

Hope Appears on the Horizon for Age-related Hearing Loss

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The loss of hearing associated with getting older is caused by chemical changes in the brain, as well as by problems in the inner ear. Yet researchers predict that the elderly soon will be able to take a pill to improve their hearing.

While medications probably won't address the type of hearing loss related to injury, illness or genetic defects, there is a murmur of hope in a world noisy with the complaints of old age.

"We hear with our brain," not only our ears, says Robert Frisina, Ph.D., director of the International Center for Hearing and Speech Research, a joint program of the Rochester Institute of Technology and the University of Rochester.

First, the brain stem processes sound that comes to the person via the ear. Second, that processed sound is sent from the brain stem to the cortex of the brain, where it is interpreted. Third, the brain modulates the sound signals that come to it from the ear.

"Our brain cortex makes judgments about those sound signals coming in," says Dr. Frisina. "It pays attention to some and disregards others, makes some louder or others softer. It's controlling what we do or do not do with incoming auditory messages."

As we age, changes occur in the nerve cells that transmit messages and process sounds in the brain. Those cells communicate via an electrochemical process that deposits a chemical between them. When imbalances of those chemicals occur as cells age or die, the nerve cells become less affective at communicating, and the brain loses some of its ability to filter sounds.

The result is that Grandma may not follow your conversation if there's music playing at the same time, or Grandpa may not hear you if you call him from the next room.

Now that researchers have identified the processes involved, they can turn to developing a pharmacological approach to replacing those chemicals, or making the chemicals work again. Dr. Frisina expects to see progress in that area in the next two decades.

"As we continue our exploration of chemical changes, we want to replace those that have degraded. The first way to do that is by having some replacement chemical, theoretically to be taken orally," says Dr. Frisina.

"The longer-term and deeper question is, why did those cells die? What messages within the genetic makeup suggested that those changes would take place? And that comes back to molecular genetics."

A person's genetic makeup, programmed at conception, is a "road map" for cellular longevity, and that raises questions that intrigue scientists. It is possible to regenerate cells that have died? What are the underlying mechanisms that would cause regrowth of dead cells? Which genes get turned off, and which chemicals underlie the actual activation of cell death? Dr. Frisina hopes the answers to these questions someday will build the foundation for a cure.

Meanwhile, it makes sense to protect the hearing you do have. Probably the easiest way to do that is to avoid auditory over stimulation and ongoing exposure to noise, such as machinery or loud music, which can cause nerve damage to the inner ear.

Second-hand smoke can cause hearing loss in children up to 18 months and older, according to *The Consumer Handbook on Hearing Loss & Hearing Aids--A Bridge to Healing*, edited by Richard Carmen.

Hearing loss in infants also has been linked to mothers who smoke. Other common causes of hearing loss listed in the handbook are mechanical injury, infections, exposure to certain medications, exposure to certain industrial chemicals and exposure to

environmental pollutants.

--By Martha Scott