

Hemovigilance Surveillance of Platelet Components Prepared with Pathogen Inactivation Treatment During a Three Year Period

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ÉTABLISSEMENT FRANÇAIS DU SANG - ALSACE

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Background

EFS Alsace provides labile blood components for 2 million inhabitants of the Alsace region. In mid 2006 pathogen inactivation (PI) treatment of all platelet components (PC) was implemented (INTERCEPT Blood System™, Cerus BV, Amersfoort, Netherlands). In compliance with regulations of the national medicinal agency (Afssaps) quality control and hemovigilance programs were utilized to monitor the quality and safety of platelet components.

Aims

Following introduction of pathogen inactivation for platelet components a study was designed to monitor:

- The quality of platelet components
- The safety of transfusion with platelet components treated with pathogen inactivation

Methods

Pooled whole blood buffy coat platelet components (MCP-IA) were produced with use of platelet additive solution (InterSol, Baxter, La Chatre, France) with residual plasma ranging from 32 – 47% by either manual or automated methods (MCP-IA/T) (TACSI, Terumo, France) and by apheresis (CPDA-IA) (Haemonetics MCS+SD, France). All components were treated with INTERCEPT (IA) according to manufacturer's directions (Figure 1). Platelet content was determined for all components. Residual amotosalen levels were determined for 1% of components by quantitative HPLC assay. PI was used in place of gamma irradiation and

CMV serology without bacterial detection. Clinical response to transfusion was assessed under the Afssaps hemovigilance program (*Transfusion* 2001;42:1356). Adverse events following transfusions were assessed for severity (Table 1) and relationship to the transfusion (imputability) (Table 2). The incidence rates for adverse reactions to transfusions of PI platelet components were compared between EFS-Alsace and national data for the period mid 2006 – mid 2009 using Yates Chi Square with correction for samples with < 5 values.

Figure 1: The INTERCEPT Blood System for Platelets

Using a sterile connecting device (SCD), the platelet container is sterily connected to the INTERCEPT kit. Amotosalen (1) is added by gravity flow and the platelet mixture is illuminated with UVA light (2). Residual amotosalen and its photoproducts in the platelet mixture are reduced to low levels using a compound adsorption device (CAD) (3) before the platelets are transferred to the storage container.

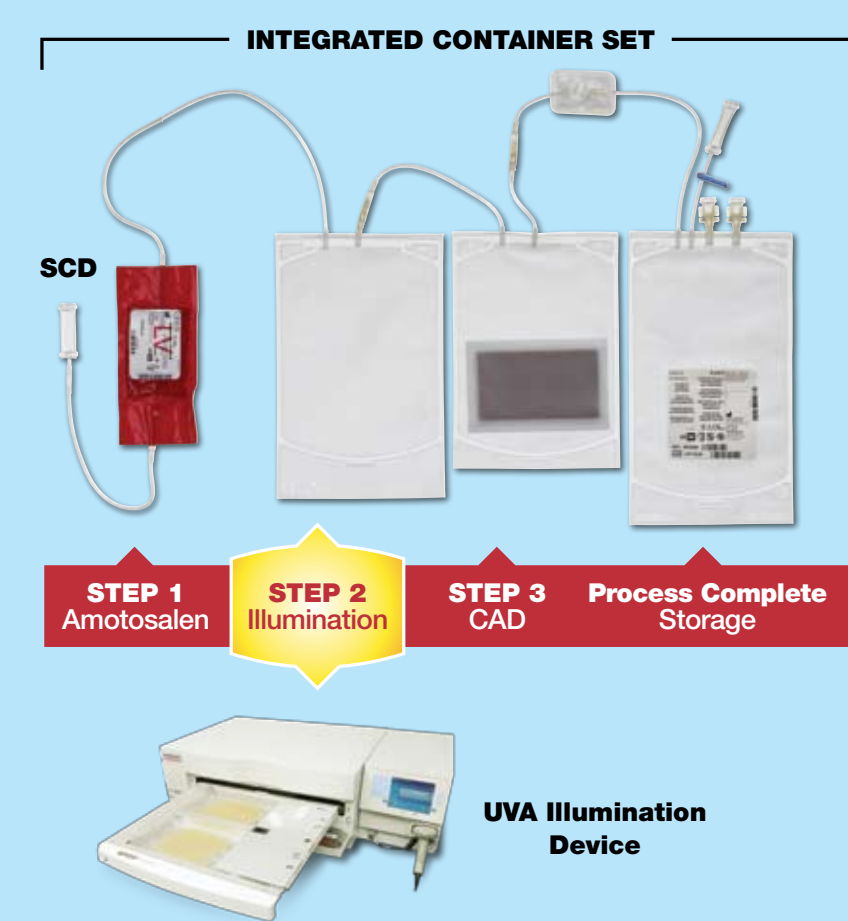


Table 1: Adverse Event Severity Grade System

Grade	Description
Grade 1	Absence of immediate or long-term vital threat
Grade 2	Long term morbidity
Grade 3	Immediate vital threat
Grade 4	Death

Table 2: Adverse Event Imputability Score

Score	Description
Score = 0	No causal relationship
Score = 1	Doubtful
Score = 2	Possible
Score = 3	Likely
Score = 4	Unquestionable

Results

During 3 years 40,465 PC were monitored for quality control (Table 3) and 42,806 were transfused and evaluated for adverse reactions (Table 4). Hemovigilance data per 10⁶ PC transfused were reported for transfusion transmitted bacterial infection (TTBI), transfusion associated cardiac overload (TACO), TRALI, antibodies to RBC antigens, febrile non-hemolytic reactions and allergic reactions and comparisons were made between IA components in EFS Alsace and national data with conventional PC (Table 4). PC prepared with PI contained sufficient platelet content in conformity with EFS standards and average residual amotosalen levels in compliance with Afssaps standards (mean level < 2.0 μM). Adverse reactions combining all severity grades (1-4) were significantly reduced for PI components (CPD-IA versus CPD National and MCP-IA versus MCP National) compared to conventional PLT components (Table 4).

Table 3: Quality Control Data (Mean ± SD) Reported For Platelet Component Production (2006 – 2009)

Component	Number PC	Platelets (10 ¹¹)	Volume (mL)	Residual Amotosalen (μM)
CPDA-IA	14,644	3.9 ± 0.8	336 ± 22	0.52 ± 0.43
MCP-IA (pool of 6)	21,658	4.6 ± 0.7	313 ± 20	0.27 ± 0.07
MCP-IA/T (pool of 5)	4,163	4.0 ± 0.7	303 ± 16	Not Reported Separately

Table 4: Hemovigilance Data Reported For Transfused Platelet Components (2006 – 2009)

Component	Number PC	Adverse Reactions/10 ⁶ PC	P-Value
CPDA-IA EFS Alsace	16,494	2182	< 0.001
CPD National	385,049	6220	
MCP-IA EFS Alsace	26,312	2166	< 0.001
MCP National	117,795	3179	

Conclusions

During a 3 year observation period, platelet components prepared with PI demonstrated:

- Acceptable quality control characteristics
- Reduced adverse reactions