In this issue of the journal, Dr Poncelet and his colleagues [1] demonstrate that normothermia and warm intermittent cardioplegia are not inferior to hypothermia and cold cardioplegia in pediatric cardiac surgery.

No clear recommendation concerning pediatric myocardial protection and cardiopulmonary bypass (CPB) is available nowadays, as a result of the very few prospective randomized studies that have been published. With reference to the CPB temperature, Marc de Leval questioned in 2006, 'Because we can, should we ...?' [2]. This is still the right question today. He argued that CPB was profoundly non-physiological and that neonates had a higher metabolic rate and an enhanced inflammatory potential. Even if smaller CPB circuits are used nowadays (it is possible to go on bypass with a 150-ml priming volume), the use of hypothermia does not reduce but only delays the inflammatory reaction until re-warming. As a conclusion, Marc de Leval stated 'What we need now is convincing evidence of the superiority of normothermia, and this requires a prospective randomized study'. This is what Dr Poncelet and his colleagues have attempted.

The second topic of the present study is the type of the cardioplegia solution. At least four different cardioplegia solutions are currently in use in pediatric cardiac surgery: crystalloids (St. Thomas) and HTK, and blood driven, cold or warm. They lead to similar results in terms of mortality. However, no comparison has ever been done between the four solutions in terms of cellular adenosine triphosphate (ATP), time to weaning from mechanical ventilation, length of the intensive care unit (ICU) stay or of the probably most important end point, which is myocardial outcome. Dr Poncelet and his colleagues have attempted to do such a comparison. However, the present study has the same limitations as nearly all the studies in pediatric cardiac surgery: a small sample size; additionally, no neonate and no patient undergoing complex repairs has been enrolled. In my opinion, there is no need to demonstrate the superiority of normothermia in this setting: as normothermia is easy to perform and less expensive, a non-inferiority trial should suffice. The interesting finding in the present study is that the cellular ATP was at steady state during cross-clamping in the intermittent warm-blood cardioplegia group. This does not avoid some cellular apoptotic trend but eludes major cellular injury. Unfortunately, only 18 patients underwent late neurological and neuro-psychological testing. Even if there was no significant difference between groups, because of the small sample size, the present study cannot provide convincing evidence, and further studies are needed to reach a conclusion. Several observational studies have been
published since the first report of normothermic CPB in children [3], but the study by Dr Poncelet and colleagues is the first prospective randomized trial addressing the question of myocardial protection and pediatric CPB technique.

However, advances in the field of surgical and CPB technique in pediatric cardiac surgery are not restricted to the CPB temperature, and the latest trends include keeping the heart beating during interrupted aortic-arch repair [4] and avoiding CPB for total cavopulmonary connection [5].

References


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