



# The cytokine balance during CABG surgery with and without cardiopulmonary bypass

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## Abstract

### Background

We investigated the cytokine response during coronary artery bypass grafting (CABG) surgery with and without cardiopulmonary bypass (off-pump) and the effect on patient's outcome in the early postoperative period.

### Methods

Eighteen patients were studied, 9 patients undergoing off-pump surgery (group 1) and 9 patients with CPB (group 2). Demographic and preoperative characteristics were comparable in both groups. Plasma levels of TNF- $\alpha$ , IL-6, IL-8, IL-10, IL-4, tumour necrosis soluble receptors-1 (TNFsr-1) and tumour necrosis soluble receptors-2 (TNFsr-2) were measured before skin incision ( $T_0$ ), before revascularization ( $T_1$ ),

after revascularization ( $T_2$ ), 2 h ( $T_3$ ) and 24 ( $T_4$ ) hours after skin closure. Levels of myocardial enzymes were also measured in the first postoperative morning.

## Results

Serum levels of TNF- $\alpha$  and IL-8 increased in group 2 at  $T_3$  and  $T_4$  more than at  $T_0$  ( $p < 0.05$ ). IL-6 increased in both groups with higher levels in group 2 than in group 1 at  $T_3$  ( $773 \pm 331$  vs  $315 \pm 189$  pg/ml;  $p < 0.05$ ). IL-10 was higher in group 2 than in group 1 at  $T_2$  ( $115 \pm 119$  vs  $13 \pm 4$  pg/ml;  $p < 0.001$ ) and at  $T_3$  ( $212 \pm 171$  vs  $31 \pm 29$  pg/ml;  $p < 0.05$ ). At  $T_3$  levels of TNFsr-1 and TNFsr-2 were higher in group 2 than in group 1 (TNFsr-1  $4858 \pm 1325$  vs  $2089 \pm 584$  pg/ml;  $p < 0.01$  and TNFsr-2  $4971 \pm 63$  vs  $3801 \pm 738$  pg/ml;  $p < 0.05$ ). Production of IL-4 did not increase in neither group. The length of ICU stay was less in group 1 than in group 2 ( $52 \pm 33$  vs  $26 \pm 11$  h;  $p < 0.05$ ) as well as was the length of hospital stay ( $7.1 \pm 0.4$  vs  $5.3 \pm 0.5$  days;  $p < 0.001$ ).

## Conclusion

Off-pump procedure evoked a lower cytokine response than CABG with CPB. This minimised myocardial damage and shorten the stay in the ICU and the hospital.

## Keywords

- Inflammatory response;
- Off-pump CABG;
- Cytokines;
- Cardiac surgery