Prevalence of Acridine Immunization to Subsaharians Africans Blood Donors

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Abstract: To conduct a study project on the inactivation of pathogens in whole blood using acridine derivatives in Africa, in order to prevent the transmission of pathogens, it is important to look for possible immunization to acridine in the blood donor population. It is therefore important to undertake an estimate of the prevalence in the sub-Saharan population in order to guide the design of the clinical study that will use the INTERCEPT Red Blood System procedure on whole blood for transfusion. to define the starting point in the evaluation of the immunological safety and transfusion safety of the product treated by this process. The objective of this study is to determine the prevalence of AAA among blood donors in sub-Saharan Africa. We conducted a multicenter prospective descriptive study of 902 blood donors collected in Côte d’Ivoire, Benin and Cameroon over the period from June 2015 to January 2017. Blood samples were collected from voluntary blood donors, of any sex, aged between 18 and 65, having given their consent for the study and having participated in the medical consultation for the donation of blood. The samples were analyzed according to the technique of the RAI gel card of the company BIORAD after centrifugation and incubation using test red cells treated with S-303 and glutathione. In the case of positive RAI results, to confirm the presence of anti-acridine, the donor plasma should be incubated with S-300. S-300 is a degradation product of S-303. The donor serum and S-300 are then incubated with the same red test cells. S-300 binds to the antibody and produces a negative result in the gel map in the presence of anti-acridin antibodies. Of the 903 samples tested both at the Abidjan laboratory in Côte D’Ivoire and at the Frankfurt laboratory, we found 1 positive sample and 8 reactive samples (positive for anti-erythrocyte antibodies). Positive donor plasma was incubated with S-300 which is the degradation product of S-303. The result is always positive, whereas according to the instructions of the reference laboratory of Frankfurt, it should be negative in case of presence of Locustacan. The results on AAA testing among 903 donors in three sub-Saharan countries show the absence of AAA in the sample of subjects included in the study according to the hypothesis emitted from this study. This opens the door to the prospect of conducting a clinical study on the inactivation of pathogens by acridine derivatives.

Keywords: Acridine, Immunization, Subsaharian, Blood Donors
1. Introduction

Inactivation of pathogens in the blood is a very important part of transfusion safety. For more than 20 years, this technique is used in the West and can significantly reduce the risk of transmission of infectious agents through the blood. To date, numerous inactivation technologies exist including Mirasol [1, 4] and Intercept [5, 8].

The intercept technology uses a molecule that is S-303 derived from acridine [7]. It is widely used for the inactivation of pathogens in plasma, platelets and red blood cell concentrates. Experimental laboratory studies on whole blood have been shown to be highly effective with no preservative in food and laboratories [12, 14], it is likely to derive from acridine [7]. It is widely used for the production of anti-acridin antibodies (AAA).

09 samples were retested at the Frankfort laboratory in Germany.

3. Results

Table 1. Overall Results of AAA Screening in Three Countries.

| COUNTRIES     | NUMBER OF SAMPLES | NEGATIF | REACTIVE (POSITIVE OR UNCERTAIN) |
|---------------|-------------------|---------|----------------------------------|
| CAMEROUN      | 272               | 265     | 07                               |
| BENIN         | 297               | 296     | 01                               |
| COTE D'IVOIRE | 334               | 333     | 01                               |
| TOTAL         | 903               | 894     | 9                                |

08 samples yielded reactive (uncertainly qualified) results, 1 strongly positive sample (that from Côte d'Ivoire, and a total of 09 samples were retested at the Frankfort laboratory in Germany.

Table 2. Results of antibody identification.

| IDENTIFICATION OF ANTIBODIES (n = 9) | COUNTRIES |
|-------------------------------------|-----------|
|                                     | COTE D'IVOIRE (n=1) | BENIN (n=1) | CAMEROUN (n=7) |
| PAN-AGGLUTINATION                   | 0         | 0           | 2             |
| ALLO-ANTIBODIES                     | Anti D    | 0           | 0             |
|                                     | Anti S    | 1           | 2             |
4. Comments

Of the 902 samples tested both at the Abidjan laboratory in Côte d'Ivoire and at the Frankfurt laboratory, we found 1 positive sample and 8 reactive samples (positive for anti-erythrocyte antibodies). The presence or absence of AAA results in preliminary and definitive results. The preliminary result is obtained at the end of the screening on 3 red cells group O tests. The final result sanctions the identification of the Ac(s) through a reference panel of 11 cells (DRK-BSD identification red cells). This screening panel allows the detection of antibodies corresponding to the antigens D, C, E, C, K, K, Kpa, Kpb, Fya, Fyb, Jka, Jkb, M, N, S, S, P1, Lea, Leb, Lub [16]. The positive blood sample was donor # 130 from Côte d'Ivoire. The search for AAA by Gel Card technique is identical to the search for irregular agglutinin. These 2 tests follow the same principle. Of the 903 samples, 893 were clearly AAA negative, i.e., the serum did not contain anti-acridine antibodies. A previous screening study in Germany (unpublished) showed that a small proportion of patients (1%) receiving a blood transfusion had a positive sample of Côte d'Ivoire. No identification could be made because it does not correspond to any erythrocyte antibody. The donor's history of eating habits was quite subjective in view of the fact that his diet is mainly based on starch and organic foods. This is a 23-year-old student from central Côte D'Ivoire whose diet is mainly based on starch and fat. However, we found the notion of intake of glutathione by ingestion of food compliments 3 weeks before inclusion in the study.

5. Conclusion

Our study of blood donors in sub-Saharan Africa confirmed our initial hypothesis, which is based on the pre-existing prevalence of pre-existing AAA in the donor estimated at approximately $1 \times 10^{-2}$ in the donor populations of a European country, and that predicts an instantaneous prevalence of $\leq 1 \times 10^{-2}$ in the African donor population. Results on AAA testing among 902 donors in three sub-Saharan countries show the absence of AAA in the sample of subjects included in the study according to the hypothesis emitted from this study. This opens the door to the prospect of conducting a clinical study on the inactivation of pathogens by acridine derivatives.

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