HEARTFELT THANKS

BY JENNIFER KLAKULAK

It’s that time of year yet again. And no, we aren’t talking about Christmas…not yet. At HEI we’re not just busy preparing for our annual board meeting, fundraiser, and #GivingTuesday. This is the season that we again feel the weight of responsibility and stewardship that comes as we review and process the final few months of donations.

Our goal is never to focus on what we can get, but what we can do with the gifts and donations that further our goals of restoring hearing. Every gift, every dollar – they mean something. We take very seriously the sacrifice and generosity of those who support what we do. None of the research breakthroughs we write about could happen without your patronage. We are always in awe of the ways our needs are continuously met, and we are grateful for friends and partners like you who share in our discoveries and celebration. As you contemplate your year-end tax-deductible giving, please consider Hough Ear Institute as a beneficiary. Thank you for your consideration.
**BABY HAIR CELLS!**

By Dr. Matthew West

The loss of auditory hair cells in the cochlea is a major underlying cause of hearing loss in humans of all ages. Unlike other parts of the body that are programmed for spontaneous regeneration, the cochlea is unable to replace lost hair cells after injury. This can result in both acute and chronic loss of hair cells and permanent hearing loss. At HEI, we are developing therapeutic strategies to reprogram the cochlea to replace lost hair cells and restore hearing function in deafened ears. In a previous newsletter report, we described exciting pre-clinical results for hair cell regeneration in guinea pigs following prolonged treatment with our proprietary siHes1 nanoparticle technology. In these experiments, noise-deafened animals with pervasive hair cell loss were treated with sustained infusion of siHes1 nanoparticles over the course of one week, resulting in pronounced improvements in hearing function in comparison to placebo-treated control animals.

These ground-breaking results propelled HEI researchers to validate these discoveries and investigate whether shorter treatment periods were possible without compromising the quality of the restorative effects. From these evaluations, our research staff have been able to demonstrate that clinically-significant hair cell regeneration and hearing recovery are, in fact, achievable using a dramatically-abbreviated (24-hour) treatment interval. The degree of recovery realized under these conditions replicated the original proof-of-concept results achieved from the continuous one-week infusion. Moreover, the restorative effects were durable and sustainable, revealing long-term preservation of the acquired hearing function. Examination of treated ears at early time points after the one-day infusion interval captured the appearance of regenerating hair cells bearing immature stereocilia, the hair-like structures that bend back and forth in response to sound waves. These “baby hair cells” were uniquely observed in siHes1 nanoparticle-treated ears and provide a fascinating snap-shot of the regenerative process in motion. This confirmation of the restorative attributes of our nanoparticle technology in noise-deafened animals and the demonstration that this therapeutic effect is achievable from a single (one-day) application is a game-changer, as it expands the playbook for the clinical development of this regenerative approach and suggests that lower doses than anticipated are capable of inducing the desired effect. As a localized, middle-ear outpatient procedure is the ideal goal for widespread clinical implementation of this technology, the reduced exposure time and dosing achieved in these studies are key findings, indeed.

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**ON THE CALENDAR**

November 17: Annual Board Meeting

November 28: #GivingTuesday

December 20: Mandy Harvey in Concert

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**HOW LOUD IS TOO LOUD?**

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**dB Levels, Common Sounds Maximum Time Before Damage**

<table>
<thead>
<tr>
<th>dB Level</th>
<th>Description</th>
<th>Time Before Damaged</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;1 dB</td>
<td>Not audible</td>
<td>Unlimited</td>
</tr>
<tr>
<td>1 dB</td>
<td>Whisper</td>
<td>4 hours</td>
</tr>
<tr>
<td>15 dB</td>
<td>Normal speech</td>
<td>2 hours</td>
</tr>
<tr>
<td>30 dB</td>
<td>Loud speech</td>
<td>1 hour</td>
</tr>
<tr>
<td>60 dB</td>
<td>Traffic noise</td>
<td>15 minutes</td>
</tr>
<tr>
<td>110 dB</td>
<td>Large explosion</td>
<td>1 minute</td>
</tr>
</tbody>
</table>

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**Human hearing pain threshold:**

The louder the sound, the less time people should listen to it.

Sound intensity (dB) measures the power of sound waves.

dB’s are logarithmic: to go from 10 dB to 20 dB, the sound intensity multiplies by 10.

For example, 80 dB is 1000x’s louder than 60 dB.

60 dB is 1000x’s louder than 0 dB.
UPCOMING EVENTS

HOUCH EAr INSTITUTE PRESENTS:

Mandy Harvey

#GivingTuesday is a global giving movement that has been built by individuals, families, organizations, businesses and communities all over the world.

We have two days for getting deals – Black Friday and Cyber Monday. On #GivingTuesday, we have a day for giving back. Together, people are creating a new ritual for our annual calendar.

#GivingTuesday is the opening day of the giving season: a reminder of the “reason for the season.”

Every act of generosity counts, and each means even more when we give together. #GivingTuesday is our rallying point this fall to invite everyone to partner with the incredible work being done at HEI and to help further our efforts in restoring hearing worldwide.

Mandy Harvey is a deaf, American singer-songwriter. Recently featured on America’s Got Talent, she reached the semi-finals with Simon Cowell’s press of the golden buzzer, eventually placing fourth overall.

After losing her hearing at the age of eighteen Mandy pursued several career options. Mandy eventually decided to fight through the challenge of her hearing loss and decided to try singing again, returning to music in 2008. She quickly became a regular performer at Jay’s Bistro in Fort Collins and then at the Dazzle Jazz Lounge in Denver, one of the Top 100 Jazz Venues in the world.

Her efforts and hard work in music have proved successful and she has been inspiring audiences with her voice and message of “hope, dream, believe, no matter what.”

Following her tremendous performances on America’s Got Talent, her music has begun to attract the attention of people all over the world. CNN’s Great Big Story featuring Mandy has had over 9 million hits on social media and she is now part of Burt’s Bees Remarkable Women campaign. September saw the release of her first book, Sensing the Rhythm. Mandy is also an Ambassador for No Barriers USA, traveling the country heightening awareness, breaking down barriers, and challenging stereotypes as she leads the charge toward a brighter future for all.

Hough Ear Institute
in partnership with the Jasco Giving Hope Foundation and Kimray, is proud to present
Mandy Harvey
December 20th @ 7:00 p.m. at Oklahoma City’s historic Tower Theatre
For tickets, visit our website, www.houghear.org or TicketFly
WE'RE IN THE NEWS...

BY ANDREA FILLMORE

It has been a pleasure to have our research featured in two articles this quarter. In August, The Oklahoman published a short piece by Scott Meacham of i2E regarding our research breakthroughs in the area of hair cell regeneration and what this could mean for the future of hearing loss. The response was overwhelming. Our office was flooded with phone calls and emails from people who were eager to share their stories of how hearing loss had affected their lives. Many asked how they could take part in any future clinical trials of treatments currently still in research. These responses came not just from our own community, but from all over the world – including Dubai, Germany, and England, and more.

More recently, a publication of the American Farmers & Ranchers by Sam Knipp featured an interview with Dr. Kopke about the risks of hearing loss among farmers. Not surprisingly, a large portion of Dr. Kopke’s patients are farmers, and are now living with hearing loss from many years of working with loud and continuous noises in their everyday lives. Dr. Kopke was able to share research updates and tips on hearing protection in the write up.

In addition to these articles, we’ve also seen two new peer-reviewed research published in the last quarter. Dr. Ibrahima Youm’s article shows how biodegradable nanoparticles can carry drugs to the ear’s hair cells and reduce or eliminate damage from chemotherapy drugs that cause hearing loss. Our research team director, Dr. Donald Ewert, has also published an article recently that discusses the antioxidant HPN-07 and its efficacy in treatment for noise-induced hearing loss.

It’s exciting to know that what we do every day has the potential to impact the lives and the well-being of so many people all over the world. Thank you for your continued support of our vision, of our research, and of our daring goal of restoring hearing worldwide. Your financial support and solidarity are invaluable to what we do.

*If you’d like to read or share either of these articles, they are available under the “Recent News” section of our website, www.houghear.org. Research articles may be read and downloaded in their entirety on the "Research Publications" page of the website.*