

TITLE: INTERLEUKIN 1 LEVELS DURING AND AFTER NORMOTHERMIC CARDIOPULMONARY BYPASS

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INTRODUCTION: Interleukin 1 (IL-1) is a polypeptide molecule which is a principal mediator of fever and the acute inflammatory response.¹ The production of IL-1 by monocytes has been shown to increase 24 hours following hypothermic cardiopulmonary bypass.² We measured plasma IL-1 levels in patients during and immediately following normothermic cardiopulmonary bypass, and correlated IL-1 levels with other markers of the acute inflammatory response.

METHODS: Following ethics committee approval and informed consent, 38 patients were studied in 3 groups of IL-1 sampling regimens: Group 1 - pre-operatively, at termination of bypass, and 12-24 hours post-operatively; Group 2 - pre-op, and every 4 hours post-op for 12 hours; Group 3 - pre-op, at 1.5, 15, 30, 60 and 90 minutes during bypass, and immediately before and after protamine administration. IL-1B concentrations were measured in plasma samples using an ELISA method (Cistron) and complement (C3a-des-arg) levels were assayed in Group 3 patients using ¹²⁵I radioimmunoassay (Upjohn). Data was analyzed using parametric or non-parametric analysis of variance where appropriate, p<0.05 being significant.

RESULTS: The mean age of patients was 59 ± 12 years, and mean bypass time was 94 ± 37 minutes. Although

changes in IL-1 levels were observed during and after bypass in some patients, no consistent pattern was observed. There was no significant change in mean IL-1 levels in any of the three groups either during bypass or in the ICU. The results for Groups 2 and 3 are shown in the table. Although C3a levels rose during bypass and after protamine, and temperature increased in the ICU, IL-1 levels did not correlate with either C3a (r²=0.027) or temperature (r²=0.006).

INTERLEUKIN 1 LEVELS DURING CARDIOPULMONARY BYPASS

	PRE OP	90 SEC	15 MIN	30 MIN	60 MIN	90 MIN	PRE PROT	POST PROT
IL-1 pg/ml (mean±SD)	5.6 ±5.7	6.4 ±7.2	3.5 ±4.1	4.0 ±4.2	3.5 ±6.2	5.3 ±6.9	5.2 ±6.8	10.8 ±6.8
C3a ug/ml (median)	2.8	3.2	14.0**	>14.0**	>14.0**	9.8**	2.4	8.6 †

** - p<0.005 vs. PREOP

† - p<0.005 vs. PREPROT

INTERLEUKIN 1 LEVELS IN THE ICU

	PRE OP	ICU ADM	4 HOURS	8 HOURS	12 HOURS
IL-1	4.5 ±4.0	6.3 ±4.5	6.6 ±4.1	9.0 ±6.8	8.1 ±10.5
TEMP	----	36.0 ±0.6	37.0 ±1.0*	37.4 ±1.0*	37.6 ±0.5*

* p<0.05 vs. ICU ADM

n=12 (except 12 hours where n=7)

DISCUSSION: Plasma IL-1 levels did not change significantly in patients during or soon after normothermic cardiopulmonary bypass. It is unlikely that acute early changes in plasma IL-1 explain systemic reactions resembling inflammation in patients undergoing normothermic cardiopulmonary bypass.

REFERENCES: 1. N Engl J Med 311(22):1413-1418, 1984.
2. J Thorac Cardiovasc Surg 98:1100-6, 1989.

TITLE: AN ANALYSIS OF FIVE YEARS EXPERIENCE IN OVER 3,000 PATIENTS OF INTRAOPERATIVE AUTOLOGOUS BLOOD SALVAGE WITH CARDIAC SURGERY

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Cases requiring autologous transfusions were retrospectively analyzed to determine if there are any predictable factors which influence the volume of intraoperatively salvaged blood.

The study protocol was approved by the Institutional Review Board. A total of 3,022 patients (2,126 males, 896 females; 14-88 years, mean 60.5 years) undergoing cardiac surgery requiring extracorporeal circulation (ECC) from January 1984 to December 1988, were studied. The following parameters were obtained from patients' records: 1) Age, sex, weight, height; 2) Preoperative laboratory data: Hct, Hgb, PT, PTT, bleeding time, fibrinogen, and activated clotting time (ACT); 3) Surgical procedure, intraoperative assist devices, history of previous cardiac surgery and duration of ECC and myocardial ischemic time; 4) Volume of washed autologous concentrate retransfused; and, 5) Units of bank blood products transfused. Statistical analysis was performed using Student t-test, ANOVA, and chi-square test. P < 0.05 was considered to be statistically significant.

The mean amount of retransfused blood in this study was 321 ± 222 ml (range 36 to 2795 ml). All the parameters examined, except for the preoperative

values of PTT, bleeding time, and ACT, showed a positive correlation with the volume of retransfused blood. Multiple surgical procedures were not significant factors. Thirteen percent of patients received only salvaged autologous blood during their hospital course. When patients who received only autologous transfusion perioperatively were compared with patients who received both autologous and homologous transfusion, all the factors examined showed statistical significance (Table 1).

In a previous study,¹ red cell volume and age were predictive of the need for homologous transfusion in patients undergoing coronary artery bypass grafting. Their study evaluated only coronary revascularization, while our patients underwent a variety of cardiac surgical procedures.

We concluded that many factors, other than red blood cell volume and age, can also be used to predict the need for homologous transfusion in patients undergoing cardiac surgery requiring ECC.

Reference:

1. J Thorac Cardiovasc Surg, 1987, pp. 512-522.

Table 1:	Non-transfused	Transfusion
Age	54.2 ± 12.5	60.5 ± 11.8
Height (cm)	175.6 ± 8.2	171.5 ± 9.6
Weight (kg)	85.3 ± 14.8	77.0 ± 15.2
Hgb (g/dl)	14.5 ± 1.3	13.2 ± 1.8
Hct (%)	42.8 ± 3.9	39.5 ± 5.1
Surgery (min)	255.8 ± 66.0	282.7 ± 92.0
Ischemic Time (min)	70.6 ± 66.0	75.2 ± 26.8
Autologous Volume (ml)	237.8 ± 128.0	297.0 ± 226.7