosanis is currently developing a Colli-Pee® variant that is directly compatible with the proprietary Abbott 10 mL collection tube. This will allow the collected samples to be placed directly into the rack of the Abbott m2000sp System. In the meantime, urine samples collected with Colli-Pee® containing UCM, FV-5000 series or with Colli-Pee® Small Volumes containing UCM do not require any special sample preparation. The required input volume (see Table 1, below) needs to be transferred into the correct tube to allow for loading onto the Abbott m2000sp System.

Sample analysis

The Abbott RealTime High Risk HPV is an IVD registered, qualitative in vitro test for the detection of DNA from 14 high risk human papillomavirus (HPV) genotypes 16, 18, 31, 33, 35, 39, 45, 51, 52, 56, 58, 59, 66, and 68 in clinical specimens. The assay specifically identifies HPV genotypes 16 and 18 while concurrently detecting the other high risk genotypes at clinically relevant infection levels.

A minimum of 700 µL of sample needs to be present in the collection tube, of which 400 µL is used as sample input. Extracted sample eluates are mixed in a fully automated fashion with the amplification mastermix in a 96 well optical reaction plate, according to the procedure of the test.

Table 1. List of analytical method and associated parameters

Analytical method	Volume input	Analytical endpoints
Abbott RealTime High Risk HPV	400 µL (min. 700 µL of sample)	Detection and cycle numbers of HPV16, HPV18 and other HR HPV (31, 33, 35, 39, 45, 51, 52, 56, 58, 59, 66, and 68)

The Abbott Realtime High Risk HPV test package insert can be retrieved from the Abbott website.

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