Short lasting anti-inflammatory reaction in neonates undergoing cardiac operations correlates with postoperative outcome

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Background.
Cardiac surgery with cardiopulmonary bypass (CPB) in neonates is related to a systemic inflammatory reaction that jeopardises postoperative outcome. In this respect, the importance of the production of anti-inflammatory mediators such as interleukin (IL)-10 and cortisol, that might counterbalance systemic inflammation might be protective and improve postoperative outcome.

Methods.
Serum levels of IL-10 and cortisol were measured during and postoperatively up to 10 days after cardiac surgery in 13 neonates (mean age: 7 days) operated on for transposition of the grat arteries (n=7), total anomalous pulmonary venous return (n=3), truncus arteriosus communis (n=1) and interrupted aortic arch (n=2).
Cardiopulmonary bypass protocol included use of moderate hypothermia, cardiocirculatory arrest if needed and preoperative administration of dexamethasone.

Results.
In all patients, IL-10 levels increased from a preoperative value of 6,45 +/- 1,14 to reach maximal values of 385 +/- 65,3 pg/ml at the end of CPB. IL-10 levels decreased in the first postoperative days to reach preoperative values 48 hours postoperatively. Maximal IL-10 levels correlated with minimal core temperature during surgery (Spearmann: 0.63, p<0,05). They also correlated with postoperative lactate – and creatinine levels and with the postoperative cardiac scoring system (p<0,05, respectively).
Cortisol levels increased from preoperative values of 1188 +/- 80 pg/ml up to 1281 +/- 275 pg/ml at the end of cardiopulmonary bypass (not significant). Cortisol levels decreased thereafter to reach a minimal value 72 hrs after surgery (765 +/- 191 pg/ml, p<0,05 versus preoperative) and normalised thereafter. Cortisol levels measured after CPB correlated with CPB duration, with po lactate levels, creatinine concentrations and systolic blood pressure (p<0,05, respectively). Po cortisol- and IL-10 levels were correlated to each others.

Conclusions.
Our data show that neonates answer the inflammatory stress due to cardiac surgery with a significant production of IL-10 that is, however, short lasting. In contrast, the production of cortisol is significantly decreased postoperatively, suggesting insufficient stress response after cardiac surgery in neonates. The correlations shown between IL-10 and cortisol, and markers of postoperative organ dysfunction, respectively, indicate that both anti-inflammatory mediators are up-regulated due to operative stress and might therefore be targets for pharmacologic modulation.