

Bypass procedure used during infant heart surgery does not impair later neurological outcomes

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Congenital heart defects (CHD) are the most common birth defects in humans, affecting 8 per 1000 live births with one third of affected children requiring intervention in early infancy. Increasing numbers of survivors combined with developmental expectations for independence, behavioral self-regulation and academic achievement have led to a growing identification of neurobehavioral symptoms in some survivors. A study now suggests that a cooling technique often used in heart operations does not impair neurological outcomes.

Congenital heart disease and its treatment were originally thought to potentially increase neurologic injury in these patients. The technique of deep hypothermic circulatory arrest (DHCA) is used in order to repair these congenital cardiac defects by providing a bloodless surgical field, which may facilitate completion of the best physiologic repair, and decrease the duration of blood exposure to the bypass circuit. However, it involves a period of reduced blood flow in the brain. Cooling is a protective mechanism to reduce metabolism of the brain and other organs during periods of low blood flow.

Stephanie Fuller, M.D., a [cardiothoracic surgeon](#) at The Children's Hospital of Philadelphia, presented these research findings yesterday in the prestigious J. Maxwell Chamberlain Lecture at the annual meeting of the Society of Thoracic Surgeons in Fort Lauderdale, Fla. According to the study, DHCA does not impair language skills, attention, and other neurocognitive abilities in school-age children.

Dr. Fuller and colleagues from Children's Hospital and the University of Washington assessed the use of DHCA as a predictor of neurodevelopmental outcomes in children who had [cardiac surgery](#) as

infants. The infants were enrolled in a prospective study of apolipoprotein-E (APOE) polymorphisms and neurodevelopmental outcome after cardiac surgery and underwent formal neurodevelopmental testing at four years of age.

Neurodevelopmental testing was completed in 238 out of 307 eligible patients. The surgeons used DHCA in 92 of those infants as deemed necessary to provide better operative exposure with a bloodless and less cluttered surgical field and therefore a shorter total cardiopulmonary support time. Use of DHCA was not predictive of worse performance for any neurodevelopmental outcome. Significant predictors of worse outcome included lower socioeconomic status, preoperative mechanical ventilation and babies that were younger and smaller at the time of first operation. Neurodevelopmental assessment included cognition, language skills, attention, impulsivity, executive function, social competence, and visual-motor and fine-motor skills.

"Selective use of DHCA during cardiac surgery in infancy may facilitate operative repair and is not associated with impaired neurodevelopmental outcomes," said Dr. Fuller. "Despite added risk factors, the selective use of DHCA during infancy for repair of [congenital heart disease](#) without an obstruction in the aorta was not predictive of worse performance at four years of age."

Dr. Fuller added "use of DHCA as a support technique during cardiac surgery in infancy has many advantages; it is not necessary to sacrifice these advantages merely to avoid use of DHCA. Our study adds to the growing literature showing no adverse influence of limited periods of DHCA. New support techniques must be carefully evaluated prior to wide-spread acceptance to confirm they are not inferior to conventional management

strategies."

Provided by Children's Hospital of Philadelphia

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