

For children with hearing loss: The earlier the better for cochlear implants

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Receiving a cochlear implant before 18 months of age dramatically improves a deaf child's ability to hear, understand and, eventually, speak, according to a multicenter study led by scientists at Johns Hopkins.

The study, published in the April 21 issue of the [Journal of the American Medical Association](#) (JAMA), is believed to be the first nationwide look at the impact of surgical timing on the success rate of the implants. The surgery consists of placing a small electronic device into the ear that bypasses the inner ear's damaged [nerve cells](#) and transmits sound signals to the brain.

The researchers followed 188 [children](#), ages 6 months to 5 years, with profound [hearing loss](#) for three years after receiving [cochlear implants](#) at six U.S. hospitals. They tracked the children's newly emerging ability to recognize speech after the implant, and compared their levels of language development to those of 97 same-age children with normal hearing.

While speech and language skills improved in all children regardless of age after they received a cochlear implant, age emerged as a powerful predictor in just how much improvement was seen. The finding points to a critical window for diagnosis and treatment, one that does not stay open for very long. Therefore, the researchers say, delaying implantation deprives children of essential exposure to sounds and speech during the formative phases of development when the brain starts to interpret the meaning of sounds and speech.

"We identified a clear pattern where implantation before 18 months of age conferred a much greater benefit than later implantation, allowing children to catch up fast, sometimes to nearly normal levels," says lead investigator John Niparko, M.D., director of Otolaryngology—Head & Neck Surgery at Johns Hopkins. "Delaying intervention until a child loses every last bit of hearing deprives the brain of much-needed sound and speech stimulation that is needed to develop language."

Each year of delay, the investigators say, can put a child a year behind in language development. Therefore all young infants with suspected hearing loss, and those with family history, should be monitored vigilantly and referred for treatment immediately, they say.

Even though the children in the study never reached the language levels of their hearing counterparts, those who received cochlear implants developed a decidedly better ability to understand and speak than they would have without the device, the researchers found.

Indeed, when researchers looked at children of all ages, their ability to understand speech grew twice as fast as it would have been expected to without the device (10.4 vs. 5.4). Their ability to communicate back, either with words or other age-appropriate modes of expression, grew nearly one and a half times faster than it would have without an implant (8.4 vs. 5.8).

Children who received a cochlear implant before age 18 months nearly caught up with their normal-hearing counterparts over the subsequent three years. Children who received implants after age 3 had language gaps that corresponded directly to the length of delay before receiving the implant.

The study also showed that children implanted before age 18 months managed to reach speech and language developmental milestones much

faster than those who received their implants later, revealing gaps between a child's chronological and language ages. For example, children with normal hearing reached a key speech comprehension milestone at age 27 months, on average, and children who received an implant before age 18 months did so around age 3 years. But those who received an implant after they turned 18 months and before they were 3, reached that milestone 15 months later than children who received an implant before age 18 months. Those who received an implant after age 3 did not reach the milestone until nearly two years later, on average, when compared with children who received an implant before 18 months of age.

When researchers looked at verbal expression milestones, a similar pattern of delay emerged. The gap between chronologic age and language age grew wider the later a child underwent implantation.

Another important factor in language development was how soon and how much the parents interacted with a child, the study found.

"The impact of early cochlear implantation was greatly augmented in children whose caregivers use language to engage them," Niparko said. "And we cannot overestimate the importance of caregiver communication with babies at a very early age, whether they have some degree of hearing loss or normal hearing."

Provided by Johns Hopkins Medical Institutions

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