Screening for hepatitis B virus infection in Egyptian blood donors negative for hepatitis B surface antigen

Assem M. El-Sherif · Mohamed A. Abou-Shady ·
Mohsen A. Al-Hiatmy · Ashraf M. Al-Bahrawy ·
Elham A. Motawea

Received: 23 June 2007 / Accepted: 28 June 2007 / Published online: 15 September 2007
© Asian Pacific Association for the Study of the Liver 2007

Regardless of all efforts to guarantee safety of blood, hepatitis B residual risk is the highest among transfusion-transmitted diseases [1]. HBV DNA was detected in 3.3% of blood donors negative for hepatitis B surface antigen (HBsAg) and hepatitis B surface antibody (HBsAb) but positive for anti-HBc [2].

The frequency of HBsAg in Egyptian blood donors is 4.3% [3]. There are no available data about the frequency of either hepatitis B core antibody (HBcAb) or HBsAb in Egyptian blood donors. In order to evaluate the role of HBcAb in blood screening for HBV infection, 150 blood donors (negative for HBsAg, HBsAb, hepatitis C virus antibody, and human immunodeficiency virus) were tested for HBcAb (total). In the anti-HBc-positive samples ($n = 20$), HBV-DNA polymerase chain reaction (PCR) assay tests were performed. HBV-DNA was detected in only 2 (10%) out of the 20 HBcAb-positive samples. Isolated anti-HBc that tested negative for HBV DNA was detected in 18 (12%) of the 150 samples that tested negative for HBsAg.

Isolated anti-HBc was reported in 2% of the 6,035 consecutive Saudi blood donors [4]. In a single Brazilian study, it was 10% [5]. In our institution, however, the prevalence of isolated HBcAb in tested samples was 13.3%. Isolated anti-HBc serologic profile may be associated with occult chronic HBV infection with undetectable HBsAg, remote HBV infection with loss of measurable HBsAb, passive transfer of anti-HBc, nonspecific cross-reacting antibody, or the period when HBsAg has disappeared and anti-HBs has not been detected. The higher prevalence of isolated anti-HBc in our study may be related to the absence of donor selection.

Molecular methods have demonstrated the presence of the virus in patients with HBcAb alone with frequencies of 0.8% and 12.2% in a Brazilian [6] and an Iranian [7] study, respectively. In our study, the overall prevalence of HBV-DNA in healthy blood donors was 10% among isolated anti-HBc-positive individuals. Such wide discrepancy, not completely understood, could result from virological, immunological, methodological, or epidemiological factors. The detection of HBV DNA by PCR in these individuals rules out the possibility of false positive results and remote HBV infection. At the same time, it confirms the presence of occult HBV infection.

Individuals with isolated anti-HBc who tested negative for HBV DNA constituted 12% of our tested populations. These subjects may have remote infection, false positive result, or represent an immunological window period. We have tested subjects for total HBcAb rather than IgM and IgG isotypes. Therefore, the differentiation between acute and chronic HBV infection was difficult.

The exclusion of all anti-HBc positive blood donors leads to unnecessary blood shortage in blood banks (12%

This work was supported by grants from Prof. Ismail Khalaf, the Dean of Al-Azhar Faculty of Medicine.

A. M. El-Sherif (✉) · M. A. Abou-Shady ·
M. A. Al-Hiatmy · A. M. Al-Bahrawy
Department of Internal Medicine, Al-Azhar Faculty of Medicine,
Al-Azhar University, Nasser City, Cairo, Egypt
e-mail: assem_elsherif@yahoo.com

A. M. Al-Bahrawy
e-mail: bahrawy3@hotmail.com

E. A. Motawea
Department of Clinical Pathology, Al-Azhar Faculty of
Medicine, Al-Azhar University, Nasser City, Cairo, Egypt

of our cases). On the other hand, missing isolated anti-HBc units positive for HBV DNA (1.3% of our cases) may have serious implication if used in blood transfusion.

Although HBV DNA testing by nucleic acid test of all collected units of blood may achieve zero risk of transfusion-transmitted HBV infection, it seems impractical in our community, considering the low endemicity of the virus and the high cost of the test. In contrast HBV DNA testing of only anti-HBc positive units is less expensive, can reduce the risk of transfusion-transmitted HBV infection and the rejection rate of the precious units of collected blood positive for anti-HBc only.

In conclusion, we suggest a policy of testing blood donors for anti-HBc (in addition to HBsAg) and those positive for anti-HBc to be submitted to HBV DNA screening by the PCR method. Taking into account the shortage of blood donors, and the relatively low risk of HBV transmission from transfusion of anti-HBc-positive and HBV DNA PCR-negative blood products, only donors positive for both anti-HBc and HBV DNA should be rejected.

References

1. Schreiber GB, Busch MB, Kleinman SH, Korelitz JJ. The risk of transfusion-transmitted viral infection. The retrovirus epidemiology donor study. *N Engl J Med* 1996;334:1685–1690.
2. Silva CMD, Costi C, Cosa C, et al. Low rate of occult hepatitis B virus infection among anti-HBc positive blood donors living in a low prevalence region in Brazil. *J Infect* 2005;51:24–29.
3. El-Gilany AH, El-Fedawy S. Blood borne infections among student voluntary blood donors in Mansoura University, Egypt. *East Mediterr Health J* 2006;12:742–748.
4. Bernvil SS, Andrews V, Kuhns MC, McNamara AL. Hepatitis B core antigen antibody as an indicator of a low grade carrier state for hepatitis B virus in a Saudi Arabian blood donor population. *Transfus Sci* 1997;18:49–53.
5. Almeida Neto C, Strauss E, Sabino EC, Sucupir MC, Chamone AF. Significance of isolated hepatitis B core antibody in blood donors from São Paulo. *Rev Inst Trop S Paulo* 2001;43:203–208.
6. Arraes LC, Ximenes R, Andrieu JM, Lu W, Barreto S, Pereira LM, Castelo A. The biological meaning of anti-HBc positive result in blood donors: relation to HBV-DNA and to other serological markers. *Rev Inst Med Trop S Paulo* 2003;45:137–149.
7. Behzad-Behbahani A, Mafi-Nejad A, Tabei SZ, Lankarani KB, Torab A, Moaddeb A. Anti-HBc & HBV-DNA detection in blood donors negative for hepatitis B virus surface antigen in reducing risk of transfusion associated HBV infection. *Indian J Med Res* 2006;123:37–42.