# MULTI-ANTIGEN PRINT IMMUNOASSAY (MAPIA): A NOVEL IMMUNOSCREENING TOOL FOR HIV ANTIGENS AND CONFIRMATORY ASSAY FOR HIV INFECTION

Konstantin Lyashchenko, Javan Esfandiari, Ganga Kanaujia, David Greenwald, and Rena Greenwald
Chembio Diagnostic Systems, Inc., Medford, New York

## OBJECTIVE

Multi-Antigen Print ImmunoAssay (MAPIA) has been recently designed to identify serodiagnostically important antigens and to characterize antibody responses in infectious diseases. The method is based on immobilization of multiple antigens to nitrocellulose membranes, followed by antibody detection using standard chromogenic immuno-development. We utilize MAPIA routinely for screening, evaluation and comparison of different HIV antigens. It can also be used as confirmatory assay for HIV infection.

## MATERIALS AND METHODS

**Antigens.** Twenty three recombinant HIV proteins, synthetic peptides and polyepitope fusions from different supplier were evaluated.

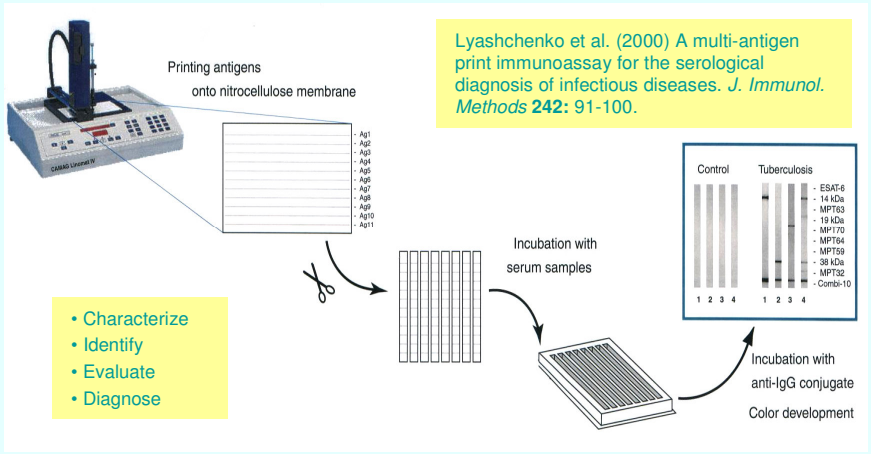
**Sera.** HIV-1 and HIV-2 positive sera, HIV negative sera, and seroconversion panels were used.

**MAPIA.** The key steps of Multi-Antigen Print ImmunoAssay are outlined in Figure 1. Antigens were immobilized on nitrocellulose membrane as narrow bands by using a semi-automatic air-brush printing device (Linomat IV, Camag). Four mm strips were made from the membrane, blocked, incubated with serum samples, and immunodeveloped using standard chromogenic method. A 15x15 cm membrane sheet could accommodate as many as 50 antigens and be used to test 50 serum samples in one experiment. The results were evaluated visually and by semi-quantitative densitometry (Figure 2).

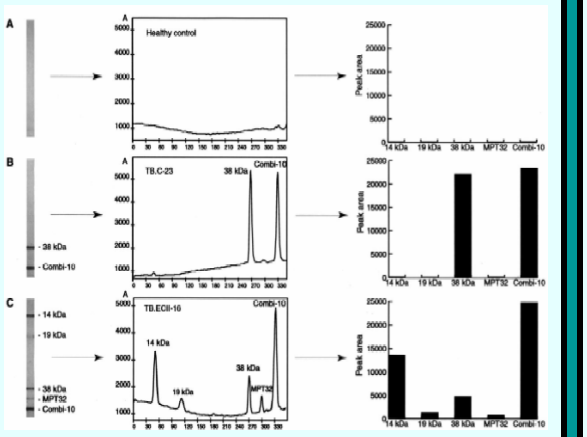
## RESULTS

1. The MAPIA data demonstrated the variability of antigen recognition patterns in the serum samples (Figure 3).
2. Recombinant proteins and polyepitope fusions showed superior performance over the synthetic peptides, in particular with early positive samples of seroconversion panels.
3. Differentiation between infections due to HIV- and HIV-2 was detected (Figure 4).
4. With BBI serum panels, the results suggested that MAPIA employing carefully selected antigens could be also used as a confirmatory assay for HIV infection. In this application, MAPIA may combine HIV-1 and HIV-2 antigens in one confirmatory assay.

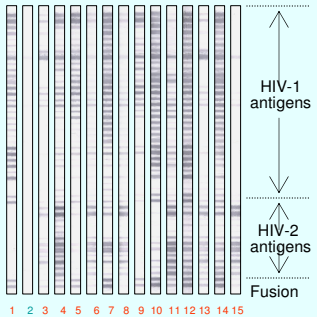
## Figure 1. MAPIA




## Figure 2. Semi-quantitative densitometry

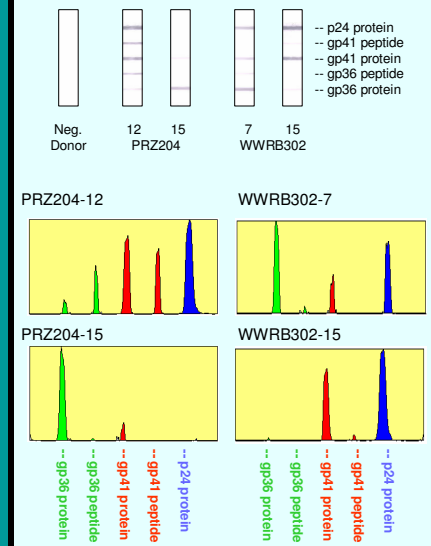



## Figure 2. Evaluation of HIV antigens by MAPIA




PRZ204
(BBI Anti-HIV 1/2 Combo Performance Panel)

## Figure 2. HIV MAPIA Densitometry




## CONCLUSIONS

1. MAPIA offers an efficient and cost-effective method for screening of multiple antigens. The assay is highly reproducible, sensitive and specific.
2. MAPIA can easily evolve into a rapid test lateral-flow format for diagnosis of HIV infection.
3. MAPIA can also be used as a confirmatory assay for HIV infection.

For questions or comments please contact:

Konstantin Lyashchenko, Ph.D.
Chembio Diagnostic Systems, Inc.
3661 Horseblock Road, Medford, NY 11763
Tel: (631)924-1135
Fax: (631)924-6033
E-mail: klyashchenko@chembio.com
Web: www.chembio.com

CHEMBIO DIAGNOSTIC SYSTEMS, INC.