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Autologous infant and allogeneic adult red cells demonstrate similar concurrent post-transfusion survival in very low birth weight neonates

Objective: Based on the hypothesis that neonatal autologous red blood cell (RBC) survival (RCS) is substantially shorter than adult RBC, we concurrently tracked the survival of transfused biotin-labeled autologous neonatal and allogeneic adult RBC into ventilated, very low birth weight infants.

Materials and Methods: RBC aliquots from the first clinically ordered, allogeneic adult RBC transfusion and from autologous infant blood were labeled at separate biotin densities (biotin-labeled RBC [BioRBC]) and transfused. Survival of these BioRBCs populations was concurrently followed over weeks by flow cytometric enumeration using leftover blood. Relative tracking of infant autologous and adult allogeneic BioRBC was analyzed by linear mixed modeling of batched weekly data. When possible, Kidd antigen (Jka and Jkb) mismatches between infant and donor RBCs were also used to track these 2 populations.

Results: Contrary to our hypothesis, concurrent tracking curves of RCS of neonatal and adult BioRBC in 15 study infants did not differ until week 7, after which neonatal RCS became shortened to 59%-79% of adult enumeration values for uncertain reasons. Analysis of mismatched Kidd antigen RBC showed similar results, thus, confirming that BioRBC tracking is not perturbed by biotin RBC labeling.

Conclusions: This study illustrates the utility of multi-density BioRBC labeling for concurrent measurement of RCS of multiple RBC populations *in vivo*. The similar RCS results observed for neonatal and adult BioRBCs transfused into very low birth weight infants provides strong evidence that the circulatory environment of the newborn infant, not intrinsic infant-adult RBC differences, is the primary determinant of erythrocyte survival.

Biography

Widness is Emeritus Professor of Pediatrics at the University. He received his M.D. from Duke University. The focus of his work encompasses neonatal anemia with a major focus on erythropoiesis—including the pharmacokinetics and pharmacodynamics of erythropoietin. More recently his interests have encompassed RBC survival and transfusion in newborn infants. Since fellowship, Dr. Widness has maintained continuous NIH support for his research. He has served as an *ad hoc* member of NIH study sections and as an Associate Editor for the *American Journal of Physiology* and for *Neonatology*. He has over 200 peer review publications.

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