

## Blasting children's cancer -- not their ears

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(PhysOrg.com) -- A new grading scale for hearing loss developed by a physician at Lucile Packard Children's Hospital could help doctors find the best way to protect the hearing of young patients who need chemotherapy to treat cancer.

In a paper published in the March issue of [Journal of Clinical Oncology](#), Kay Chang, MD, associate professor of otolaryngology and of pediatrics, presented the new grading scale. He worked with Nina Chinosornvatana, MD, formerly a Stanford medical student and now at Columbia University.

“Many kids survive their cancers,” said Chang, but with certain drugs, “they could end up with significant [hearing loss](#).” In children who haven't yet started talking, he said, “even a small hearing loss can limit not just their language, but their overall [cognitive development](#). This could lead to problems at school as well as diminished abilities to function in society during their adult life.”

The new grading scale gives oncologists a better understanding of the clinical significance of the audiology testing, as well as reflecting more closely how a person's hearing is changed and what impact the hearing loss will have on understanding speech. It also should help researchers standardize the hearing assessment for young cancer patients so that results of clinical trials can be compared with each other and treatment protocols designed to minimize the hearing loss.

In developing the new scale, the researchers studied cisplatin, a decades-

old drug that is effective against many cancers and is known to be toxic to the kidneys, nerves and the delicate cells that register sounds in the inner ear.

“Fortunately, the vast majority of cisplatin therapy is given in older patients who are more resistant” to the toxic action on inner ear cells, Chang said. “Furthermore, adults also have fully developed language skills and have coping strategies that minimize the effects of the hearing loss. These compensatory mechanisms are not available to pre-lingual children struggling to learn language.

“What really limits cisplatin dosing is the kidney toxicity and the neurological effects,” Chang said. However, the drug’s effect on hearing tends to be given a lower priority and thus the cisplatin dosing may not be changed even if the patient is experiencing severe hearing loss.

Chang said the lack of a standard rating scale makes it challenging to compare results from different studies that have explored chemotherapy’s effect on hearing. The most widely used grading scale does not accurately convey the loss from the patient’s perspective, Chang said. That scale, known as CTCAE, rates the amount of loss measured in decibels. Such an approach fails to take into account what frequencies are more important to speech. Those limitations have led researchers to use their own alternative criteria to describe their data.

But the lack of standardization has resulted in a wide variation in the reported incidence of hearing loss in the cancer literature, which varies from 2 percent to 97 percent. This wide range makes it difficult to fairly compare alternative dosing protocols with each other in terms of effect on hearing loss. Lack of standardized assessment also hampers development of drugs to protect against hearing loss. “How do you measure if there is a protective effect” from a drug, he said, “if you can’t compare findings from different institutions.”

Compounding these difficulties is that the various doctors involved in a child's cancer treatment often don't have a common vocabulary, Chang said. Oncologists don't have the expertise in hearing loss and how it is classified, and audiologists and otolaryngologists haven't been involved closely enough with the oncologists. The current reports typically given to the oncologists from the audiologists use a lot of specialized terminology that the oncologists are unfamiliar with and unable to translate into clinical effect.

"I designed a scale to reflect the clinical impact of that hearing loss to that patient," he added. "If a certain loss requires more intervention, that should be reflected in the grade of the scale."

On the new scale, 1a or 1b is a measureable loss of hearing. It signifies that the cells of the [inner ear](#) are being damaged, but not enough to be subjectively apparent to the patient. A rating of 2a or 2b requires intervention. Someone with a score of 3 will require hearing aids to understand speech, he said. Even with hearing aids, someone with this score may continue to have some difficulties with speech discrimination.

"The Packard Children's audiology services have been reporting their post-chemo audiogram results to the pediatric oncology service using my scale for several years," Chang said. "This has made it much easier for the oncologists to understand the reports and also understand if the hearing loss is severe enough to warrant altering therapy to minimize further losses. Now that the paper is out, I think many centers will start to use this. It is fostering cross-discipline communication."

Provided by Stanford University Medical Center

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