



California Cures!

How the California Stem Cell Program is Fighting Your Incurable Disease!

By (author): **Don C Reed** (*Americans for Cures Foundation, USA*)

Chapter Four: When the Dolphin Broke My Ear

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WHEN THE DOLPHIN BROKE MY EAR

Sleek gray lengths gliding through the blue, the dolphins were absolute masters of their environment ...

From 1972–86, I worked as a professional scuba diver for Marine World/Africa USA, an aquarium-zoo in Redwood City, California. Most of the work was plain labor, scrubbing algae off the walls, floors, and windows of the giant tanks. But the creatures we swam with? Sharks, dolphins, eels, seals and killer whales — magic.

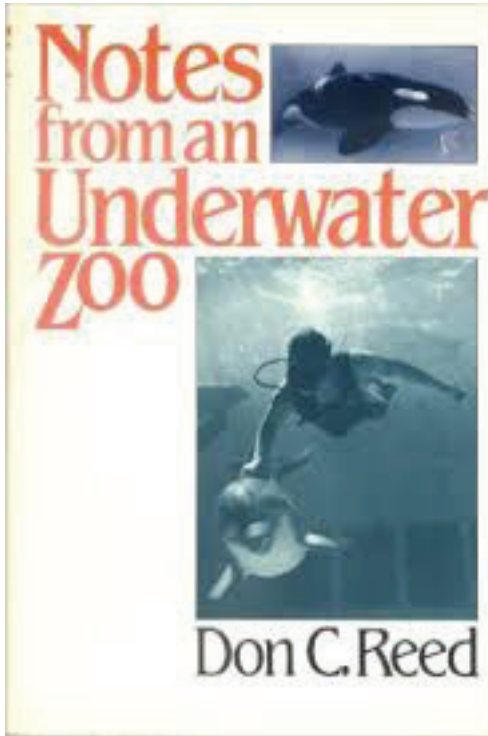
Sometimes we had to bring the dolphins to the vets for medical attention. This was not always easy. (In later years, tanks were made with rising floors, which made the situation less stressful for all concerned.)

But in those early days, we would often put a net in the water: not to catch the dolphins, but to narrow their swimming area. We would swim over the top of the net, wait until the dolphin appeared to relax, and then gently approach, and put our arms around them. When they cooperated, everything was easy. However ...

One day a 350-pound dolphin named Ernestine snapped her jaws at me, and nodded her head in warning. (“Yes” means “no” in dolphin.) I should have backed off and tried again later. But I was young. I swam toward her, slowly, arms out.

Ernestine did a sudden forward roll, like dolphin judo. Her tail slammed the side of my head, impact like a car crash. Cold water entered my burst eardrum.

There was a roaring in my head, as I pulled myself out of the tank. Everything was spinning round and round, and I sat down to make the planet hold still.



Author and dolphin.

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I was lucky; the damage was minimal. I stayed out of the water for the next six weeks, and was deaf in one ear for a while.

Most people lose their hearing in a more permanent way.

Hair loss. No, not the white tufts sticking out of old folks' ears, but near-invisible hair cells, deep within the ear, in the snail-shaped cochlea, where 30,000 hair cells rest in a bath of liquid. When noise occurs, the hair cells tremble slightly. This sends vibrations to the brain, which translates them as sound.

When the hair cells wear out, there are no replacements. Lose some, and you become hard of hearing. Lose them all, and you are deaf.

Over the age of 65, one third of the world's population is deaf.¹

¹http://www.who.int/pbd/deafness/news/GE_65years.pdf



Alan Cheng (Stanford Profile).

And those who are just “hard of hearing?”

“Approximately 15% of American adults (37.5 million!) aged 18 or over report some hearing loss.”²

Hearing aids help, turning up the volume, but in a distorted way. With or without the aids, hearing-challenged people face difficulties.

Anyone who has had to answer a hearing-challenged person’s endless questions — “What did you say? What was that?” — knows how irritating it can be.

But imagine being on the other side of the equation, needing others to speak louder, not once or twice, but for every encounter of the day? And what if the hearing departs altogether?

Helen Keller, blind and deaf, compared the two conditions:

“Deafness means the loss of the most vital stimulus ... voice that brings language, sets thoughts astir, and keeps us in the company of man. Blindness separates people from things; **deafness separates people from people.**”³

²<https://www.nidcd.nih.gov/health/statistics/quick-statistics-hearing>

³<http://www.goodreads.com/quotes/391727-blindness-separates-people-from-things-deafness-separates-people-from-people>

All too often a deaf person will sink into loneliness, depression and despair, and just quit trying to participate. And, of course, some jobs are denied them.

But if their hair cells could regrow, we might restore their hearing.

Why are there no deaf chickens? Birds can regrow hair cells. If they can do it, why should humanity be denied the subtlety and grandeur of sound?

At Stanford University, a group of scientists want to rectify that situation.

"There are seven of us in the Stanford Initiative to Cure Hearing Loss (SICHL, pronounced like sea shell) working on different parts of the ear. As a group, we collaborate, and push hearing research forward," said Dr. Alan Cheng, M.D., when we did a recent catch-up interview.

A surgeon, Dr. Cheng operates on deaf children, giving them a cochlear implant, a "complex electronic device that can help provide a sense of sound ..."⁴

But implants give only a crude imitation of normal sound. The person may understand speech, and grasp warning signals, like a car honk, but that is about it.

Dr. Cheng feels frustrated, because he does not have something better for the children. But that may change.

Remember how I felt dizzy after the dolphin struck? Not only was my hearing affected, but also my sense of balance. Our sound system has two parts: hearing itself, and also balance. The hair cells in the hearing part do not regrow, but those in the balance system do.

A tiny balance organ, the utricle, is our center of gravity awareness. When the elevator drops, or a pilot swerves the jet, what we feel are signals from the utricle.

And inside the utricle, hair cells can regrow.

Dr. Cheng may have found the stem cell that starts hair cell regeneration.

"How's it going?" I asked him.

⁴<https://www.nidcd.nih.gov/health/cochlear-implants#a>

"It's going!" he said enthusiastically, "We see re-growth of hair cells in the mouse balance organs. And the balance function appears to improve, according to how many hair cells come back."

And then, an unexpected delight, like money found between couch cushions.

There may be a way to prevent a major cause of deafness.

In poor countries, sick children are often given an antibiotic drug called aminoglycoside. This helps their immune system problems — but may also make them deaf. An estimated 30% of those who take this drug lose their hearing.⁵

What if there was a replacement antibiotic that would not steal the patient's hearing? Dr. Cheng and colleagues may have developed a drug to do just that.

Their path is complicated and difficult. In fact, one of their group leaders, the renowned Dr. Stefan Heller, has just released a paper on deafness-healing approaches that did NOT work out for them.

Discouraging? Not really. The scientists at SICHL — and all who read the paper — can use that knowledge to avoid mistakes, not wasting their time going down the wrong road. And it offers a positive direction: on the importance of the environment of the inner ear.

Dr. Cheng sums up the struggle:

"Regenerating hair cells in humans to restore hearing is going to be a long journey with numerous obstacles. But with the support of the California Institute of Regenerative Medicine, and the Stanford Initiative in Curing Hearing Loss ... we are ... positioned to overcome these challenges in years to come." — Alan Cheng, personal communication.

Scientists like Drs. Cheng and Heller are self-starters. If they have the funds, they will do the work: practically living at the lab, working toward the day when the deaf can hear again.

If I had to sum up their attitude, it might be something like:

If we never quit trying, we can only win or die — and everybody dies, so why not try?

⁵<http://emedicine.medscape.com/article/857679-overview>