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Comparison of two novel minimized cardiopulmonary bypass systems MECC®, Maquet versus ECC.O®, Sorin regarding inflammatory response

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This study was designed to explore the concentrations of different inflammatory markers in patients operated with the use of minimal invasive extra corporeal circulation (ECC). We wanted to compare the concentrations of different cytokines in patients' sera operated with two different compositions of minimal invasive ECCs (MECC and ECC.O) to each other and in reference to the conventional ECC (CECC). It is well established that CPB causes a systemic inflammatory response, with a potential dire clinical outcome. In recent years the use of minimal-invasive ECC is being promoted as an alternative to the standard composition of the heart lung machine to dampen the body's immunologic response to the unphysiologic state of cardiopulmonary bypass. Among these ECC-Systems are the MECC and ECC.O heart lung machines. In previous studies one of the different constellations of minimized ECC was being tested against either the conventional ECC and / or the OPCAB procedure. We wanted to explore whether the reduced surface area, the use of centrifugal pumps, the biocompatible coating of the tubing and oxygenators with heparin will differ in the body's inflammatory reaction to different ECC-systems, and if so whether one of the compositions would be superior to the other. For that patients enrolled in this study were randomized to one of the three trial groups (MECC, ECC.O and CECC) and donated blood specimens at draw points related to CPB for the measuring of cytokine concentrations using ELISA. As secondary objectives, patients' outcomes were registered to note if there is a benefit in the immediate postoperative period. Our results showed a clear reduction in the concentrations of human MIF, IL-1 β and IL-10 in patients operated with either of the minimally invasive circuits. There was no difference in the production of human RAGE or IL-6 in any of the three test groups. The concentration of TNF- α was highest in the ECC.O group. Although the overall reduction of inflammatory markers was fairly similar in our mini ECC-groups, the need for transfusion of PRBCs was lowest in the MECC group and the time of ventilation and ICU-stay was shortest in the ECC.O group. Furthermore the concentrations of heart enzymes in the routine lab (CK-MB and TnT) were significantly lower in patients operated with either of the minimal invasive ECC when compared to CECC. Whether these parameters are directly linked to the reduced inflammatory response caused by these CPB-circuits needs to be further examined and studied.