

Choclear implants

New hope for the profoundly deaf

A California company provides the wire products integral to the transfer of electrical signals to the choclear.

Modern science has continued to develop hearing aids of reduced size and increased complexity to provide clear, amplified sound for the hearing impaired. But what options are available to profoundly deaf patients who face a world of silence when those conventional hearing aids no longer work? The answer for many is cochlear implants, devices that depend on micro-fine wire electrodes to bridge the gap between man and machine and restore hearing to the totally deaf. One person whose life has been enriched by the latest implant technology is Doug Lynch of Sylmar California.

Lynch knew that his life was going to change drastically one month before his wedding in 1992 when he suddenly became deaf. His immune system turned on itself, attacking his left inner ear and rendering him totally deaf on that side. Then eight months later, in just one day, his right ear failed also.

Allergic to self

"An auto-immune inner ear disease caused my deafness. My body attacked my own inner ears as though I was allergic to myself," Lynch recounts. "The treatment included very aggressive chemotherapy, which I went through with moderate success. I regained a little bit of hearing in one ear. Then, a year later, after weaning myself off of medications and using powerful hearing aids, the disease struck again and wiped out what I had struggled to regain through chemotherapy."

Lynch was only 25 years old at the time. "Deafness was the most isolating thing I could ever imagine," recalled Lynch. "Being

deaf means losing your ability to communicate. I think Helen Keller said it best when she said, "The loss of sight removes you from things and objects, but the loss of hearing removes you from people."

Searching for solutions, Lynch discovered a new technology: cochlear implants. Initially he was discouraged from looking into implants because his doctors said that they weren't perfected. He quickly found that implant technology was far more effective than the doctors were claiming.

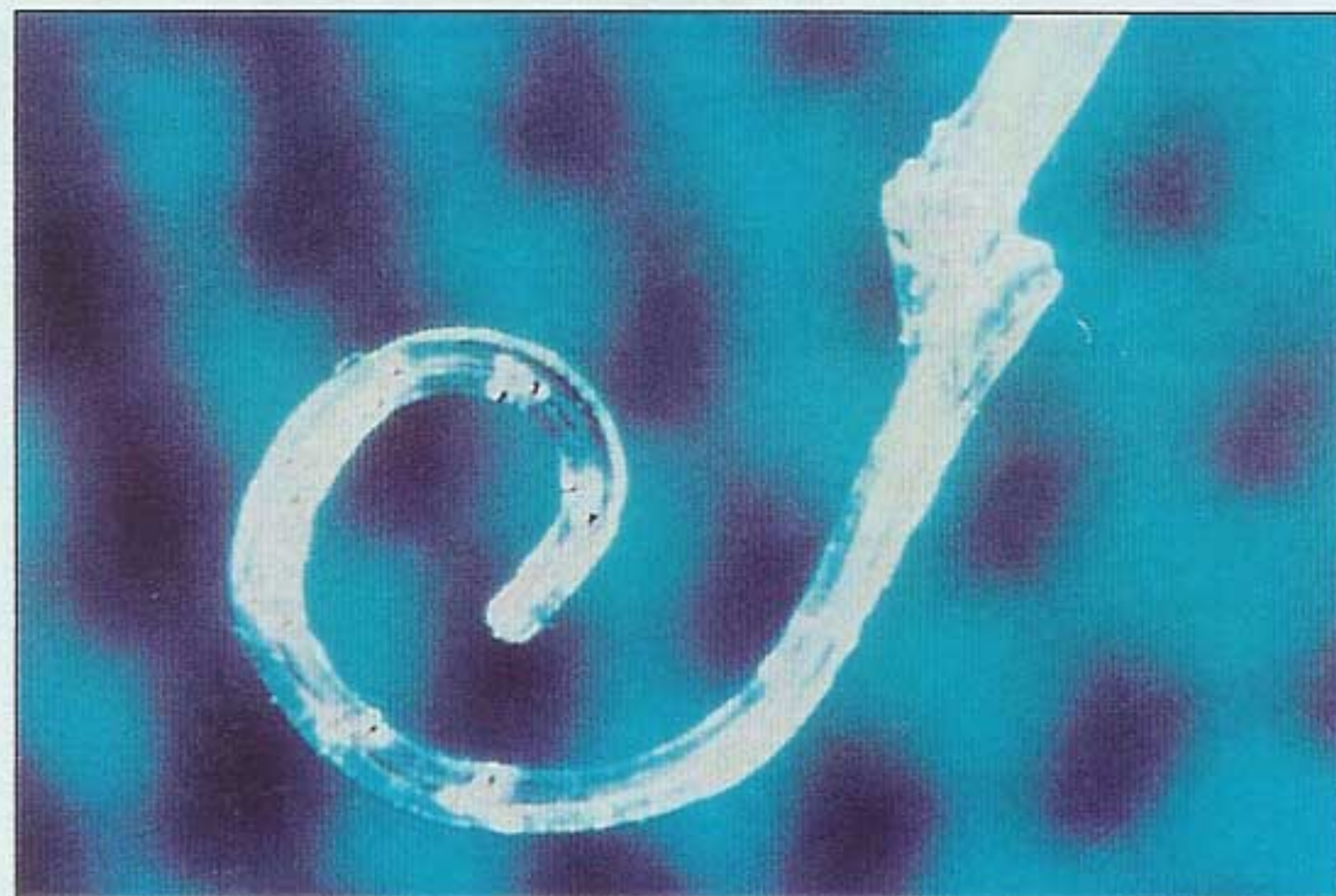
Cochlear implants are electronic devices designed to improve the hearing and communication abilities of people who are profoundly deaf. They differ from normal hearing aids in that they do not amplify sound, but rather convert it to electrical signals that are sent directly to the cochlea, the snail-shaped part of the inner ear.

Hearing restored

After much research Lynch consulted with his physicians and decided on the Clarion cochlear implant by Advanced Bionics, a decision that restored his hearing and marked a turning point in his life.

The Clarion system includes a cochlear stimulator/receiver surgically implanted under the skin behind the ear. External components include a sound processor box, a cable, and a headpiece incorporating a microphone and transmitter.

The implant's most critical component is the spiral-shaped electrode array, which extends from the stimulator/receiver and fits inside the cochlear itself. The array consists of 16 ultra-fine platinum/iridium wires. These



ultra-fine wires deliver electrical signals to the hair cells at areas in the cochlear corresponding to the sounds' frequencies. Higher sounds are sensed near the cochlear's entrance, lower sounds are sensed further in.

To manufacture this simple yet critical component, Clarion called upon California Fine Wire, A Grover Beach, California-based supplier of speciality wire products. The cochlear implant array's effectiveness is heavily dependent on California Fine Wire's ability to maintain a high degree of consistency and quality in their production process. Initially, large-diameter wire is drawn through a series of progressively smaller dies and re-wound into spools. Each pass through a die further reduces its diameter and dramatically increases its length. The wire quality and die construction is extremely important considering that even a microscopic burr could produce an unacceptable scratch in the finished wire. CFW can draw wire, made from over 1000 different metals and alloys, down to diameters as small as 0.0003 inches, one tenth of the human hair.

Focused electrical signals

"At CFW the ends of the wires to be used in the arrays are formed into very small balls. These balls focus and direct current toward the interior of the cochlear where the nerve fibres are," explains Lynch. "The more fo-

cused that you make the electrical signals, the more control you have over the patient's ability to receive and formulate signals."

An audiologist uses a computer to 'tune' the implant to the individual patient's needs. Each patient's implant is programmed to provide the amount of electrical stimulation he requires depending on the viability of his hair nerve fibres.

"When the device was first programmed, I was completely shocked and amazed that I could hear quite well," Lynch enthused. "In my own personal experience, and almost every single situation, things sound just like they did before I lost my hearing. Its as pure and rich and beautiful as it was before. For me, it's been an almost total restoration of my ability to hear."

Unfortunately, not everyone is qualified for receiving a cochlear implant. Candidates must have a profound sensorineural hearing loss in both ears which is unresponsive to high-powered hearing aids, and should have some speech and language experience. Children must be over two years of age (although some as young as 18 months may qualify under certain circumstances), and should be in a positive family environment where speaking and listening are encouraged.

California Fine Wire