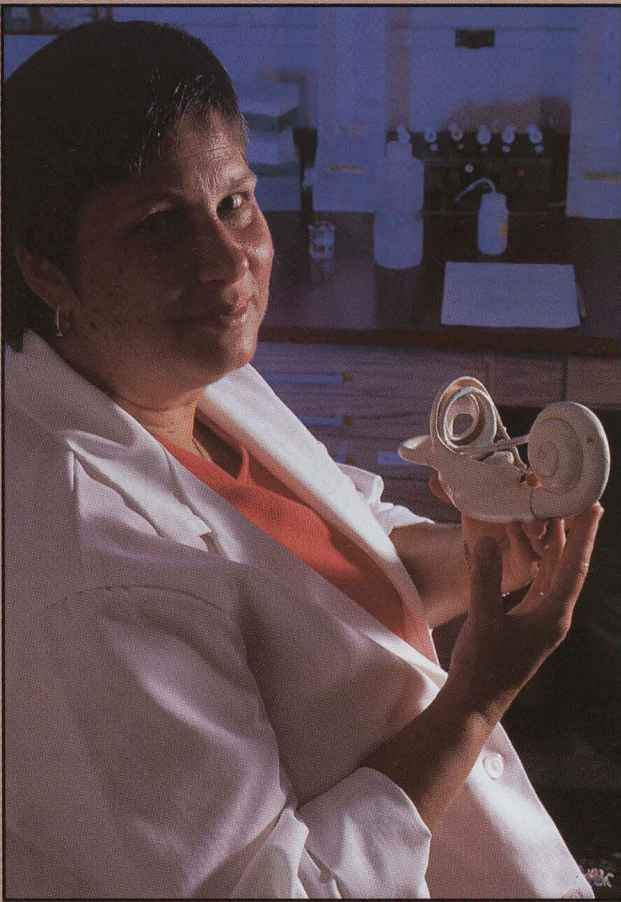


# Research Report

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Norma Slepecky, a professor in the bioengineering and neuroscience department of the L.C. Smith College of Engineering and Computer Science, holds a model of the human ear's inner structures.

**"Noise is usually defined as something loud that you don't like, but we're exposed to lots of noises that are either unavoidable or that we like, but could be damaging."**

**—Norma Slepecky**

## Examining the ear's inner workings

**F**rom the ridges and furrows of the outer ear to the snail-shell-shaped cochlea, the human ear is an elegant, complicated instrument. No wonder it is so susceptible to damage from disease, loud noises, and, ultimately, the aging process.

At the Institute for Sensory Research, Norma Slepecky is seeking a better understanding of that instrument, and her research could lead to methods for preventing or even repairing hearing loss. "I'm looking at several aspects of the ear, such as how the structure of the cells relates to hearing—specifically the damaging effects of noise and antibiotic drugs," she says. "I want to know how the damage is caused, how we might prevent it, and how we can use the damage to study repair mechanisms and the generation of new cells."

Slepecky '65, G'68, a professor in the bioengineering and neuroscience department of the L.C. Smith College of Engineering and Computer Science, receives funding from the National Institutes of Health and the National Organization for Hearing Research. She recently received a \$15,000 grant from the Deafness Research Foundation to study the effects of the antibiotics gentamicin and streptomycin on the ear's cochlear and vestibular systems. Slepecky is studying which of the drugs is more toxic to the cochlea (which enables hearing) or the vestibular sense organs (which affect equilibrium). One or both drugs could be used to treat patients suffering from Meniere's disease, a debilitating disorder characterized by varying degrees of hearing loss and dizziness. "One way to stop the dizziness is to destroy the vestibular nerve through surgery," Slepecky says. "If you could give a drug that selectively destroys the vestibular system, but doesn't make you lose your hearing, then you could use the antibiotic's bad properties in a good way."

Once she's found a way to destroy the system, Slepecky can study whether it regenerates. "For neuroscience that's fascinating," she says. "You're always told your brain cells never regenerate, but the sensory systems of your ears are modified neurons, brain cells. Some in the vestibular system do come back. Also, do the nerves come back? The cells by themselves aren't effective at communicating things to your brain unless the neurons make the right connections.

"I'm not claiming that my research will be the definitive research in this area, but certainly the whole focus of inner ear research today is repair and regeneration of the sensory component. We know that it happens in the auditory systems of fish and birds, and in the vestibular system of humans. So it's a question of finding the right stimulus or support system for these cells to make them grow back—in a way that they can function and interact with nerves."

Slepecky's other research projects involve hearing loss from noise. Every year she lectures her students about the dangers of overexposure to noise. "Loud noise causes you to lose your hearing—it's a given," she says. "Noise is usually defined as something



loud that you don't like, but we're exposed to lots of noises that are either unavoidable or that we like, but could be damaging."

Slepecky has found, however, that all noises are not created equal. Very low levels of noise apparently condition the ear and protect it from some louder noises—a phenomenon with tremendous implications for workplace applications where ear protectors are now commonly used. The protection must result from biochemical, metabolic, or structural changes in the ear, Slepecky explains. To find out which, she and her students examine tissue samples microscopically or biochemically, looking for changes in cell number, shape, and relationship to other cells. "If you could find which molecular changes allow for protection, then you might be able to induce them on command, rather than having somebody listen to noise for three hours," she says.

Many students take an active role in Slepecky's work. Brian Bane '98, who graduated with a degree in biochemistry, worked for almost two years on a project to distinguish some of the biochemistry of cellular structures in the cochlea. "It made me move above and beyond what a normal undergraduate education requires," he says. "I learned skills that are going to see me through for the rest of my life, and I came out with a pretty good research project."

—GARY PALLASSINO

## Embracing culture to improve lives

Helping people help themselves is important to Keith Alford, a value instilled in him since childhood. That's why he chose to study social work in college, earning master's and doctoral degrees from Ohio State University. "My goal has always been to provide social services that help people improve their conditions, and empower and strengthen themselves," says the School of Social Work professor.

Throughout his career, Alford has focused on family therapy, family preservation services, and culturally specific services within social work practice. He has done extensive research in all these areas, and has become an accomplished author and sought-after speaker at conferences across the country.

In his most recent work, Alford has aimed his insights at researching social workers' attitudes about targeting services to African Americans, and evaluating programs designed to address culturally specific rites of passage. "Social work covers so many areas that we need to pay special attention to diversity in programs, activities, and services to help consumers," he says.

Specifically, Alford notes that social work intervention with children of color must be culturally indigenous in order to be effective. The number of children in substitute care continues to rise every year, with children of color being the most at risk of remaining in this type of care for extended periods. Alford's research finds that African American children have the highest rates of out-of-home placements in such states as New Jersey, Maryland, and Louisiana.

"Family Preservation Services and Special Populations: The Invis-



School of Social Work Professor Keith Alford, front, shown here with students (left to right) Tanya Howell '97, G'99, Jason Rafalak '98, G'99, and Heather Lane '98, G'99, focuses his research and teaching on family therapy, family preservation services, and culturally specific services within social work practice.

ible Target," a recent article Alford co-wrote, presents research findings from a national survey that examined attitudes, beliefs, and behaviors of family preservation workers regarding special population services. The research showed that many social workers focus on such special populations as children under age 5, or children with HIV/AIDS; however, more attention needs to be placed on the needs of African American children and other children of color as special populations.

Because of the disproportionate number of African American children in out-of-home care and the problems that arise when they are targeted as a special population, Alford has become a strong supporter of culturally specific social services programs. "When these youths enter foster care, it becomes critical that caregivers and other members of the treatment team offer emotional and cultural support," Alford says.

To address the demands of young African American males, culturally specific rites-of-passage programs have been created. One such initiative—the African American Rites of Passage Program (AA-RITES), which was implemented by the Ohio Office of Child Care and Family Services—serves as an adjunct and transition to independent living programs. "Through the program, African heritage is learned," Alford says. "This helps them to develop ethnic pride and encourages higher self-esteem, essentially helping them to know who they are, where they came from, and what they should be about."

While most studies of programs like AA-RITES focus on implementation and operation, Alford evaluated the program's effectiveness, basing his research on interviews conducted with AA-RITES participants. Several recurring themes emerged from the interviews, including positive racial identification, and increased commitment to personal and community responsibility. Program developers and facilitators are now using the results to modify and improve their efforts. Alford says the research supports his ultimate goal to inform the social work community about effective culturally specific programs.

"Our growing multicultural society demands that we celebrate diversity and explore cross-cultural commonalities," he says.

—BRIANNA WILLIAMS