# In Response to "Use of Autologous Umbilical Cord Blood Transfusion in Neonates Undergoing Surgical Correction of Congenital Cardiac Defects: A Pilot Study"

In this issue of Annals of Cardiac Anaesthesia, the authors describe the use of autologous umbilical cord blood (UCB) at the 3rd week of life during arterial switch operation for surgical correction of transposition of great arteries.[1] Laboratory studies[2,3] have demonstrated and clinical use confirmed that UCB is a rich source of hematopoietic stem cells. Cord blood for transplantation is collected from the umbilical cord and placenta after a baby is delivered and is frozen and stored at a cord blood bank for future use. Stored umbilical blood has been used for treating cerebral palsy;[4] treating Type 1 diabetes in very young children;[5] treating leukemia, lymphoma, myeloma, myelodysplastic syndromes following high-dose chemotherapy or radiation therapy; and treating inherited or acquired marrow or immune system disorders.[6] Utility of the autologous stem cells from the individual's own UCB is under investigation to find out whether it can be used to strengthen the muscle of the right ventricle. This will help determine the safety and feasibility of using cell-based regenerative therapy as an additional treatment for the management of hypoplastic left heart syndrome.[7] Evidently, the UCB is an important source of stem cells and future for the various untreatable or difficult-to-treat diseases.

The authors of the index paper describe the use of autologous UCB during surgical correction of Transposition of Great Arteries at the 20th day of life. The authors describe that UCB was collected from the placenta in a 150-mL bag containing 5 mL of citrate-phosphate-dextrose with adenine solution. The collected bag with 70–75 mL cord blood was stored at 2°C–6°C and tested for blood grouping and infections after proper labeling. The neonate's autologous UCB was used for postcardiac surgery blood transfusion to correct surgical bleeding in the postsurgical period. The study describes an alternative to homologous blood in managing neonatal cardiac surgery wherein necessity of homologous blood is almost unavoidable. It should be noted that the storage conditions of UCB and adult blood/red blood cells (RBCs) are different; adult RBCs can be successfully stored at 1°C–6°C in an anticoagulant/preservative solution e.g., citrate-phosphate dextrose/saline-adenine-glucose-mannitol for 42 days.[8] In contrast, cord RBCs deteriorate much faster under the same conditions and cannot be stored for more than 14 days without significant decrease in quality.[8,9] Cryopreservation and subsequent storage at ultra-low temperatures may preserve cord RBCs and maintain a high quality of cord RBCs for use in neonatal transfusions.[10] Fedevych *et al*.[11] and Chasovskyi *et al*.[12] described open cardiac surgery in the 1st h of life using autologous UCB. Recently, Chasovskyi *et al*. analyzed their 5-year experience with arterial switch operation in the 1st h of life.[13] Fedevych *et al*.[11] and Chasovskyi *et al*.[12] stored the UCB at room temperature and operated on neonates at 1 h of neonatal life; they added UCB to cardiopulmonary bypass prime and showed significant decrease in the requirement of homologous blood transfusion/requirement. The authors of the present study preserved the UCB similar to adult RBCs and transfused autologous UCB at 20th day; apparently, the autologous UCB may be stored similar to adult blood; however, the viability of the RBCs may be shorter.[8,9] Apparently, the ideal time for using autologous UCB is as close to birth as possible; however, the logistics of operating within few hours of neonatal life are highly demanding and would at least require availability of fetal echocardiography expert and readiness of operating room and cardiac surgical team.

There are other issues in transfusing adult blood to neonates; the practice of administering adult RBC transfusions to premature infants has been associated with the increased incidence of retrolental fibroplasia that may lead to blindness[14-16] and possibly bronchopulmonary dysplasia, a chronic inflammatory lung disease that can lead to respiratory dysfunction.[17] Needless, the practice of autologous UCB use shall be beneficial not only in neonatal cardiac surgical practice but in many other neonatal surgical procedures where homologous blood transfusion is generally required.

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**Website:** www.annals.in

**DOI:** 10.4103/aca.ACA_103_18

**How to cite this article:** Neema PK. In Response to "Use of autologous umbilical cord blood transfusion in neonates undergoing surgical correction of congenital cardiac defects: A pilot study". Ann Card Anaesth 2018;21:275-6.