

# CALIFORNIA EAR INSTITUTE

Hear For Your  
Future!



CALIFORNIA EAR INSTITUTE

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# WE'RE ALL EARS!

SPECIAL RESEARCH EDITION



MEDICAL/SURGICAL SERVICES



HEARING DEVICE CENTER



AUDIOLOGY



LET THEM HEAR FOUNDATION



CALIFORNIA SINUS INSTITUTE

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## WHY RESEARCH?

The hearing loss population has grown to 31.5 million according to the July 2005 edition of *The Hearing Review*. Projections indicate that this trend will continue and we can expect the hearing loss population to grow by one-third within a single generation\*. Since 1968 the California Ear Institute has been solely dedicated to providing the best service in hearing healthcare. A large part of our success is our dedication to research.

Whether the research focuses on improving and inventing surgical techniques, providing state-of-the-art hearing and balance testing, or impacting the future of cochlear implants, our goal is to improve the lives of all who suffer from hearing disorders. Included in this special Research edition is a brief explanation of just some of the current research efforts of the California Ear Institute and the Let Them Hear Foundation.



## RESEARCH IN COCHLEAR IMPLANTS

### CI Surgical Findings and Perioperative Outcomes <18 months

Cochlear implant surgery has become the standard of care for deaf children at younger and younger ages. At the Let Them Hear Foundation, we have a very high number of young children with CI's. The results of surgery and Cochlear Implantation in children down to 5 months of age is being studied. Studies such as this are necessary in order to go to the FDA to lower the allowed age of implantation below the current 12 month limit.

### Bilateral Cochlear Implants Adults and Children

Only in the last 3 years Bilateral Cochlear Implants have come into clinical use as the result of the work at the Let Them Hear Foundation and others. Less than 1% of patients world wide with CI's have them in both ears. At LTHF, a very large number (1<sup>st</sup> or 2<sup>nd</sup> in the

US) are bilateral cochlear implant patients. Proven results of previous work here shows directional hearing capabilities, increased understanding in noise, and improved speech understanding. Continuing work in adults and extension to Pediatric patients is occurring in this unique population of patients

### Allergy to Cochlear Implants

Five cases of allergy to Cochlear Implant casing materials have been reported in the world literature. LTHF / CEI has 2 more to add, and details in this important work the protocol for testing and diagnosis when Allergy to CI is suspected, course of treatment, and the mechanism to make a CI without those components that create the allergy in the patient.

### Accuracy of ASSR in Pediatric Cochlear Implant Evaluation

For the first time, testing of children with hearing loss can be done accurately at each sound frequency with this ground

breaking machinery utilized by our diagnostic audiology department. The techniques extend to children from birth onward. With deaf children in the first months of life, accurate testing is critical to the decision for cochlear implantation or other intervention. With this study, we compare the accuracy of the Auditory Steady State Response Equipment to our current standard, the hearing test to ensure appropriate decisions are being made for each patient.

### Bilateral Cochlear Implants and Sound Localization

Through a special laboratory at UC Berkeley, previous studies done at LTHF on the ability of patients with bilateral CI's to localize a sound source are being extended. The laboratory has sophisticated psychoacoustic measurement capabilities such as 3D instead of 2D special relations measurements. Previous work in the laboratory has shown that patients with Cochlear

\*The Hearing Journal, July 2005

Implants do not rely on timing cues (like the person with normal hearing), but rely on other qualities of sound in order to localize sound. Results should lead to a better Cochlear Implant produced in conjunction with manufacturers.

#### **Posturography and Cochlear Implantation**

Posturography is a very sophisticated and sensitive testing mechanism for the balance system. We know Cochlear Implant patients do very well without balance problems following surgery. We also know the inner ear, where the electrode is placed, contains both balance and hearing function. By applying this test we will define any subtle balance changes that have previously gone undetected. This will be particularly important with bilateral CI's to determine if two devices place these patients at risk for balance dysfunction.

#### **Dural Exposure in Cochlear Implant Surgery**

CI surgery in very young children involves placement of a device that measures 5 mm or so in thickness. This device is placed in a depression created in the skull surgically. The average skull thickness in children is less than 2mm. Full thickness removal of the skull and placement of the CI on the underlying fibrous lining of the skull, called the dura, is the safest technique in the very young. This study looks at the frequency of the need to expose dura and the safety of it while defining surgical techniques for less experienced surgeons to follow.

#### **Stapedius Resection in Cochlear Implant Patients < 12 months of age**

Very small children have middle ears that are correspondingly tiny. Placement of Cochlear Implant electrodes through the middle ear must avoid structures such as the facial nerve. In order to accomplish this safely in children under one year of age, removal of a small muscle attached to the middle ear bones has been performed. Since very few children under one year of age have received implants, this surgical technique is new and novel. This report seeks to describe it for the benefit of other patients and their surgeons.

#### **Auto NRT**

New equipment can potentially automate the CI programming process. In young children, this is extremely important as they do not have the language to help us program their device. Working with Cochlear Corporation, we are refining the equipment, software, and techniques to allow this to extend to others. The impact on this goal to developing nations is potentially huge, as few to no audiologists experienced with Cochlear Implants live in these environments.

#### **Cochlear Implant IRB's**

CEI / LTHF has been the site of all FDA sponsored clinical trials for CI's in Northern California since the early 1990's. These FDA studies assist in determining the safety and efficacy of these new devices. LTHF and CEI perform research for the three CI manufacturers: Cochlear Corporation (Australia), Advanced Bionics Corporation

(USA), and MedEl Corporation (Austria) and offers all devices to our patients. Dr. Roberson and Lisa Tonokawa serve as advisors on the Surgeon's Advisory Board and the Audiology Advisory Board for manufacturers.

#### **Adult Bilateral CI**

##### **Advanced Bionics Corporation**

Bilateral CI study in Adults with the Advanced Bionics 90k Cochlear Implant / Bionic Ear  
**Bilateral Pediatric CI MedEl**  
Bilateral CI study in Children with the MedEl Cochlear Implant

##### **System 4 Cochlear Corporation**

Study of the Cochlear Corporation Freedom CI, the newest Cochlear Implant on the market

##### **Hearing Preservation CI**

Surgeons at CEI / LTHF are able to insert CI electrodes into the inner ear of some patients without losing the hearing that is present in the ear. This study seeks to understand the surgical technique needed to perform hearing preservation CI surgery, potentially opening a new frontier for Cochlear Implants and the hearing impaired.

##### **Hybrid CI Cochlear Corporation**

A short electrode CI can be implanted into the inner ear without damage to the limited hearing that remains there. These patients can then use both a hearing aid and a CI to produce a melding of sound that is proving to be superior to sound from a Hearing Aid or sound from a CI alone.

## RESEARCH IN SURGICAL TECHNIQUE

#### **Pediatric Cholesteatoma**

Surgeons at CEI have performed surgery for a non-cancerous, destructive tumor of the middle ear on over 3,000 patients. This tumor, called a cholesteatoma, is the most common tumor of the ear. Several unique techniques for removal and reconstruction of the damaged hearing mechanism are practiced at our institution. This very large study seeks to understand the success of certain techniques allowing refinement in surgical technique. These findings will be shared with Ear Surgeons across the world in order to improve the standard of outcomes for Pediatric Patients.

#### **Revision of Stapedectomy vs. Revision of Stapedotomy**

Surgery for a condition called Otosclerosis

involves removing all of the stapes (called a Stapedectomy) or a portion of it (called Stapedotomy) and replacement with a prosthesis. You may not know that the Stapedotomy surgery performed with a laser was first described and performed at CEI. You may also not know that Dr. Roberson designed the prosthesis we currently use for the procedure. In a small number of patients, revision surgery is needed. This study compares revision surgery performed on patients who had stapedectomy to revision surgery performed on patients who had stapedotomy. Results favor stapedotomy and should prompt all surgeons to abandon the older technique of stapedotomy replacing it with the surgical technique described at CEI – the laser stapedotomy.

#### **Secreting Glomus / Alpha Blockade Surgical Management**

A rare tumor of the blood vessels involves the base of the skull in the ear. Surgical removal is frequently necessary. A small percentage of these tumors produce a chemical – adrenaline – that can make surgery dangerous. Specifically, removal of a secreting tumor can suddenly decrease the amount of Adrenaline in the bloodstream causing blood pressure to drop. This drop in blood pressure is non-responsive to medications and may lead to the death of the patient in the operating room. This work details the preoperative recognition, preparation for the removal of the adrenaline source (the tumor), and the intraoperative treatment of such patients based on our experience with several such cases.

## RESEARCH IN GENETICS

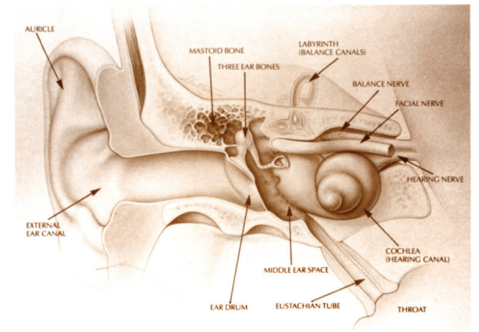
**Premature Presbycusis and Connexin Gene**

Genetic transmission of hearing impairment is the most common cause of hearing loss and our ability to understand it, define the gene responsible, and screen patients is exploding. This extremely exciting and ground-breaking study looks at the most common gene for unexplained causes of hearing loss and its effect on the aging ear.

**Genetic Sequencing in Hearing Loss**

Working with Dr. Iris Schrijver, and a start up genetics testing laboratory, LTHF and CEI patients have the option to have testing

performed on the genes that code for the structures in their ears. Approximately 300 genes and the proteins that come from them are needed to form a human ear. This “gene chip” technology could, for the first time, allow Doctors in the clinic to test over half of these genes at a single time! We are very enthralled that this work will have immense impact on the treatment of the hearing impaired.



## RESEARCH IN AUDIOLOGY

**Superior Semicircular Canal Dehiscence and Posturography**

A new cause of dizziness has been described in the last 3 years where bone over one of the balance canals dissolves exposing the inner ear. Balance disturbance and hearing loss result. In a specialized test, the posturography equipment may be a way to screen for this disorder quickly, inexpensively, and accurately. A new test has been devised in conjunction with NeuroCom, the maker of the Posturography machine, for this purpose.

**Stacked ABR and Meniere's Database**

Using commonly available equipment, a new test protocol has been formulated to test for Meniere's Disease and the associated elevated fluid pressures in affected ears. Working with the House Ear Clinic, we are gathering data to determine the accuracy and sensitivity of this not-yet-available-to-the-public test.

**iPod Project – Sound exposure with personal music players**

A generation of young people is using personal music players very frequently. In many cases, sound exposure is intense. LTHF worries that

children and young adults are damaging their hearing from chronic exposure to damaging sound energy. From industrial exposure experiments, we know that noise exposure over a lifetime gives a cumulative effect. Our youth may be setting themselves up for hearing loss in later life. By measuring the Sound Pressure Levels from individual personal music players and the amount of weekly exposure, we seek to quantify this risk before it is too late for some individuals.

**If you are interested in our Botox for Tinnitus Study please contact Regina in San Ramon 925/807-1122 or Kathleen in Palo Alto 650/462-3129**

## RESEARCH WITH BOTOX

**Botox® for Tinnitus**

Botox®, frequently used for wrinkles, also has the characteristic that injections can stop chronic pain syndromes such as migraines. Tinnitus, very similar to chronic pain, is the target of this investigation. In the first work ever conceived or done on the subject, CEI / LTHF have shown a 20% response rate for tinnitus sufferers in a small group of patients. This study broadens

the number of people and sites that will treat tinnitus sufferers with Botox® injections while following the tinnitus in each subject to define effects of the intervention.

**Botox® for Migraine Associated Dizziness**

Patients with migraines frequently suffer dizziness as the dilated blood vessels in the brain responsible for the headache steal blood from the inner ear. This leads to dysfunction

and symptoms. Treatment of the migraines with Botox® may also alleviate the dizziness associated with the underlying cause. Only recently recognized, migraine associated dizziness may account for over 50% of those cases of dizziness previously beyond the limits of medical understanding giving hope to a segment of patients with a very disabling problem

## RESEARCH WITH CASE STUDIES

**Case Report: Carcinoid of the Tympanic Membrane**

Report of a case of a patient with an extremely rare tumor of the eardrum that was treated at CEI

**Case Report: Ependymoma of the IAC**

Report of a case of a patient with an extremely rare tumor of the brain that involved the canal between the brain and the inner ear. This tumor was removed surgically curing the patient.

**Case Report – lightning strike hearing impairment**

A patient hit by lightning 16 years ago has been deaf since. Implanted with Bilateral Cochlear implants at CEI / LTHF, she has had her hearing returned! This is the first such patient to our knowledge in the world and this report details her case.



**CEI and LTHF staff meet monthly to research case studies.**

**SAVE A TREE!**

**SIGN UP TO HAVE THE CEI/HDC NEWSLETTER SENT TO YOU ELECTRONICALLY. JUST FOLLOW THESE STEPS:**

- 1. GO TO OUR WEBSITE, WWW.CALIFORNIAEARINSTITUTE.COM**
- 2. SELECT THE "NEWSLETTER" LINK**
- 3. COMPLETE AND SUBMIT THE NEWSLETTER SUBSCRIPTION FORM**

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**RESEARCH FOR THE FUTURE**

**Stuttering Study**

For some reason, time delaying sound can completely stop stuttering in some stuttering patients! CEI physicians are working with the maker of an implantable device that would perform this function for the treatment of those with stuttering.

**Middle Ear Mechanics Lab**

A large number of studies are ongoing in the laboratory, located onsite at LTHF, that allow measurement of the effects of intervention and device application to the human middle ear. Human cadaver bones are being used to test new prostheses, adjustable

prostheses for surgical reconstruction, implantable hearing devices, and hearing preservation Cochlear Implant surgical techniques. Several pieces of equipment have been built for Dr. Roberson that allow LTHF to perform experiments not possible anywhere else in the world.

**Advanced Capabilities**

- Acoustic Neuroma Center
- Assistive Listening Devices
- Skull Base Surgery
- Pediatric Hearing Loss Evaluation & Treatment
- Vestibular Rehabilitation
- Sudden Hearing Loss
- Tinnitus Retraining Therapy
- Cochlear Implant Program
- Congenital Aural Atresia Repair
- Universal Newborn Hearing Screening Program
- Hearing Device Evaluation & Fitting
- Laser Stapedotomy for Otosclerosis
- California Sinus Institute

**RESEARCH AT THE CALIFORNIA SINUS INSTITUTE**



The **California Sinus Institute (CSI) and California Sinus**

management of difficult chronic sinus cases since 2000. This work has led to an entirely new treatment option being available nationwide for these patients where the medications are bubbled into the nose by patients vs. taken as pills.

**Sinus Surgery with computers:**

Our doctors are also studying the role of surgical navigation ([www.surgicalnavigation.com](http://www.surgicalnavigation.com)) in sinus surgery. This involves the use of advanced sinus imaging techniques to assist during surgery- like a GPS for your car - to avoid unintended injury to surrounding vital structures and increase the safety of the surgery.

**Drug Resistance in Chronic Sinusitis:**

Chronic sinusitis patients have frequent infections. There are several studies that demonstrate increased antibiotic resistance, and the emergence of gram negative and fungal species. We are studying whether there are approaches that can decrease the use of empiric antibiotics in chronic sinus patients.

**Psychological Impact of Chronic Sinusitis:**

All chronic diseases can lead to significant impact on the quality of life and psychological functioning of patients. Quality of life outcome surveys are offered to all sinus patients at CSI.



Breathe Again

**Foundation (CSF)** is involved in research to improve the management of diseases related to the nose and sinuses.

**Sinuplasty:** This is our current **leading research project.** This involves the use of small balloons to expand the sinus drainage holes and not remove tissue - it's like angioplasty for the heart applied to the sinuses instead - hopefully faster recovery, no packing and much less pain than current endoscopic sinus surgery.

**Nebulized Medications:** The doctors at CSI have pioneered the development, use and research into nebulized medications for the

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