

# HEI RESEARCH *in the news*

## BREAKTHROUGH AUDITORY DEVICE USES MICROELECTRODES IN BRAIN TO RESTORE HEARING

**A**t the House Ear Institute in late 2003 and early 2004, physicians successfully implanted the first five patients of a clinical trial with a penetrating electrode auditory brainstem implant (PABI), a revolutionary prosthetic device. An electrode array is placed into the hearing portion of the brainstem (the cochlear nucleus) to stimulate the brain and restore some hearing to deaf patients. This success capped a 15-year joint effort by scientists, engineers and physicians of HEI, the Huntington Medical Research Institutes in Pasadena, and Cochlear Limited in Australia.

The PABI was created primarily to restore hearing to patients whose auditory nerves have been destroyed by the growth of bilateral tumors, and who therefore cannot benefit from cochlear implants. There are also cases of bilateral damage to the cochlear nerve where a PABI may be indicated. The PABI is an improvement of an Auditory Brainstem Implant (ABI), which was FDA-approved in 2000 and has been implanted in more than 300 patients worldwide. The PABI's new electrode array is designed to provide pitch-selective microstimulation, and deliver greater speech recognition and comprehension of more environmental sounds than its predecessor.

House Clinic surgeon Derald Brackmann, M.D., and neurosurgeon William Hitselberger, M.D., implanted the PABI device in all five patients, and HEI audiologist Steve Otto, M.A., and scientist Robert V. Shannon, Ph.D.,

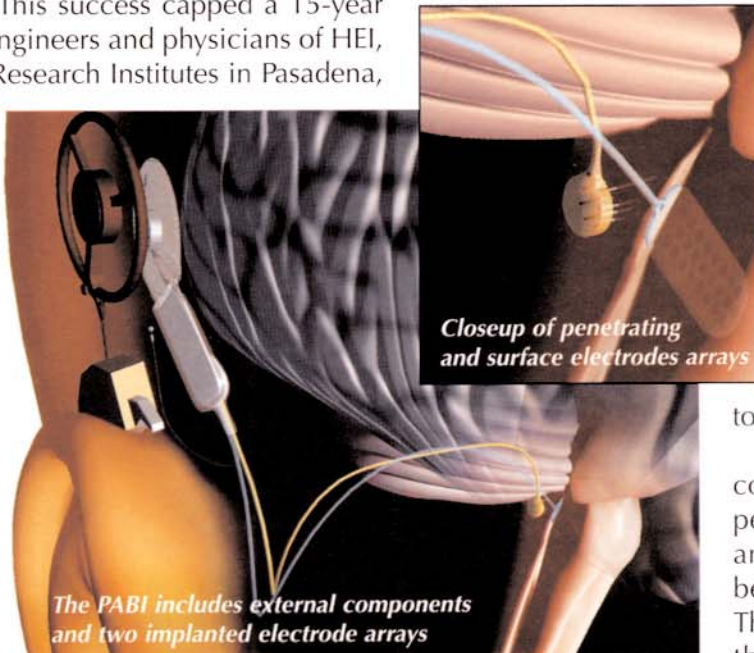
tested its effectiveness by activating the electrodes. "Our hope for this new device is that speech comprehension will be closer to that experienced by multi-channel cochlear implant users," said Dr. Shannon, co-investigator of the project at HEI, and developer of the methodology used to evaluate the PABI's capabilities.

Molly Brown (see her story on page 18), the second

PABI patient, attended a January 2004 press conference held at HEI just days after her device was activated. "It's only been three days, but already I'm hearing sounds I'd forgotten. I'm hearing paper crinkling, doors closing and voices – I can tell when someone is speaking. I can't wait to hear my children's voices."

"Deafness isolates you so completely," says Molly. "For people who once could hear and now are deaf, the world becomes a very lonely place. The PABI has returned me to the world of expression through sound, allowing me to connect with my family, friends, doctors and community." ❖

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*The PABI includes external components and two implanted electrode arrays*

*Closeup of penetrating and surface electrode arrays*