Published OnlineFirst July 14, 2016; DOI: 10.1158/1940-6207.CAPR-16-0038

Research Article

Cancer Prevention Research

Comparison between Urine and Cervical Samples for HPV DNA Detection and Typing in Young Women in Colombia

Alba Lucía Cómbita[1,2], Tarik Gheit[3], Paula González[4], Devi Puerto[5], Raúl Hernando Murillo[5,6], Luisa Montoya[7], Alex Vorsters[8], Severien Van Keer[8], Pierre Van Damme[8], Massimo Tommasino[3], Gustavo Hernández-Suárez[5], Laura Sánchez[1], Rolando Herrero[6], and Carolina Wiesner[5]

Abstract

Urine sampling for HPV DNA detection has been proposed as an effective method for monitoring the impact of HPV vaccination programs; however, conflicting results have been reported. The goal of this study was to evaluate the performance of optimized urine HPV DNA testing in women aged 19 to 25 years. Optimization process included the use of first void urine, immediate mixing of urine with DNA preservative, and the concentration of all HPV DNA, including cell-free DNA fragments. Urine and cervical samples were collected from 535 young women attending cervical screening at health centers from two Colombian cities. HPV DNA detection and genotyping was performed using an HPV type-specific multiplex genotyping assay, which combines multiplex polymerase chain reaction with bead-based Luminex technology. Concordance between HPV DNA detection in urine and cervical samples was determined using kappa statistics and McNemar tests. The accuracy of HPV DNA testing in urine samples was evaluated measuring sensitivity and specificity using as reference the results obtained from cervical samples. Statistical analysis was performed using STATA11.2 software. The findings revealed an overall HPV prevalence of 60.00% in cervical samples and 64.72% in urine samples, HPV-16 being the most frequent HPV type detected in both specimens. Moreover, our results indicate that detection of HPV DNA in first void urine provides similar results to those obtained with cervical samples and can be used to monitor HPV vaccination trials and programs as evidenced by the substantial concordance found for the detection of the four vaccine types. *Cancer Prev Res; 9(9); 766–71. ©2016 AACR.*

Introduction

Three prophylactic HPV vaccines based on L1 virus like particles (VLP) have been commercially developed: Cervarix, a bivalent vaccine by GlaxoSmithKline against HPV-16 and -18 (1); Gardasil, a quadrivalent vaccine against HPV-6, -11, -16, -18 (2); and Gardasil9, a nonavalent vaccine against HPV-6, -11, -16, -18, -31, -33,- 45, -52, and 58; these two latter vaccines by Merck (3). A large number of clinical trials have proven that these vaccines are safe, well tolerated, highly immunogenic, and effective in preventing persistent infections by HPV vaccine types as well as cervical intraepithelial lesions associated with them (4–18).

In Colombia, HPV vaccination was introduced in the National Immunization Programme in 2012 as a primary prevention strategy for HPV-16/-18-related preneoplastic and neoplastic cervical lesions. The school-based program was initially launched targeting a single-year age cohort (4th graders), but since 2013 any girl between 14 and 17 years old was included. In this context, the Colombian government is designing a surveillance system, and the screening based on DNA testing for HPV types could offer the opportunity to measure the impact of a vaccination program in an early stage. Nevertheless, an efficient and feasible method for detecting and genotyping HPV with high analytical sensitivity is necessary (19, 20).

The use of a noninvasive and easy self-collection sampling method, like a urine sample to detect HPV DNA, could offer a more accessible and acceptable method to simplify HPV vaccine monitoring (19, 20). This approach could allow sampling of large cohorts to measure the impact of HPV vaccination programs in sentinel municipalities or within cohort studies (20, 21). Several studies focused on cervical cancer screening have reported a good performance to detect any HPV DNA in urine samples with sensitivities ranging from 71 % to 88% and

[1]Grupo de Investigación en Biología del Cáncer, Instituto Nacional de Cancerología (INC), Bogotá, Colombia. [2]Departamento de Microbiología, Facultad de Medicina, Universidad Nacional de Colombia, Bogotá, Colombia. [3]Infections and Cancer Biology Group, International Agency for Research on Cancer, Lyon, France. [4]Proyecto Epidemiológico Guanacaste, Fundación INCIENSA, Guanacaste, Costa Rica. [5]Grupo de Investigación en Salud Pública y Vigilancia Epidemiológica, Instituto Nacional de Cancerología (INC), Bogotá, Colombia. [6]Early Detection and Prevention Section, International Agency for Research on Cancer, Lyon, France. [7]Unidad de Análisis, Subdirección de Investigaciones, Instituto Nacional de Cancerología (INC), Bogotá, Colombia. [8]Centre for the Evaluation of Vaccination, Vaccine and Infectious Disease Institute, University of Antwerp, Antwerpen, Belgium.

Note: Supplementary data for this article are available at Cancer Prevention Research Online (http://cancerprevres.aacrjournals.org/).

Corresponding Author: Alba Lucía Cómbita Rojas, Av. 1 No. 9-85, Bogotá, Colombia. Phone: 571-4320160 ext. 4212; Fax: 571-3341360; E-mail: acombita@cancer.gov.co

doi: 10.1158/1940-6207.CAPR-16-0038