

Could reducing painful procedures help premature infants' brains?

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Premature infants born earlier than 28 weeks gestation who experience fewer needle pokes while receiving life-saving care in the neonatal intensive care unit may have better growth of a part of the brain called

the thalamus. The new study is published in the October 21, 2020, online issue of *Neurology*, the medical journal of the American Academy of Neurology. The thalamus is a structure at the center of the brain. One of its functions is to relay sensory information from the body to the rest of the brain, where it is then interpreted as sensations like pain, touch or temperature.

The study compared [premature infants](#) who had a catheter placed in their central veins and central or peripheral arteries for more than 14 days to infants who had the catheter for a shorter period of time. The catheters, called central arterial lines and venous lines, act as portals for blood draws, blood pressure checks, nutrition and medication, reducing the number of individual needle pokes.

Researchers found that premature infants for whom the central lines were maintained for longer periods of time had fewer needle pokes and thus fewer painful procedures. They also found that children with longer use of a central line had larger volumes of the thalamus. Other studies have found that the volume of the thalamus may be associated with overall brain development in early childhood.

"Babies born very prematurely are exposed to multiple unpleasant and painful yet necessary procedures every day," said study author Emma Duerden, Ph.D., who conducted the research while at The Hospital for Sick Children (SickKids) in Toronto, Canada. "Placing central arterial and venous lines in a premature infant's skin to deliver care and monitor their progress dramatically reduces the number of painful skin breaks. However, some clinicians don't place these catheters for longer periods of time due to concerns about possible infection. Our research not only found that prolonged use of central arterial and venous lines was associated with larger thalamus volumes, it also found that prolonged use was not associated with a greater number of infections."

For the study, researchers followed two groups of very premature infants, all born earlier than 28 weeks gestation at two hospitals. The first group of 86 infants had central lines that were in place for 14 days or more. The second group of 57 infants had the central lines in place for fewer than 14 days. The central lines were exchanged with peripheral lines that need to be replaced almost every day. The average hospital stay for all premature infants was 28 days.

The infants who had prolonged use of the central lines had an average of 34 needle pokes while the infants who had restricted use of the central lines had an average of 91 invasive procedures during their hospital stay.

Researchers used brain scans to measure the size of the thalamus a few weeks after birth. After adjusting for factors like sex, age at birth and age at brain scan, researchers found that the infants who experienced 34 or fewer needle pokes had an average thalamus size of 1,233 cubic millimeters (mm³) compared to a smaller average size of 1,110 mm³ for the infants who experienced 91 or more needle pokes.

Researchers assessed the children again when they were an average of five years of age. They were given cognitive tests to measure thinking and memory skills as well as motor tests to measure strength, movement and coordination. Children who had larger thalamus size as premature infants scored better on average on cognitive and motor tests than those who had smaller thalamus size.

"Babies born prematurely can have numerous health struggles, so if clinicians can reduce their pain during the first few weeks after they are born, this could possibly lead to improved brain development over time, with a potential to have a huge impact on their lives," said Duerden.

"While our study shows an association between pain reduction and brain development, it is important to note that more research is needed. We found no increased risk of infection with extended central arterial and

venous line use, however future studies in larger groups of premature infants should examine this more closely to determine if the benefits to the [brain](#) outweigh any possible risks."

A limitation of the study was that prolonged and shorter use of the lines was not randomly assigned. Instead, the decision to use central or arterial lines was driven primarily by the hospital at which the premature [infants](#) received care.

Provided by American Academy of Neurology

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