The Role of Alloimmunization in Platelet Survival Studies*

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Die Bedeutung von Alloimmunisierungen bei der Bestimmung der Thrombozytenüberlebenszeit


Schlüsselwörter: Thrombozytenüberlebenszeit – thrombozytäre Alloantikörper

Summary. The role of platelet alloimmunization in the survival of $^{51}$Cr-labeled allogeneic platelets was investigated in 89 patients with severe thrombocytopenias. The serological analysis included HLA typing of patients, screening of their sera in the lymphocytotoxicity test (LCTT), the platelet complement fixation test (PCFT), and the platelet radioactive anti-IgG test (PRAT; N = 38). Platelet donors were selected according to the best available HLA match and crossmatch in LCTT. Alloantibodies against HLA antigens were found in the sera of 17 patients (19.1 %). No platelet-specific alloantibodies were detected.

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The use of compatible, allogeneic platelets permitted the discrimination of diminished platelet production from increased platelet turnover in thrombocytopenic patients with proven alloimmunization. Our results stress the necessity of a serological workup prior to platelet survival studies.

**Key words:** Platelet survival – Platelet alloantibodies

The determination of the survival time and the destruction site of $^{51}$Cr-labeled platelets is an essential diagnostic procedure in thrombocytopenic states (for a review: [18]). Autologous platelets should be used for labeling whenever possible, except when the yield is inadequate [13]. If allogeneic platelets have to be used, alloimmunization of recipients can seriously compromise the interpretation of results [13]. Although it has been well recognized that alloantibodies shorten the survival time of incompatible platelets indistinguishable from that by true autoantibodies, i.e., in chronic idiopathic thrombocytopenic purpura (ITP) [2, 9, 19, 21, 22], to our knowledge no systematic study has been published evaluating the type and frequency of platelet alloimmunization in patients subjected to survival time examinations. We, therefore, wish to report the results of an analysis of 89 survival studies with special emphasis on HLA immunization.

**Patients and Methods**

Platelet survival studies in 107 patients (52 males, 55 females) were performed within the last 5 years. In 89 patients with severe thrombocytopenias, in severely ill patients, or in children, the investigations were carried out with allogeneic platelets. Patients fell into the following disease categories: ITP syndrome (N = 51); pancytopenia (N = 4); hemoblastoses (N = 15); undefined thrombocytopenias (N = 11); other diseases (N = 8).

Specimens of all patients receiving allogeneic platelets were assayed as follows: Determination of ABO blood group and Rh factors by conventional techniques; HLA typing by the international standard technique of the lymphocytotoxicity test (LCTT) [23]; antibody screening of sera in the LCTT against a panel of lymphocytes from 30 highly selected donors with practically all known HLA antigens, and in the platelet complement fixation test (PCFT) [10] against 20 platelet suspensions of known HLA and P1A types. In addition, 38 patients investigated since 1977 were studied by the direct and indirect platelet radioactive anti-IgG test (PRAT) [16, 17]. Their sera were screened against platelets of one P1A-positive and one P1A-negative donor of known HLA type. Platelet-associated IgG was determined quantitatively using $2 \times 10^7$ autologous platelets [17]. Antilymphocyte serum, polyspecific HLA antisera, and inactivated human AB sera served as positive or negative controls, respectively. Allogeneic platelets for labeling were prepared from ABO-compatible, HLA-typed blood donors according to the best available HLA match. Sera of patients were crossmatched with donor lymphocytes in LCTT.

The platelet survival time was determined by labeling platelets with $^{51}$Cr as described by Aster and Jandl [3] and modified by Seidl [21]. The recommendations of the International Committee for Standardization in Hematology were essentially followed [13]. Blood samples for determination of platelet-bound radioactivity were taken at 5, 10, 30 min and at daily intervals after injection of labeled platelets. The platelet mean life span (MLS) was calculated as “weighted mean” [13].