HEARING SOLUTIONS SIG
Thursday, October 9, 2014

Steve Knowles: **"From Deafness Back to the World of Sound"**

Personal account of the short, but meaningful time that Steve Knowles spent in total deafness from a sudden crash of his hearing on August 17, 2014 until his Cochlear Implant was activated on September 18, 2014.

Steve recounted his personal history with his inherited disease, Neurofibromatosis II that caused his hearing to go into decline in his early 30's. He pursued searches to find technology to keep him active in a busy family and business environment.

He stayed actively engaged with his ENT doctor and audiologist, while utilizing the research expertise of doctors at the Mayo Clinic and the House Ear Institute. As hearing declined and tumors inside his brain enlarged, Steve learned of encouraging options. Through the medical technology developed by numerous doctors around the world, an option that was open to him was the use of a cochlear implant.

Steve considered the options that lay before him- **deafness or a cochlear implant** The decision became clear, to have the cochlear implant surgery using the Cochlear Nucleus 6 product developed by Graeme Clark. It was Doctor Clark who invented the first multichannel cochlear implant product in his native home of Australia. The company is named Cochlear Limited and has an American subsidiary. Dr. Derald Brackman of the House Ear Institute in Los Angeles and Dr. James Kemper of the Austin Ear, Nose and Throat Clinic counseled Steve in his decision.

Cochlear implant surgery has come a long way in its process. It is now a two-hour day surgery process, and typically the patient goes home the same day. Surgery consists of securing a receiver and stimulator in the bone beneath the skin behind the ear and securing an array of 22 electrodes that are wound around the ear's Cochlea.

Sounds are received in a microphone that is part of the speech processor and looks like a hearing aid and is positioned behind the ear. The processor filters sound to prioritize audible speech, splits the sounds into channels, and sends the electrical sound signals through a thin cable to the transmitter. The transmitter is actually a coil that is held in position by a magnet placed behind the external ear. It transmits power, and the processed sound signals, across the skin to the internal receiver by electromagnetic induction. The coil is talking to the receiver and stimulator which convers the signals into electric impulses that are sent through an internal cable to the electrodes array. These impulses go to the nerves in the scala tympani and then directly to the brain through the auditory nerve system.

In Steve's situation, his surgery was completed on September 10, 2014, with instructions to see his audiologist on September 18, 2014. Results from the surgery are not apparent immediately but the actual implant is tested during surgery to make sure that the electrodes are receiving signals. Due to the swelling of the brain around the surgical incision, a typical period of a week or more is needed before any attempt is made to activate the implant. In the afternoon of September 18, four weeks and one day from deafness, the Cochlear implant was activated. Steve immediately heard low frequency sounds and then could hear the voices of his wife, daughter and the audiologist. Sound had returned.

There will be a period of acclimation for the brain to relearn some sounds and voice recognition. The last piece that will take the most time will be the appreciation of music, since it involves so

many complex frequencies. This can take up to six months. Steve has shared his appreciation for morning walks when the birds, crickets, and sounds of the neighborhood come gloriously into his head again. He can talk by phone to his children and grandchildren and he can resume interaction in the world of sound once more. In his words, "THIS IS A MIRACLE."