

# Usefulness of Simultaneous Screening for HIV- and Hepatitis C–Specific Antibodies and Hepatitis B Surface Antigen by Capillary-Based Multiplex Immunochromatographic Rapid Test to Strengthen Prevention Strategies and Linkage to Care in Childbearing-Aged Women Living in Resource-Limited Settings

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Childbearing-aged women (n = 266) attending a gynecological clinic in Chad were subjected to multiplex immunochromatographic rapid test for HIV, hepatitis B virus (HBV), and hepatitis C virus (HCV). Ten (3.7%) and 8 (3.0%) were seropositive for HIV and HCV, respectively, and 20 (7.5%) for HBV surface antigen, allowing diagnosis of chronic viral infections in 1 of 7 (14.3%) women.

**Keywords.** Chad; childbearing-aged women; HCV; hepatitis B surface antigen; HIV; multiplex rapid diagnostic test; sub-Saharan Africa.

Infections by HIV, hepatitis B virus (HBV), and hepatitis C virus (HCV) are highly prevalent in Central Africa and share common risk factors and modes of transmission [1, 2]. Chronically infected individuals remain frequently unaware of

their serological status, especially childbearing-aged women. They are at risk for spreading their viral infections and developing AIDS-related illnesses and viral hepatitis-associated liver cirrhosis and cancer. HIV, HBV, and HCV testing is the gateway for access to both prevention and treatment services, and therefore constitutes a critical component of an effective response to these 3 chronic viral infections [1–3].

We herein report our field experience in the use of the multiplex rapid diagnostic test (RDT) for simultaneous detection of HIV-1-, HIV-2-, and HCV-specific antibodies (Ab; IgG and IgM) and HBV surface antigen (HBsAg) in childbearing-aged adult ( $\geq 18$  years) women living in Chad. The multiplex HIV/HCV/HBsAg RDT (HCV/HBSG/HIV Combo Rapid Test Cassette [ITHD-C43], Biotest Biotech Inc., Hangzhou, China) consists of a manually performed, lateral flow, immunochromatographic RDT using 25  $\mu$ L of serum and plasma or 50  $\mu$ L of whole blood (venipuncture and finger stick) that can be visually interpreted in 15 minutes and has demonstrated high sensitivity and specificity (ranging from 99.9% to 100.0%) in the diagnosis of HIV and replicative chronic HBV and HCV infections, as previously reported [4]. The multiplex HIV/HCV/HBsAg RDT has previously been shown to give similar performances with erythrocytes-spiked serum (mimicking capillary blood) and serum [4]. The price of its manufacture is around US\$1 per HIV/HCV/HBsAg RDT.

In July 2017, 266 women (mean age, 37.5 years; range, 25–65 years) attending the clinic "La Renaissance Plus," the main setting for sexual health in N'Djamena, Chad, were prospectively included. Only 5.1% of women were aware of their HIV status, and none had ever been tested for HBV and HCV. For each woman, 1 drop of capillary blood was subjected to the multiplex HIV/HCV/HBsAg RDT. Ten (3.7%), 20 (7.5%), and 8 (3.0%) women were HIV-specific Ab-, HBsAg-, and HCV-specific Ab-positive, respectively. One (0.4%) HIV-infected woman was co-infected with HBV, 1 (0.4%) HIV-negative woman was positive for both HBV and HCV, and no women were co-infected by the 3 viruses. Finally, 38 out of 266 (14.3%) women in the study were infected by HIV, HBV, or HCV. Women infected with HIV were immediately referred to a medical care center for HIV care including biological monitoring and antiretroviral treatment. All positive women by multiplex HIV/HCV/HBsAg RDT showed similar serological profiles by conventional serologies (not shown). None of the 38 women diagnosed positive for at least 1 of the 3 viral infections in our short series was lost to follow-up in the transition to reference health care, demonstrating that 1 potential benefit of multiplex RDT results is the ability to immediately establish continuity of care, even in Chad. In the present series of childbearing-aged women living in Chad, 1 out

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of 7 women attending a sexual health clinic have benefited from the rapid and simultaneous detection of HIV, HBV, and HCV infections by a single drop of capillary blood using multiplex HIV/HCV/HBsAg RDT.

Only 1 woman was aware of her HIV serological status at attendance, while 90% were unaware. Chad is a country of generalized HIV epidemic, with the adult prevalence rate at 3.5% in N'Djamena [1], as observed in our series. Childbearing-aged women are largely underscreened for HIV in Chad, as evidenced by the high rate of mother-to-child transmission of HIV, reaching 32%, the low coverage of the prevention of mother-to-child transmission, at only 7%, and the dramatically high number of children living with HIV, reaching 25 000 [1]. Under these conditions, the use of the multiplex HIV/HCV/HBsAg RDT may allow not only early management and care, but also the prevention of sexual and mother-to-child transmission of HIV.

None of the women in the study were aware of their HBV and HCV serological status at attendance, and none would have been screened for HBV or HCV during their consultation in the absence of the multiplex RTD, even for the prevention of mother-to-child transmission of HBV. Chad is a country with high HBV and HCV prevalence rates in adults [5]. Early screening for HBV and HCV is in keeping with the goal of eliminating viral hepatitis as a major public health threat by 2030, as recommended by the World Health Organization [6].

Taken together, the simultaneous screening of HIV, HBV, and HCV using multiplex HIV/HCV/HBsAg RDT in childbearing-aged women during their medical visits to gynecology services may strengthen the prevention strategies already in place. Indeed, multiplex RDT is likely more advantageous than many monospecific RDTs used independently because it maximizes available resources and simultaneously provides rapid results

for several viral infections with 1 single drop of blood and only 1 test device [7]. In populations at high risk of chronic viral infections such as childbearing-aged women living in sub-Saharan Africa, the simultaneous use of multiplex HIV, HBV, and HCV RDT may improve all at once the “cascade of screening,” prevention strategies, and linkage to care with reduced cost.

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