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SOLCO-TRANS AUTOTRANSFUSION AND PLATELET FUNCTION DURING AORTIC SURGERY.

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The potential for HIV transmission from bank blood has renewed interest in methods of operative autotransfusion. Widespread acceptance of such techniques will depend on the safety and function of the salvaged blood. In 11 patients undergoing elective aortic reconstruction, we have studied changes in platelet function during the use of Solco-trans* - a simple, disposable, non-mechanical autotransfusion device. All patients received 1 mg/kg heparin prior to aortic cross-clamping, after which 440 mls blood was salvaged into the Solco-trans device, which contained 60 mls ACD-A. Platelet count, aggregation to collagen and ADP, thrombin-stimulated total ATP, APTT and plasma heparin levels were measured:- 1) pre-operatively, 2) post-heparinisation, 3) in the operative pool, and 4) in the Solco-trans reservoir, whilst citrate, ionised calcium, plasma Hb and pH were recorded only in the Solco-trans device.

RESULTS: (mean ± s.d.)

	Sample No 1	2	3	4
Count ($x\cdot10^9$)	210 ± 91	165 ± 34	141 ± 26	108 ± 29
Collagen (%)	72 ± 8	58 ± 17	22 ± 22	4 ± 3
ADP (%)	69 ± 9	50 ± 13	22 ± 21	5 ± 9
ATP (nmols)	3.84 ± 1.9	1.47 ± 0.9	1.15 ± 1.2	0.47 ± 0.52
Hb (mg/%)				359 ± 198
APTT (secs)	47 ± 6	528 ± 112	399 ± 109	261 ± 134
Heparin (iu/ml)		1.46 ± 0.35	1.04 ± 0.33	0.51 ± 0.16

CONCLUSION: There is a significant decrease in platelet numbers, aggregation and ATP content ($p< 0.05$, Wilcoxon signed rank test) in the acidotic, hypocalcaemic and highly haemolysed environment of the Solco-trans reservoir. In large volume autotransfusion, additional fresh platelet concentrates will be required.

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THE EARLY THROMBOGENICITY OF IMPREGNATED DACRON GRAFTS ASSESSED IN AN ARTIFICIAL CIRCULATION

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The impregnation of knitted Dacron grafts with biodegradable protein removes the need for preclotting at implantation. The effect of such impregnation on the thrombogenic potential of these prostheses is, however, unknown. We have compared the early thrombogenicity of two impregnated knitted Dacron grafts - Hemashield (collagen-impregnated Dacron, Meadox) and Gelseal (gelatin-impregnated Dacron, Vascutek) - with conventionally preclotted knitted Dacron in an artificial circulation. Fresh, heparinised human blood, containing ^{111}Indium-labelled platelets, was circulated around identical twin circuits of silicone tubing by a Sarns roller pump at 180 ml/min and 120 mmHg. Into each circuit a different 15 cm x 8 mm type of graft material was mounted. Changes in platelet count, platelet aggregation to collagen, plasma haemoglobin and blood radioactivity were recorded and after 60 minutes of perfusion each graft was sectioned and counted for radioactivity prior to scanning electron microscopy (SEM) of the luminal surface. The mean graft radioactivity divided by the mean blood radioactivity yields a Graft Activity Index (GAI) allowing comparison of platelet deposition and thus thrombogenicity.

RESULTS: (mean ± s.e.m.) 8 examples of each graft

	Hemashield	Gelseal	Preclotted Dacron
GAI	0.15 ± 0.01	0.33 ± 0.08	1.79 ± 0.21
Plasma Hb	97.6 ± 9.3	112 ± 3.2	19.6 ± 4.7

SEM confimed these findings with preclotted Dacron having the highest platelet deposition. Both impregnated grafts produced significant early haemolysis within 4 minutes of blood contact. Our findings indicate that the early thrombogenicity of these impregnated grafts is significantly less than conventionally preclotted Dacron, ($p< 0.01$, Wilcoxon signed rank test), despite the early haemolytic phenomenon and that Hemashield grafts are less thrombogenic than Gelseal grafts. ($p< 0.05$, Wilcoxon signed rank test)

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INTERACTION OF HUMAN ENDOTHELIAL CELLS WITH HEPARIN-LIKE POLYMERS : INSOLUBLE SULPHONATED POLYSTYRENE RESINS.

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It was previously demonstrated that insoluble sulphonated polystyrene resins possessed an anticoagulant heparin-like activity in the presence of plasma. The antithrombic activity is dependent on the surface density of the sulphonated groups and involves plasmatic anti T-III. This anticoagulant activity makes this material interesting for blood compatibility concerning its effect on the coagulation system. As these anticoagulant biomaterials may be used "in vivo", their compatibility with endothelial cells (EC) is of great interest. In the present study, EC from human umbilical cord vein were cultured in 96 well plates in presence and absence of cryoprecipitate considered as the reference culture surfaces, and in wells covered with sulphonated polystyrene beads (SPB). Cell growth in this various conditions was observed and the following parameters were compared : rate of growth of EC, presence of Von Willebrand factor (VWF) by immunofluorescence, release and synthesis of EC specific antigens : VWF, tissue plasminogen activator (T-PA) and tissue plasminogen activator inhibitor (PAI). On SPB, cellular growth was found to be in a normal range but cell morphology was somewhat different. VWF antigen was identified in cells grown either on SPB or on reference wells. Non stimulated cells, incubated in serum free medium released a basic level of VWF in the supernatant. Thrombin enhanced the release of VWF from cells cultured on coated or uncoated dishes and from cells cultured on wells covered with SPB as well. In paralell, VWF in cell extracts decreased after thrombin stimulation and no difference was observed with cells cultured in presence or in absence of SPB. Without stimulation a small amount of t-PA was only observed in the supernatant 24 H samples. Thrombin stimulation induced a comparable release of t-PA from cells cultured either on SPB or reference surfaces. t-PA synthesis, measured in cell extracts did not show significant differences. In contrast, SPB inhibited the release of PAI from EC stimulated or not stimulated by thrombin. Studies are in progress to determine whether PAI is released and absorbed by SPB or absent from the cells.

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COAGULATION CONTROL MADE IN FIFTEEN RECIPIENTS OF JARVIK 7 ARTIFICIAL HEART. AN STATISTICAL STUDY.

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From April to December of 1986 fifteen Jarvik-7 artificial heart were temporally implanted until definitive heart transplantation in 12 men and 3 women of 18 to 55 years old.Jarvik's stay ranged between 48 hours to 20 days.The coagulation control applied was:PT,APTT, reptilase,fibrinogen,platelet aggregation by turbidimetry to ADP,epinephrine,collagen and arachidonic acid thromboelastography in whole blood,plasma and serum antithrombin III and activated factor X by specific substrates,haematocrit, platelet count,platelet factor 4 and B-thromboglobulin by enzymeimmunoassays,fibrin/fibrinogen degradation products,alfa-2-antiplasmin, fibrinopeptide A and Raby's transference test.Number of controls for each patient were 1 to 3 daily.Measurements were done in preoperative,immediate postoperative and maxim bleeding period.The most significant data were compiled in tables as number of cases, $\bar{x} \pm$ S.E. and S.D.$\bar{x}$.Statistical methods were correlation coeffic ient,Pares "t"and Newman-Keuls for $p<0.05$.It is concluded that the most critical period was the immediate postoperative and because of the treatments applied in the maxim bleeding period, it was possible to reach the patient's health recuperation whenever either a severe organic failure or sepsis did not appear.Treatments mainly applied were heparin,dipyridamol,aprotinin and antithrombin III concentrates, dose being adapted to the results obtained in controls.Jarvik's status observations when explanted will be presented in a paper aside.No patient suffered any cerebral vascular or thromboembolic event.