For more information,
Please contact Deanna Meinke, deanna.meinke@unco.edu, 970-351-1600,
or Ben Stein, bstein@aip.org, 301-209-3091

Kids Helping Other Kids to Protect Their Hearing
Students Strive to Reduce Noise-Induced Hearing Loss from Personal Stereo Systems, Concerts

College sophomore Genna Martin with Jolene, the electronic mannequin she designed to help people measure the sound levels from their portable music players to determine if they are potentially damaging to their hearing. (Courtesy William H. Martin, Ph.D.)

October 17, 2006--Genna Martin, a college sophomore, was excited to take Jolene out to the streets for the first time. On a special shopping trip to Goodwill Industries, Martin and her sister had treated Jolene to a completely new outfit: stylish sunglasses, a red dress, and a black hat that nicely complemented her blue hair and bronze face. But the most important part of Jolene was her lifelike rubber ears--connected to an electronic circuit with a Radio Shack sound meter.

When Martin took her electronically equipped mannequin out on the street, curious pedestrians placed the earbuds from their personal music players onto Jolene's ears. The

sound meter measured how loud their music was playing. Many were surprised to see that volume levels that had seemed innocuous to them could actually damage their hearing permanently over time.

Genna Martin is part of a new generation of students who are trying to educate and convince their peers to reduce the risk of noise-induced hearing loss (NIHL), the permanent damage to hearing caused by noise. An estimated 12.5% of all young people between the ages of 6-19 already have some form of NIHL, according to federally funded research, and a group of researchers is now working intensely to raise awareness of this issue.

On October 19 and 20, Martin and other students will join scientists, educators, and other professionals in the Cincinnati area to convene for the first-ever conference on NIHL in children. The organizers see this unprecedented event as the beginning of a nationwide effort to change young people's attitudes and behaviors on protecting their hearing.

Martin created Jolene just a few months ago, during her summer break after freshman year of college at Boston University. She contacted others who had done similar projects, including Dave Brown, an audiologist now based in Cincinnati, who had built a purple-colored electronic head called the Walkometer (see http://www.ucalgary.ca/UofC/events/unicomm/Research/heardam.htm).

Martin wanted to create a similar device, and use it to study beliefs and practices regarding noise among young people in her Portland, Oregon hometown. She hoped it would help young people understand the dangers of loud sounds and to know the safe volumes for listening to music. She obtained a used mannequin, mounted rubber, life-like ears on it, added some electronic components, and Jolene was born. Martin hopes Jolene will get people interested in the dangers of noise-induced hearing loss and spur them to protect their hearing.

Martin is not alone. Many other students will attend the Cincinnati conference to share their strategies for educating young people about the risks of loud noise. Among them will be members of what conference organizers call "the Michigan Seven," a group of middle-schoolers taught by civics teacher David Vermeulen at Montague Public Schools of Montague, Michigan. Consisting of students Julian Smith, Cheyne Rushing, Greg Harris, Alexys Race, Tara Reed, David Ahlstrom, and Brandon Kieft, the Seven won first prize in Michigan's statewide Project Citizen competition, in which they researched the risks of NIHL from personal music players, suggested preventative measures, and then pursued the solutions they determined to be most effective.

In their research, the Michigan Seven measured the decibel output of students' personal music players. Then, they gave these students charts which indicate potential hearing loss as related to length of time the music is played at that volume.

Their advocacy efforts included three steps: crafting public service announcements, designing warning labels on products, and calling for regulations to ensure the volume

dials on all personal music players have an accompanying explanation in the owner's manual, which covers potential decibel output. They continue to contact officials regarding their suggestions for policy change.

As a result of their work, "they certainly have caught the attention of their peers," Vermeulen says.

Annaliisa Koski began her hearing loss prevention work as a senior in high school in Portland, OR. She volunteered to become a research educator for Dangerous Decibels®, a program on hearing loss education at her local science museum. She decided to do an independent study of her schoolmates' knowledge and attitudes about using hearing protection. She got responses from 171 students, nearly all of those at her school. Not surprisingly, 80% of her peers said they would not use hearing protection at a loud concert. Annalissa will present a poster on her research at the conference, and discuss educational strategies for changing her peers' attitudes and behavior.

Noise-induced hearing loss is clearly a risk to youth, but why do so many students—and their parents—do so little to prevent it?

"Because hearing loss is gradual and invisible, it's underappreciated until it's too late and the damage is done," says Oregon Health and Science University researcher William Martin, Genna's father and co-organizer of the Cincinnati conference. "Most people understand that if you stay too long in the sun, it'll give you sunburn," he says. But hearing loss from noise exposure, he points out, is subtle and can take years to manifest itself.

William Martin believes the best way to educate students and change behaviors is to start early. "If you wait until 7th to 9th grade, it's too late." He greatly enjoys his visits to elementary-school classrooms.

During his school visits, Martin delivers a simple lesson that impresses upon young students how their hearing can be damaged. Calling upon the students to act as scientists, he instructs them on how to make a model of the hair cells in their inner ear.

Martin asks the students to hold out an arm and make a fist, as if they are holding a bouquet of flowers. The fist, he says, represents the body of a hair cell. The arm corresponds to the nerve connecting the hair cell to the brain. In each student's fist, he puts several pipe cleaners, which represent the stereocilia on top of each hair cell. Then he has students simulate the effects of noise on the cells. Soft sounds hitting the hair cell cause them to rub the pipe cleaners gently, while loud noise causes them to move the cleaners back and forth more violently.

After the simulation, Martin says, the pipe cleaners are misshapen and lying on their sides—giving the students a good mental image of how loud noise can permanently harm their ears—while constructing a reasonably accurate scientific model.

"It's about changing knowledge, attitudes, and behavior," he says, and "empowering them to make good decisions."

Annaliisa Koski and her mother, researcher Judith Sobel, have studied educational methods for changing those attitudes and behaviors. Interestingly they are applying techniques that are used in prevention education for alcohol and drugs. The "Stages of Change" model states that individuals alter their behavior after several stages: initially not believing that the behavior is unhealthy, then becoming aware of the behavior's dangers, subsequently planning to change their behavior, then making the change, and finally, maintaining the new behavior until it becomes an unconscious habit.

Another model, known as the "Theory of Reasoned Action," takes into account the fact that young people will only adopt a new behavior if it fits into their cultural norms. "So changing the norms associated with their peer group is key," says Sobel. Koski and Sobel both plan to apply these and other education models to the prevention of noise-induced hearing loss.

Meanwhile, Genna Martin can't wait to return to her Portland, Oregon home for her Winter and Spring breaks. She plans to take Jolene out on more trips. She is even writing a detailed and illustrated "Jolene Cookbook" that will enable other students to build clones of Jolene for their outreach efforts.

But one thing is clear—a societal effort to prevent hearing loss in youth is beginning and many of its proponents are young people.

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Conference information: "Noise-Induced Hearing Loss in Children at Work & Play," October 19-20, 2006, Embassy Suites Hotel Cincinnati-Rivercenter in Covington, Kentucky, http://www.hearingconservation.org/conf_childrenconf.html

Both talks will be presented on Thursday afternoon, October 19, at the "NIHL in Children at Work and Play" conference. This NIOSH grant funded conference is jointly sponsored by the Centers for Disease Control; National Institute for Occupational Safety and Health (NIOSH); the National Institute of Deafness and Other Communication Disorders (NIDCD); the National Hearing Conservation Association (NHCA); the Marion Downs Hearing Center (MDHC); the Oregon Health & Science University (OHSU) and the University of Northern Colorado (UNC). Conference contributions have also been received from the Acoustical Society of America (ASA); AEARO Technologies; the Deafness Research Foundation (DRF); Etymotic Research, Inc. and 3M.

Associated presentations:

"Jolene: How loud is your music?" interactive presentation, Genevieve Y. Martin, William Hal Martin, Ph.D., William Lambert, Ph.D.

"Beliefs about Hearing Loss and Hearing Protection in a Small Public High School in Oregon," Annalisa Koski, Judith Sobel, Ph.D., and Jacqueline Villnave M.P.H.

"Can you Hear Me Now? Personal Music Players and Hearing Loss," David Vermeulen, Greg Harris, Brandon Kieft, Alexys Race, Tara Reed, Cheyn Rushing, Julian Smith"

"Persuading adolescents to protect their hearing: What can we learn from hearing communication research?" Judith Sobel, Ph.D., Mary Meikle, Ph.D., Gloria Reich, William H. Martin, Ph.D.

Abstracts for the meeting are at
http://www.hearingconservation.org/conf_childrenconf_program.html