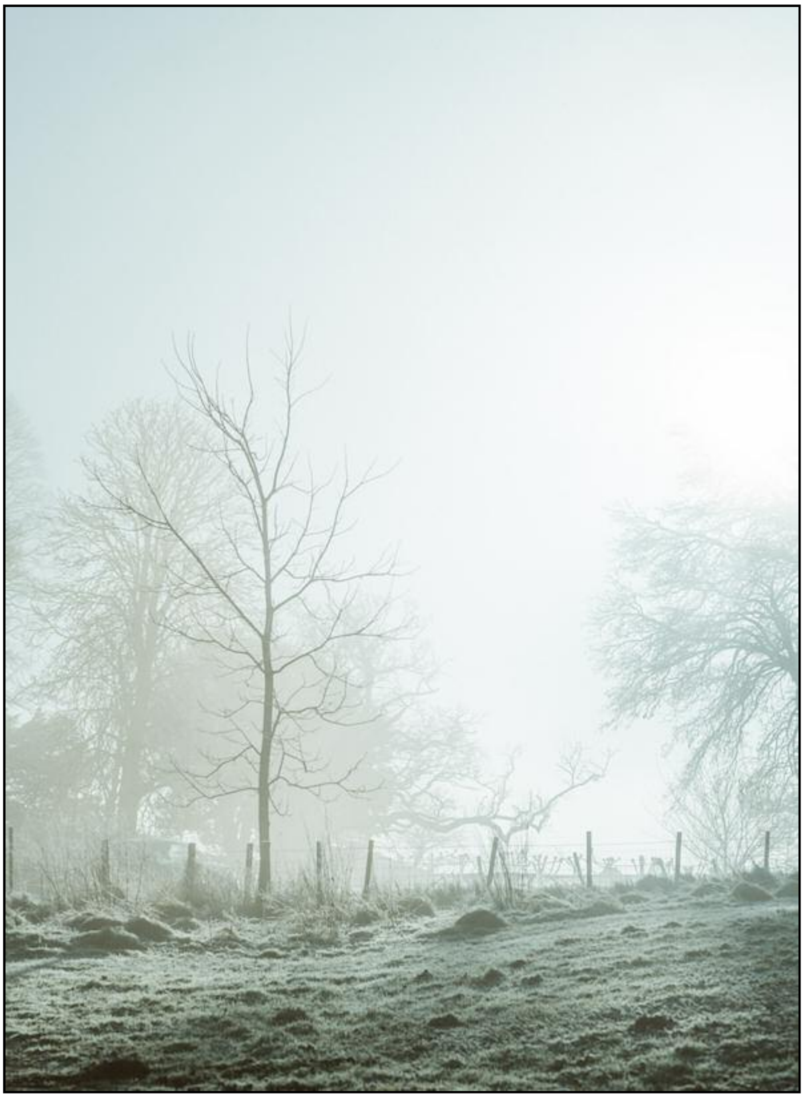
ReSound

For people with Cochlear Implants

Winter 2020 Issue 65



Countryside on a cold Winter's morning

a charity supporting implant patients

This newsletter has been produced on behalf of the Manchester CICADA Charity

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Editorial

Welcome to the Winter edition of Resound.

I have to say that this is not the start to the year that I would have envisioned as I got ready for this issue.

It has been said on many occasions recently that we are in unprecedented times, and I would agree with that.

All of the things that we normally set out to achieve as a charity will be affected over the coming months and so this issue is smaller than normal as a result.

As outlined on the next page we will be bringing out a monthly newsletter to try and keep in touch during the crisis.

I encourage everyone who may have information or experiences to pass on, to take full advantage of the Facebook, Website and Blog facilities that are or will be coming into operation shortly.

CICADA will be working closely with the Implant team at the MRI to help both new and existing CI users with information and advice to keep us all safe and also maintain the service that the MRI provide to us all.

Our close association with the MRI has also helped us recruit new members during the last year and hopefully once the immediate crisis is over , we can move on and build on the success we have had in previous years and can continue to grow.

Once again, if you have a story to tell about your journey with the implant program or an everyday occurrence we would love to hear from you, this magazine after all is about you.

We hope you enjoy this issue and if you’ve any comments, or stories to send along please let me know.

Kevin Williams - Editor

COVID-19 and CICADA

by Kevin Williams

As you know our recent AGM, which was scheduled to take place at the MRI recently was cancelled because of the risk to potential attendees because of the virus.

The need to follow the government's advice on meetings and gatherings, as well as the action taken by the majority of public venues has also meant that our event schedule has also now been cancelled and will be reviewed when the general situation improves.

For many of us, this now will mean longer periods of isolation from friends and family, which while necessary to minimize the risk of spreading or catching the virus, is in itself an added burden at times of stress.

We are, as human beings, social creatures and as a group with hearing loss all the more susceptible to isolation, which is one of the reasons that CICADA was formed in the first place many years ago.
Its objective was, and remains to be a way of bringing people with similar hearing issues together so that by social interaction we could collectively help each other.

The present crisis, apart some incidents of selfishness, has shown that we can adapt and using our own initiative find ways to support those who need it most.

We intend to do that.

CICADA as a support charity will do everything we can to use whatever methods are available to support our members.

We are looking at several ways in which we can try to help each other during this period including the following:-

1. Encourage everyone who has Internet access to join our Facebook page where we can maintain contact and collectively try to find solutions to daily problems that members may have.

2. We will produce a monthly update, both electronically, and hard copy for those without internet access, which will carry news updates from within our membership and any updates from the clinic about services, for example: How to get new batteries, what to do if equipment fails etc.

3. We will produce a Social Services contact list for each geographical location that our members live in so that they can get support if needed.

4. Set up a special blog page on our website, where you can ask questions, post comments and keep in touch with our community too during this lockdown time.

5. I would encourage people to make notes about how they cope, adapt or just manage and share their thoughts with us, as well as providing information for the monthly bulletin, which may be of help to others without internet access.

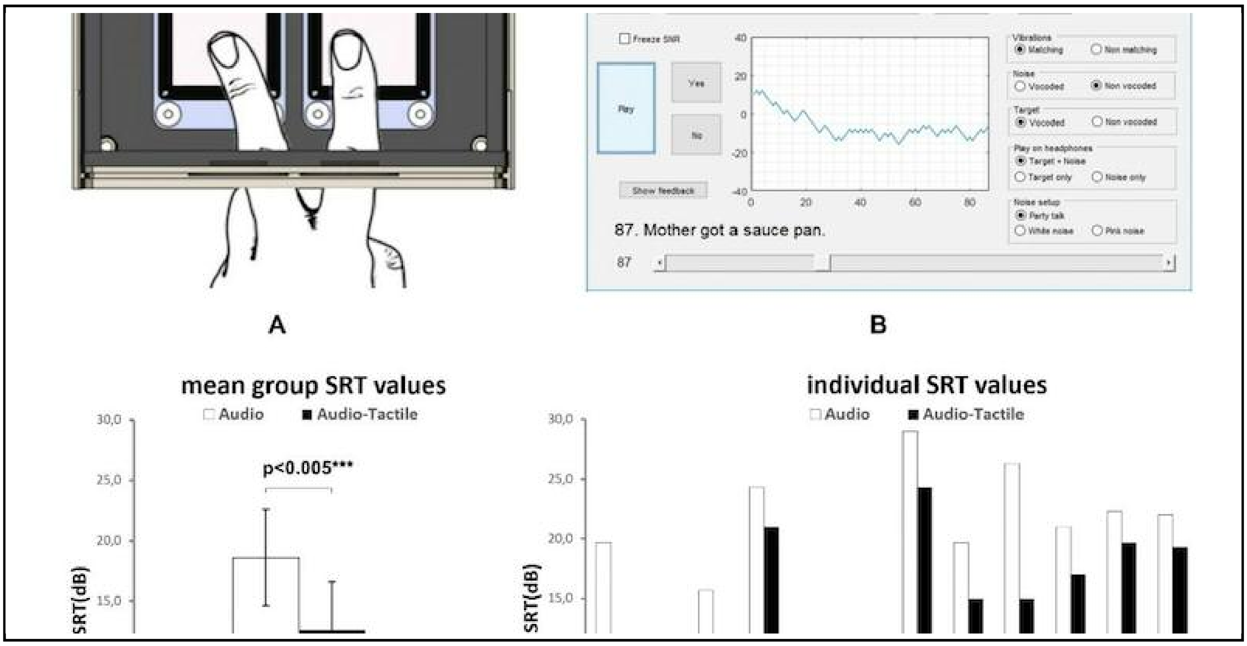
6. If you find out something that would help others in your area such as special opening times for Supermarkets then let us know either via the blog page or email me, and we will make sure people know about it.

There will be times of course when, with the best will in the world, we are not in a position to help ourselves but we are hoping that we will be able to call on other services to help.

I encourage all of you to heed whatever advice is given and above all don't be afraid to ask for help. Someone once said in a comedy I think it was, that "I didn't get where I was today by being backward at coming forward", and while I don't admire the character in the show I encourage all those that can, to not be backward at coming forward, a single idea can transform the lives of many!

Hearing through fingers: A device that converts speech

A new proof-of-concept study provides the first evidence that a speech-to-touch sensory substitution device can improve hearing in the hearing-impaired without any training, scientists report.



A novel study published in Restorative Neurology and Neuroscience provides the first evidence that a simple and inexpensive non-invasive speech-to-touch sensory substitution device has the potential to improve hearing in hearing-impaired cochlear implant patients, as well as individuals with normal hearing, to better discern speech in various situations like learning a second language or trying to deal with the "cocktail party effect." The device can provide immediate multisensory enhancement without any training.

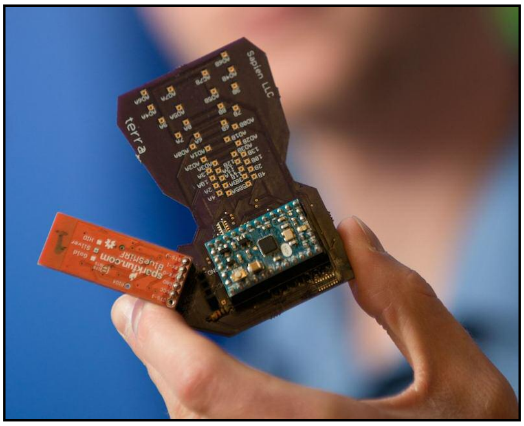
"Despite recent advancements in hearing aid and cochlear implants, the most widespread surgical implant to restore audition, hearing-impaired users still encounter significant practical and social challenges with or without aids," explained lead investigator Amir Amedi, PhD, Department of Medical Neurobiology, Institute for Medical Research Israel-Canada, Faculty of Medicine, Hebrew University of Jerusalem, Hadassah Ein-Kerem, and The Cognitive Science Program, The Hebrew University of Jerusalem, Jerusalem, Israel. "In particular, they all struggle with understanding speech in challenging, noisy acoustic environments, especially in presence of a competing speaker."

The number of sensory deprived patients and auditory deprived patients is expected to rise so it is crucial to develop efficient techniques for auditory recovery designed to convey the missing information to patients. "We live in a world that is becoming steadily more multisensory and we really need to understand the mechanisms underlying multisensory perception and integration. Providing relevant information using the sense of touch can significantly help hearing," commented Dr. Amedi.

In this current proof-of-concept study

investigators hypothesized that they would be able to improve speech understanding under challenging conditions by exploiting the ability of the brain to integrate information coming simultaneously from different senses. They designed a minimalistic auditory-to-tactile sensory substitution device (SSD) that transforms low-frequency speech signals into tactile vibrations delivered on two fingertips. They asked a group of non-native English speakers to repeat a series of sentences, which was degraded by embedding them in speech-like noise.

As expected, when participants' could rely only on audition, their understanding of such sentences was poor. Crucially, however, their sentence understanding significantly improved when they paired the degraded speech signal with complementary vibration delivered on the participants fingertips. The vibration conveyed a specific set of frequencies known as fundamental frequencies that characterize speech signals.



A tongue sensor for hearing

The reported improvement at the group level was 6 dB - a major difference considering that an increase of 10 dB represents a doubling of the perceived loudness. These results are especially relevant when compared to earlier SSD studies showing effects in behavior only after demanding cognitive training.

"Our results carry important implications for further research, as well as possible clinical and practical solutions," noted co-author Tomasz Wolak, PhD Eng, Head of the Bioimaging Research Center, Institute of Physiology and Pathology of Hearing, World Hearing Center, Warsaw, Poland." The ability to 'hear through one's fingers' can significantly help hearing. Our approach suggests that multisensory stimulations providing the same type of information (in this case spoken language conveyed through touch in addition to hearing) should be processed in the same brain region (in this case spoken language centers), ultimately then predicting that multisensory stimulations (both sounds and touch) should enhance perception.

According to lead author Katarzyna Cie PhD, World Hearing Center, Warsaw, and Hebrew University of Jerusalem, "The most compelling aspect of our study is the fact that learning to use such speech-to-touch sensory substitution device did not require any training. We believe it can also serve as an aid for the elderly population, which finds it challenging to follow extensive training regimes. This might be the first study showing such immediate relevant enhancement of a sensory substitution device and suggests the brain is much more multisensory than the common wisdom."

"This study is a major step forward to introduce multisensory plasticity of the brain as an innovative paradigm to maximize the potential of patients to compensate for their sensory loss," commented Bernhard Sabel, PhD, Editor-in-Chief of Restorative Neurology and Neuroscience.

Next the team plans to further improve the device and training regimes in order to reach the goal of 10 dB enhancement and to test for human brain mechanisms using an MRI-compatible version of the device in various populations (both hearing and hearing-impaired people).

Story Source:Materials provided by IOS Press. Note: Content may be edited for style and length.

Biomarkers of brain function may lead to clinical tests for hidden hearing loss

Researchers have identified two new biomarkers for measuring our ability to follow conversations in noisy environments

A pair of biomarkers of brain function - one that represents "listening effort," and another that measures ability to process rapid changes in frequencies -- may help to explain why a person with normal hearing may struggle to follow conversations in noisy environments, according to a new study led by Massachusetts Eye and Ear researchers.

Published online last week in the scientific journal eLife, the study could inform the design of next-generation clinical testing for hidden hearing loss, a condition that cannot currently be measured using standard hearing exams.

"Between the increased use of personal listening devices or the simple fact that the world is a much noisier place than it used to be, patients are reporting as early as middle age that they are struggling to follow conversations in the workplace and in social settings, where other people are also speaking in the background," said senior study author Daniel B. Polley, PhD, Director of the Lauer Tinnitus Research Center at Mass. Eye and Ear and Associate Professor of Otolaryngology Head-Neck Surgery at Harvard Medical School. "Current clinical testing can't pick up what's going wrong with this very common problem."

"Our study was driven by a desire to develop new types of tests," added lead study author Aravindakshan Parthasarathy, PhD, an investigator in the Eaton-Peabody Laboratories at Mass. Eye and Ear.

"Our work shows that measuring cognitive effort in addition to the initial stages of neural processing in the brain may explain how patients are able to separate one speaker from a crowd."

Hearing loss affects an estimated 48 million Americans and can be caused by noise exposure, aging and other factors.

Hearing loss typically arises from damage to the sensory cells of the inner ear (the cochlea), which convert sounds into electrical signals, and/or the auditory nerve fibers that transmit those signals to the brain.

It is traditionally diagnosed by elevation in the faintest sound level required to hear a brief tone, as revealed on an audiogram, the gold standard test of hearing sensitivity.

Hidden hearing loss, on the other hand, refers to listening difficulties that go undetected by conventional audiograms and are thought to arise from abnormal connectivity and communication of nerve cells in the brain and ear, not in the sensory cells that initially convert sound waves into electrochemical signals.

Conventional hearing tests were not designed to detect these neural changes that interfere with our ability to process sounds at louder, more conversational levels.

In the eLife report, the study authors first reviewed more than 100,000 patient records over a 16-year period, finding that approximately 1 in 10 of these patients who visited the audiology clinic at Mass. Eye and Ear presented with complaints of hearing difficulty, yet auditory testing revealed that they had normal audiograms.

Motivated to develop objective biomarkers that might explain these "hidden" hearing complaints, the study authors developed two sets of tests.

The first measured electrical EEG signals from the surface of the ear canal to capture how well the earliest stages of sound processing in the brain were encoding subtle but rapid fluctuations in sound waves.

The second test used specialized glasses to measure changes in pupil diameter as subjects focused their attention on one speaker while others babbled in the background. Previous research shows changes in pupil size can reflect the amount of cognitive effort expended on a task.

They then recruited 23 young or middle-aged subjects with clinically normal hearing to undergo the tests. As expected, their ability to follow a conversation with others talking in the background varied widely despite having a clean bill of hearing health.

By combining their measures of ear canal EEG with changes in pupil diameter, they could identify which subjects struggled to follow speech in noise and which subjects could ace the test.

The authors are encouraged by these results, considering that conventional audiograms could not account for any of these performance differences.

"Speech is one of the most complex sounds that we need to make sense of," Dr. Polley said. "If our ability to converse in social settings is part of our hearing health, then the tests that are used have to go beyond the very first stages of hearing and more directly measure auditory processing in the brain."

Story Source:

Materials provided by Massachusetts Eye and Ear Infirmary. Note: Content may be edited for style and length.

What is a BioMarker?

In medicine, a biomarker is a measurable indicator of the severity or presence of some disease state.

More generally a biomarker is anything that can be used as an indicator of a particular disease state or some other physiological state of an organism.

Biomarkers are useful in a number of ways, including measuring the progress of disease, evaluating the most effective therapeutic regimes for a particular cancer type, and establishing long-term susceptibility to cancer or its recurrence. The parameter can be chemical, physical or biological. In molecular terms biomarker is "the subset of markers that might be discovered using genomics, proteomics technologies or imaging technologies. Biomarkers play major roles in medicinal biology.

Biomarkers help in early diagnosis, disease prevention, drug target identification, drug response etc. Several biomarkers have been identified for many diseases such as serum LDL for cholesterol, blood pressure, and P53 gene and MMPs as tumor markers for cancer.

The lost CI, or “don’t set off from here“,

by John Newton

There is a hoary old joke where the townee he finds himself in some remote part of the countryside and asks a local yokel for directions back to civilisation. “Well, I wouldn’t set off from here if I were you“ he is told. This is how I felt one beautiful morning last summer when faced with the problem of getting from, one of the islands of the Hebrides, to Manchester.

I had jumped happily off my boat onto the quayside and my cochlear implant fell off my head, bounced once and disappeared irretrievably into 30 feet of salt water. “Oh, something!” I said feeling that hollow sensation in my stomach which you get when you know something has gone really seriously wrong. I was in Port Ellen, a pretty coastal village on the island of Islay off the west coast of Scotland which is chiefly famous for its whiskey distilleries. It’s the first of the Hebridian islands which the wandering sailor meets when approaching from the south. To the east is the long Peninsula of the Mull of Kintyre and to the south is the north coast of Ireland. To the west is a great deal of salt water stretching all the way to North America. It’s not a particularly beautiful island - Jura, its northerly neighbour, is much more mountainous and spectacular. Islay is mostly fairly flat and boggy, but it situation is idyllic and it shares in the romance of these Western Isles in being remote and thinly inhabited. It’s a place where traffic jams are caused by the sheep and where the noisy adolescents are seagulls and the females on the beach are seals. But in spite of this beautiful situation my only thought at that instant was that it was a long way from Manchester.

I had been feeling pretty perky that morning because only the previous day I had been released from the bondage of the plaster cast on my arm and was at last free to continue my summer cruise and head back to England.

Six weeks before that, in July, I had slipped on the foredeck while picking up a mooring and broken my wrist, so instead of a sailing adventure to the far north, my summer holiday had become a static one since I was quite unable to sail my boat with only one useful arm.

There are, of course, many less desirable places to be stuck in. I had done some walking, got to know the locals and had a good few rides to other places on the ubiquitous Cal Mac ferries. And of course I had got to know the local medical services, which on Islay consist of what, when I was a youngster, was called a Cottage Hospital an hour’s bus ride away.

It was a delightful contrast to most large hospitals, a place where they greet you by name as you walk in because you are the only patient! I thought of the kindly nurse who had cut my cast off. “I can ask her to ring Manchester and get them to post a replacement" I thought innocently. I knew I had to get a replacement quickly. Although I managed for a long time on lipreading only, the implantation had almost destroyed the hearing in my left ear and I had very little residual hearing in the other. Life was going to be distinctly awkward for a lone sailor far from home without my CI.

I set off to the bus stop and anxiously scanned the timetable. Buses on Islay do not exactly chase each other's tails. Some days there are none at all. "Terribly sorry" said Manchester "we cannot post a replacement, you have to come to the clinic in person."

(Readers will understand that I was having this conversation via the amiable nurse) "do they realise how far it is?" I wailed. "Yes, but very sorry we are not allowed to replace the CI without seeing you." Like most of their patients, I have a warm place in my heart for those miracle workers in the Ellen Wilkinson building so was very reluctant to cause a row by being too persistent. Reluctantly I began to think about how to get to Manchester.

The first step was easy, the ferry dock was 100 yards from the watery grave of my CI, so the following morning I bought a ticket an uncomplicated procedure since the boat, like most ferries has only one destination, and I strolled aboard. I suppose that the Cal Mac ferries are not much different to other ferries but I am nevertheless a big fan. They do a good cooked breakfast and the view from your table is definitely better than you get in a motorway cafeteria

They even have the morning papers, which in most of those islands don't arrive until midday. I cheered myself up with the Guardian and the dose of cholesterol on the passage to the mainland which takes about an hour.

The Mull of Kintyre has only one public connection with the outside world, a thrice daily coach from Glasgow to Campbelltown at the foot of the Peninsula (and back of course). Sir Paul must have either had a limo or a helicopter to get him to his residence there.

The bus takes three hours and is generally busy in the summer. The prudent traveller books his seat, especially if boarding from an intermediate stop as I had to do. I had not booked of course. The ferry dock is at West Loch Tarbert which is just, well a dock, a jetty, surrounded by woods and heather. The bus pulled up in front of a gaggle of waiting passengers and there ensued the usual scrum around the luggage locker. Veterans of coach travel know what I mean. The driver shouted out something, which I of course could not hear. I did what are usually do in the circumstances, shuffled behind the person in front, climbed aboard, bought my ticket and sat in a vacant seat and waited for someone to object. No one did. Phase 1 complete!

It's a wonderful bus ride as only bus rides can be in the Scottish highlands

It's a wonderful bus ride as only bus rides can be in the Scottish highlands, looping around the heads of the long lochs which stretch northwards from the Clyde estuary, a lot of the route is right beside the water, and it delivered me to Glasgow by early afternoon. The busy city was quite a shock after two months in the remote Western Isles. I marched through the crowded streets to Central Station, not wishing to complicate matters by trying to find the right local bus.

I have a soft spot for Glasgow Central Station. It's a great place for seeing the Scots en masse. My previous visit had been on a Saturday when Scotland was playing an international soccer match so the station was full of their supporters. They have a terrifying reputation but they seemed a very amiable crowd to me. Many of them were in the Scottish supporter's uniform of heavy woollen kilt worn, not with the familiar accessories, but with a T-shirt and Doc Martens, which I thought was a big improvement on the Sassenach supporters kit of an anorak with a big striped scarf.

On another occasion there was evidently some big "do" on in Edinburgh and there was a crowd waiting for the Edinburgh train in evening dress, the ladies in long dresses with plaid shawls and the men in dinner jackets worn with tartan trousers, very elegant.

On this occasion however I was faced with a sort of situation that every deaf person dreads, a huge crowd in a sort of untidy queue in front of the London platform and the timetable showing my train as "delayed".

There were three blokes with "Virgin" on their jackets talking to parts of this crowd and one deaf codger feeling his usual frustration at being unable to find out what was going on. It gradually became apparent that there was a problem with all Southward trains. This big crowd trying to get out of the country put me in mind of stories about people escaping from advancing armies in World War II, all desperate for information and trying to get the attention of the officials.

Since it was clear that no one was going anywhere for a while, I found a seat to eat my belated M&S sandwich lunch. After a while things calmed down and I managed to get the attention of one of the officials and persuade him to look at me while he talked. I explained about my deafness. "Where are you going?" He said. "Manchester" I said. "Follow me" said he, and five minutes after this admirably terse and business like exchange I was on a train and another five minutes later we were heading south at Pendolino speed. What a wonderful relief! And full marks to Virgin Trains for recognising my problem immediately.

Of course it was too late to get to the CI clinic that day. My genial nephew (contacted via text message, where we would be without it?) Who lives near Manchester met me off the train, took me to his home for the night and delivered me to the local station the next morning.

A short commuter train trip and a bus down Oxford Street held no terrors by then. At the clinic, I had to fill in a form explaining how I had lost the CI and was re-equipped and out of the place in less than an hour. They were much too polite to scold me for losing such a valuable object but there was a hint that it might not be so easy if it happened the second time.

After another night with my nephew and his family I reversed the journey the following day. I had to admit that, after all I had had a pleasant three day trip, a wonderfully scenic journey, a sociable interlude with my nephews family and surprisingly little hassle (except for an encounter with a Neanderthal bus driver on the way back). I have been very careful with my bionic ear since then. Before doing any leaping about I take it off and put it in my pocket. But how do parents of toddlers with CI's manage?

Researchers test hearing by looking at dilation of people's eyes

University of Oregon neuroscientists have shown that a person's hearing can be assessed by measuring dilation of the pupils in eyes, a method that is as sensitive as traditional methods of testing hearing.

The approach is being developed as a potential way to test hearing in babies, young adults with developmental disabilities and adults suffering from a stroke or illness - populations where direct responses are not possible.

In the experiments, changes in pupil size of 31 adults were monitored with eye-tracking technology for about three seconds as they performed a traditional tone-based hearing test while also staring at an object on a monitor. Dilation in all subjects matched their subsequent push-button responses, when prompted by a question mark on the screen, signifying whether or not a tone was heard.

The project, detailed in an open-access paper published online last month in the Journal of the Association for Research in Otolaryngology, was inspired more than a decade ago when the study's lead author, Avinash Singh Bala, noticed changes in the pupils of barn owls in response to unexpected noises in their environment.

In the interim, Bala and co-author Terry T. Takahashi -- whose lab studies how owls hear and process sounds -- researched how an eye-focused hearing exam could produce results with the same sensitivity as traditional tone-based exams.

"This study is a proof of concept that this is possible," said Bala, a researcher in Takahashi's lab in the UO Institute of Neuroscience. "The first time we tested a human subject's pupil response was in 1999. We knew it could work, but we had to optimize the approach for capturing the detection of the quietest sounds."

In the research, a traditional hearing exam and eye-tracking methods were done simultaneously to allow for comparison. A dot appeared on the screen, and tones at 1, 2, 4 and 8 kilohertz were played at randomized delays to make sure subjects couldn't predict when the sound would appear.

Pupil size was tracked for at least one second before the sound, and two seconds after the sound. Then, the dot on the screen changed to a question mark, cuing participants to push one of two buttons to indicate whether or not they heard the sound. Since just pushing a button can change pupil size, the button press task was delayed until after pupil size had been tracked for two seconds.

"In this project we randomized the timing of the tone's pulsing in relation to the dots, which also helped us avoid the expectation of a tone within a pattern," said Takahashi, a professor of biology and member of the Institute of Neuroscience.

Pupils began to change within 250 milliseconds, about one quarter of a second, of the sound stimulus. The swiftness of the response, Bala said, allowed the team "to see and establish causality."

"What we found was that pupil dilation was as sensitive as the button-press method," Bala said. "We had presented early data analyses at conferences, and there was a lot of resistance to the idea that by using an involuntary response we could get results as good as button-press data."

Internal grants from the UO supported the research. Elizabeth A. Whitchurch, a former doctoral student now at Humboldt State University, was a co-author.

"A pupil dilation test is not as useful in adults, who can communicate with the tester," Takahashi said. "The utility of the method is in testing people who can't tell us whether they heard a sound - for example, babies."

Takahashi and Bala are now part of a university-supported collaboration with Dare Baldwin, a UO psychology professor, to test the approach in babies. The two neuroscientists also have formed a UO spinout, Perceptivo LLC, to pursue development of an infant-hearing assessment.

Story Source:

Materials provided by University of Oregon. Original written by Jim Barlow. Note: Content may be edited for style and length.

A week in the dark rewires brain cell networks and changes hearing in adult mice

Scientists have known that depriving adult mice of vision can increase the sensitivity of individual neurons in the part of the brain devoted to hearing. New research from biologists at the University of Maryland revealed that sight deprivation also changes the way brain cells interact with one another, altering neuronal networks and shifting the mice's sensitivity to different frequencies. The research was published in the November 11, 2019 issue of the journal eNeuro.

"This study reinforces what we are learning about how manipulating vision can have a significant effect on the ability of an animal to hear long after the window for auditory learning was thought to have closed," said Patrick Kanold, professor of biology at UMD and senior author of the study.

It was once thought that the sensory regions of the brain were not adaptable after a critical period in childhood. This is why children learn languages much more readily than adults. Kanold's earlier research disproved this idea by showing that depriving adult mice of vision for a short period increased the sensitivity of individual neurons in the auditory cortex, which is devoted to hearing.

The current study expands on that earlier work. Kanold and his team investigated how exposure to darkness affects the way groups of neurons in the auditory cortex work together in response to a given sound -- which neurons are connected and which fire more powerfully or faster. The researchers placed adult mice in a dark space for one week and then played 17 different tones while measuring brain activity in the auditory cortex. Based on their earlier work, Kanold and his team expected to see changes in the neural networks, but they were surprised to find that groups of neurons changed in different ways.

Young brains wire themselves according to the sounds they hear frequently, allocating areas of the auditory cortex for specific frequencies based on what they are used to hearing. The researchers found that, in adult mice, a week in the dark also redistributed the allocation of space to different frequencies. In the areas of the auditory cortex they examined, the researchers saw an increase in the proportion of neurons that were sensitive to high and low frequencies and a decrease in proportion of neurons that were sensitive to mid-range frequencies.

"We don't know why we are seeing these patterns," Kanold said. "We speculate that it may have to do with what the mice are paying attention to while they are in the dark. Maybe they pay attention to the noises or voices from the other mice, or maybe they're paying more attention to the footsteps they are making."

Kanold said his next steps include manipulating the sounds the mice are exposed to during the darkness phase of the experiment and monitoring brain activity to determine what aspects of their soundscape the mice are listening to. This will help the researchers understand the role of focus and attention in promoting change to the auditory neurons. Such information could be very useful in helping people adapt to cochlear implants or hearing aids.

Other authors of the study from UMD include biological sciences graduate student Zac Bowen, biophysics graduate student Ji Liu, and alumna Krystyna Solarana (Ph.D. '16, neuroscience and cognitive science) now at USAID.

Story Source:

Materials provided by University of Maryland. Note: Content may be edited for style and length.

Discovery of new neurons in the inner ear can lead to new therapies for hearing disorders

Researchers at Karolinska Institutet in Sweden have identified four types of neurons in the peripheral auditory system, three of which are new to science. The analysis of these cells can lead to new therapies for various kinds of hearing disorders, such as tinnitus and age-related hearing loss. The study is published in Nature Communications.

When sound reaches the inner ear, it is converted into electrical signals that are relayed to the brain via the ear's nerve cells in cochlea. Previously, most of these cells were considered to be of two types: type 1 and type 2 neurons, type 1 transmitting most of the auditory information. A new study by scientists at Karolinska Institutet shows that the type 1 cells actually comprise three very different cell types, which tallies with earlier research showing variations in the electrical properties and sonic response of type 1 cells.

"We now know that there are three different routes into the central auditory system, instead of just one," says Francois Lallemend, research group leader at the Department of Neuroscience, Karolinska Institutet, who led the study. "This makes us better placed to understand the part played by the different neurons in hearing. We've also mapped out which genes are active in the individual cell types."

The team conducted their study on mice using the relatively new technique of single-cell RNA sequencing. The result is a catalogue of the genes expressed in the nerve cells, which can give scientists a solid foundation for better understanding the auditory system as well as for devising new therapies and drugs.

"Our study can open the way for the development of genetic tools that can be used for new treatments for different kinds of hearing disorders, such as tinnitus," says Dr Lallemend. "Our mapping can also give rise to different ways of influencing the function of individual nerve cells in the body."

The study shows that these three neuron types probably play a part in the decoding of sonic intensity (i.e. volume), a function that is crucial during conversations in a loud environment, which rely on the ability to filter out the background noise. This property is also important in different forms of hearing disorders, such as tinnitus or hyperacusis (oversensitivity to sound).

"Once we know which neurons cause hyperacusis we'll be able to start investigating new therapies to protect or repair them," explains Dr Lallemend. "The next step is to show what effect these individual nerve cells have on the auditory system, which can lead to the development of better auditory aids such as cochlear implants."

The researchers have also shown through comparative studies on adult mice that these different types of neurons are already present at birth.

Story Source:

Materials provided by Karolinska Institutet. Note: Content may be edited for style and length.

Elizabeth Elliott - pianist

"I can once again be a musician"

Elizabeth's musical career was severely affected by her progressive hearing loss when she reached her 30s. She became profoundly deaf and had an implant in 2007. She is now giving piano recitals.

"My cochlear implant has completely transformed my life. It has given me great happiness to come out of the silent world and communicate with everyone again – through speech and playing the piano"

Elizabeth's story has a special resonance because of the impact of her deafness on her music - not just her love of it, shared by many, but because it was also her career. Her description of the time and persistence she needed to achieve the outcome she wanted is also an invaluable insight.

Her hearing loss began while still a violin and piano student at the Guildhall School.

Despite this she became a successful freelance professional player and a teacher - the latter with the renowned London Suzuki teaching group.

Her immediate family are also musicians.

"At first my hearing loss was very gradual and I managed to keep my career going, though it became increasingly difficult. By the time I was 30 I could no longer hear the high frequencies, so could not play the violin as I once had. By 45 I was profoundly deaf, unable to hear the doorbell, let alone music. I took my children to concerts - but couldn't hear the music myself. Hearing aids were useful in the early stages but later were no help at all.

I remember tears rolling down my face when I could not hear the music at a performance; my world had become silent and my career seemed over. I had to lipread my children and was dependent on people writing down what was being said, constantly needing help. But bringing up my children, I just had to keep going and trying to cope."

Elizabeth was aware of cochlear implants and became, she says, 'desperate to have one'. She also sought answers to questions she had through the NCIUA and the experiences of current users. After quite a lengthy wait, she finally received her implant in 2007.

"I shall be forever grateful to my expert surgeon. After the operation I had no pain and was able to get straight on with my life. The period between operation and being switched on posed no difficulty as I was used to silence … but then, when the day actually came, I was over the moon to be able to hear sounds again.

I had been warned I wouldn't hear perfectly straight away and that it would take time to remember how to. In fact at first, speech was like an incomprehensible language and the piano was a jumble of noise. But each day my sound recognition got better and every small improvement was encouraging. Over the months, my mapping technician and audiologists adjusted things to achieve maximum benefit - I was lucky to have such a good team.

So month by month, year by year, my hearing got better and better. After a year, short phone conversations replaced texts and I could slowly begin to re-enter the world of music. I couldn't hear pitch well enough to play the violin so it was the piano that became my redeemer.

At first, even that was just a noise with tone and pitch so distorted I nearly gave up. But I persevered and had a breakthrough when I found that an electronic keyboard let me hear much better. I found one with a beautiful grand piano tone – and from then on never looked back. I practised and practised and within two weeks had given a concert … on a ward at my implant hospital. Now I play regularly at all kinds of venues, including a recent theatre production.

Learning a piece now is a bit like a jigsaw puzzle. I can see my fingers on the keys, I hear the beautiful tone, and I combine what I hear now with my memory of the sound before I went deaf. I 'fit the music together' in this way with hours of practice. The constant practice helps train my listening and I believe that has assisted my speech recognition. I can also play an 'acoustic' piano again.

Even after seven years since getting my implant, my music perception continues to improve; tone quality is far better and although pitch and melody are difficult at orchestral concerts, I would say that live opera and choral music are easier, as are smaller voice and instrument combinations. So going to live concerts is very important and the more I go, the more I am inspired.

I am forever grateful to my implant. Not only can I communicate with people but I can go for a walk and hear the birdsong; I am safer too, being able to hear traffic. But my greatest joy is that through my piano and thanks to my medical team and my CI, I can once again be a musician"

Story Source:

With many kind thanks to the NCIUA for their help.

Notes

As these are exceptional circumstances and as a result of the current virus situation we do not have events to remind people of.

However we thought that if we could give you links /contact details then you would not be short of someone to ask if you need assistance or advice.

The key to getting through all this is to follow advice, and if you encounter a situation that causes you risk then don't hesitate to shout for help.

Our website has a dedicated page for the Clinic, so, in no particular order :-

CICADA

Website:www.manchestercicada.org.uk

Facebook group:Manchester CICADA club

Secretary direct contact:Text 07533217730

Main contacts for cicada listed at the bottom of this page.

Manchester Implant Centre

The Richard Ramsden Centre for Auditory Implants,Peter Mount Building, Manchester Royal Infirmary, Oxford Road,Manchester, M13 9WL
Main Contact Details:
TeL: 0161 701 6931 (Appointments)
TeL: 0161 276 8079 (repairs and spares)

* Please check the website regularly for updates on what the clinic are doing in the light of the virus outbreak.

http://www.manchestercicada.org.uk/implant-clinic/

National Support organisations

British Tinnitus Association:
https://www.tinnitus.org.uk/
Hearing Link:
https://www.hearinglink.org/
RNID (Action on Hearing Loss):
https://www.actiononhearingloss.org.uk/
Disabled Travel Advice:
http://www.disabledtraveladvice.co.uk/
Meniere's Society:
http://www.menieres.org.uk/
National Deaf Children's Society:
http://www.ndcs.org.uk/
National Association of Deafened People (NADP): http:// www.nadp.org.uk/

Equipment Suppliers for Deaf People

Sarabec: https://www.sarabec.com/
Connevans: http://www.connevans.co.uk
Hearing Link UK: https://www.hearinglink.org/
RNID (Action on Hearing Loss):
https://www.actiononhearingloss.org.uk/

COVID-19 information links.

(Just some official ones which you can subscribe to to get updates)
Main government website whih has links to information and also a facility to be on a mailing list for updates which is handy.

https://www.gov.uk/coronavirus

Most local council websites now have a corona virus section to tell us what they are doing and what services may be affected.

If you need help for other thngs during the duration of the virus then contact social services in the first instance.

Chairman	**Honorary Treasurer**	**Hon Secretary**
John Newton 32 Queens road Buxton Derbyshire SK17 7EX chairman@manchestercicada.org.uk	Alan Corcoran 45 Polefield Road Prestwich Manchester M25 2GN treasurer@manchestercicada.org.uk	Kevin Williams 107 Manchester Road Hyde Cheshire SK14 2BX secretary@manchestercicada.org.uk