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## Hear, Kitty Kitty

By Carolyn Gramling  
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When it comes to restoring hearing, timing is everything. Inner-ear implants work well for congenitally deaf children, or for adults or children who lost hearing later in life, but do little for adults who have been deaf since birth. Now researchers believe they have figured out why.

Cochlear implants bypass damaged hair cells in the inner ear and directly stimulate the auditory nerves. But why are they more effective when implanted at a young age? Deaf cats may have provided the answer. Like humans, congenitally deaf cats have an abnormal auditory nerve structure, with nerve endings that lack most of the small cellular spheres, called synaptic vesicles, that carry chemical transmitters from one

### Listen up.

Cochlear implants may work by restoring key structural features important for hearing.

Credit: Giry Daniel/Corbis Sygma

nerve cell to the next. What vesicles are present are misshapen, flattened, and oversized.

To figure out why cochlear implants are more effective in young mammals, neuroscientist David Ryugo of the Johns Hopkins University Center for Hearing and Balance in Baltimore, Maryland, and his team implanted the devices in four 3-month-old congenitally deaf cats. After implantation, the researchers had the cats listen to 3 months of environmental and speech sounds in the lab. To ensure that the implants were improving the cats' hearing, the researchers recorded the animals' neural responses as a result of electrical stimulation, a standard test that is also used for patients with cochlear implants. After the testing period, the researchers compared sections of the implanted cats' brains with the brains of three normal and three untreated deaf cats. They found that synaptic structures in a group of auditory nerve fibers in the normal and treated cats' brains were indistinguishable. That suggests that during nervous system development, it's possible to "resurrect" those synapses, the researchers report 2 December in *Science*.

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It's a convincing argument that implanting the devices at a young age can help preserve or restore key structural features important for hearing, says neuroscientist Thomas Parks of the University of Utah in Salt Lake City. And, he adds, it suggests that the benefits of inserting cochlear implants may offset the risks of performing the surgery in children.

### Related Sites

- [Ryugo Lab at Johns Hopkins](#)
- [Parks Lab at University of Utah](#)
- [CDC's site on hearing loss](#)



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