

PHOTOCHEMICAL TREATMENT OF FRESH PLASMA. EVALUATION OF FUNCTIONAL ACTIVITY OF COAGULATION FACTORS AND INHIBITORS

Francisco Dias, Marika Bini-Antunes, Mónica Pereira, Eduarda Valente, Renata Cabral, Rui Trindade, David Norival, Margarida Amil, Jorge Coutinho, Manuel Campos

Background: The Intercept Blood System (IBS)™ improves the safety of blood components by the inactivation of a high number of pathogens and leucocytes. The technology combines a psoralen molecule (amotosalen) and ultraviolet A light (UVA). The amotosalen penetrates in cellular and nuclear membranes and forms covalent crosslinks to the nucleic acid base pairs upon UVA exposure blocking DNA and RNA replication. This process should maintain the therapeutic efficacy of plasma and platelets.

Material and Methods: 54 plasma units were obtained from whole blood CDP-SAGM units by differential centrifugation. IBS treatment was performed in pools of two plasma units. Units were subsequently frozen at -18°C. Analysis of coagulation times (PT and APTT), factors and inhibitors was performed before and after IBS treatment and after 6 months of storage. We applied paired t-student test to compare results. Differences between values were considered significant when $p < 0.05$.

Results: Table 1 presents the results. A statistical significant decline of all coagulation factors and inhibitors was observed, particularly for FVIII, after IBS treatment and after recovery ($p < 0.01$). However the functional activity was always maintained above 70% for all factors except for FVIII whose mean recovery value was 65.9%.

Conclusion: Our results show preservation of the functional activity of all coagulation factors and inhibitors after IBS treatment, according to what is described in other previous studies in literature.

We observed a loss of FVIII functional activity after recovery although we considered it acceptable.

These results contributed to validate IBS treatment for fresh plasma units in our Department.

Table 1: Results of the coagulation tests before and after fresh plasma treatment (IBS) and after recovery. Results are presented as mean values±-standard deviation.

	Before IBS treatment	After IBS treatment	After recovery
PT (sec)	11.14±0.4	11.56±0.5	11.84±0.6
APTT (sec)	27.18±2.2	30.18±2.2	33.4 ±2.7
Prot C	110.51±10.0	95.79±8.1	102.4±9.3
Free Prot S (u/dL)	93.49±11.7	86.86±9.8	85.89±12.9
Antithrombin (u/dL)	94.41±7.8	88.37±8.1	89.27±8.0
Fibrinogen (mg/dL)	264.92±35	182.18±25.8	195.22±35.3
Factor II (u/dL)	101.06±9.6	89.32±9.4	90.27±9.3
Factor V (u/dL)	106.14±9.6	100.68±12.2	95.24±18.4
Factor VII (u/dL)	95.42±12.8	82.00±15.9	87.91±19.7

Factor VIII (u/dL)	121.00±20.2	93.36±18.2	65.9±13.8
Factor IX (u/dL)	119.18±20.0	105.32±22.7	93.26±17.5
Factor X (u/dL)	106.43±11.0	92.66±9.2	101.09±17.9
Factor XI (u/dL)	105.28±20.0	92.58±24.3	98.75±12.9
Factor XII (u/dL)	113.14±30.0	94.93±24.4	92.71±20.7