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Letter to the Editor

Biological effects of coronary surgery: role of surgical trauma and CPB

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We did read with interest the Letter to the Editor from Dr Raja in the May issue of the EJCTS [1]. He commented the prospective randomised study, comparing off-pump and on-pump CABG, by Wehlin recently published in the EJCTS [2]. Moreover, he quoted as reference a review paper about the same topic from our group [3]. Here we would make some comments about the contents expressed by Dr Raja. First, quoting the review paper from our group, he stated that excessive shear stress during CPB may cause damage to blood constituents, activation of the inflammatory response, platelet activation and it may contribute to endothelial injury. We recognize that the shear stress may have a potential role in the pathophysiology of the CPB. Nevertheless, we have to point out that our literature review did not investigate the evidences about the relationships between shear stress and CPB [3]. Moreover, we also recognize that the CPB may elicit the inflammatory response by means of several pathways. However, the evidences emerged from the available literature comparing on-pump surgery to off-pump surgery, including even major thoracic and abdominal surgery, suggest that CPB may have a limited role in inflammatory and hemostatic derangements during the perioperative period. Moreover, such role seems to be limited to the final steps of the operation and the very early postoperative hours [3]. On the other side, it is likely that the trauma to the tissue, imposed by the surgical procedure, may be the more consistent source of pro-inflammatory and pro-coagulant mediators during the entire perioperative period. In our opinion, the observations from Wehlin and colleagues are a further confirmation of this hypothesis [2].

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Reply to the Letter to the Editor

Reply to Cannata et al.
Trauma or no trauma, cardiopulmonary bypass is the major contributor to inflammatory response after cardiac surgery

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In an era of evidence based medicine, Cannata and colleagues' views that cardiopulmonary bypass (CPB) may have a limited role in inflammatory and hemostatic derangements during the perioperative period and that the trauma to the tissue, imposed by the surgical procedure, may be the more consistent source of pro-inflammatory and pro-coagulant mediators during the entire perioperative period seem a bit naive and contrary to available robust evidence from a large number of randomized controlled trials (RCTs).

There is no doubt that both operative trauma and CPB are associated with increased expression of pro-inflammatory mediators. However, the best way to determine the relative contribution of surgical trauma and CPB on activation of cytokines and adhesion molecules and initiation of systemic inflammation is to undertake RCTs in patients undergoing coronary revascularization on CPB by comparing them with patients receiving off-pump coronary artery bypass grafting (OPCAB). Interestingly, such trials have already been undertaken and available evidence from these trials conclusively proves that in the presence of comparable surgical trauma, the OPCAB revascularization procedure without the use of CPB and cardioplegic arrest significantly reduces the systemic inflammatory response [1–3]. In other words, CPB specifically activates and aggravates the inflammatory response after cardiac surgery. Furthermore, I will take this opportunity to inform Cannata and associates that plenty of evidence exists to verify that excessive shear stress may develop during CPB as a result of large pressure changes across the CPB circuit, causing damage to blood constituents and activating the inflammatory response [4].

I agree that operative trauma triggers an acute inflammatory response, but the continuous exposure of heparinized blood to nonendothelial cell surfaces followed by reinfusion and circulation within the body greatly magnifies this response in operations in which CPB is used. Abundant evidence exists to verify that CPB is primarily responsible for 'blood injury' which in fact produces a unique response termed 'systemic inflammatory response syndrome'. Hence, all one can say is trauma or no trauma, cardiopulmonary bypass is the major contributor to inflammatory response after cardiac surgery.

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