TITLE : TRANSFUSION OF PLATELETS THROUGH MICROAGGREGATE FILTERS

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Introduction. Some microaggregate blood filters(MABF) remove significant numbers of platelets from fresh blood.[1,2] Thrombocytopenic patients,however,are rarely treated with fresh blood because platelet concentrates(PC) are the preferred therapy. Since transfusion of platelets through a MABF may be desireable in critically ill patients receiving massive blood transfusions, and as there is little data,we posed the question,"Can PC be safely transfused through MABF?"

Methods. PC were prepared from volunteer donor blood collected in citrate-phosphate-dextrose and kept at 22°C. PC stored for 8,36,or 72 hours were passed through 170u standard, 40u(Pall SQ40),or 20u (Fenwal 4C2131) filters. Pre and post-filtration evaluations were made of platelet counts,ADP aggregation, levels of B-thromboglobulin(B-TG is a marker for the platelet release reaction), and platelet morphology. Counts-5 units of type-specific PC were pooled and aliquots passed through each of the 3 types of blood filters. Pre and post-filtration samples were counted(x4) using an electronic counter. Aggregometry-the % maximal aggregation was calculated for several dilutions of ADP. B-TG-levels in pre and post-filtration platelet poor plasma were assayed using an I^{125} radioimmunoassay. Morphology-pre and post-filtration electron photomicrographs(EM) were taken of whole platelets fixed on Formvar coated slides. Serial Filtration-to simulate clinical practice,16 units of 24 hour-old PC were pooled and equal aliquots were passed through the 3 filters at a rate of 1 ml/minute. Counts were taken every 15 minutes for 3 hours. Pre and post-filtration B-TG levels were analyzed for each filter. Values were evaluated as mean + SEM(n=6). Significance($p<.05$) was determined by Students' t-test for paired data.

Results. Pre and post-filtration platelet counts,% maximal ADP aggregation, and B-TG levels showed no significant differences ($p>.05$) at 8 hours(Table 1), 36,or 72 hours. With 20uM ADP the % maximal aggregation at 8 hours was 37%. Levels of B-TG did not increase after filtration but did with time of platelet storage ($p<.05$). During storage,from 5%(8 hours) to 40%(72 hours) of the total intraplatelet pool of B-TG was released into the supernatant plasma. EM studies correlated B-TG levels with morphologic evidence of platelet release. Serial filtration studies(Figure 1) showed no significant post-filtration changes ($p>.05$) for platelet counts or B-TG levels.

Discussion. Platelets in PC can be safely transfused through MABF. We found no changes in any of the pre and post-filtration parameters studied. Significant changes in platelet function and B-TG did occur with increasing time of in vitro storage. For each storage period(8,36,72 hours) filtration per se had no effect. Changes in platelet function measured in vitro may be more dependent on the duration of storage than on the type of blood filtration. In vitro storage of PC,even for 8 hours, seems to render the platelets insensitive to activation by the filter media. The storage lesion does not inactivate the platelets in PC since concentrates stored at 22°C for 72 hours are hemostatically effective in vivo. Transfusion of PC through clean,unused MABF of the types studied can be performed without the loss of platelets or changes in platelet activity as measured in vitro.

References.

1. Cullen DJ, Ferrara L: Comparative evaluation of blood filters. Anesthesiology 41:568, 1974.
2. Dunbar RW, Price KA, Cannarella CF: Microaggregate blood filters. Anesth. Anal. Current Res. 53:577, 1974.

TABLE 1. 8-HOUR STORED PLATELETS (n=6)

	PREFILTER*	POSTFILTER*		
		170u	40u	20u
Counts+	179± 4	176± 4	178± 4	176± 6
ADP AGG.#	37± 5	37± 5	37± 5	35± 4
B-TG**	6.6±.9	6.9±.9	6.9± 1	6.0±.7

* mean + SEM
\+ platelets x 10^4/ul
\# % maximal ADP aggregation(20uM final conc.)
**B-TG ng x 10^3/ml

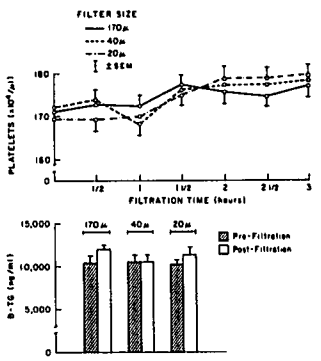

FIGURE 1. SERIAL FILTRATION