

Chemotherapy and hearing loss: Until now, an unquantified risk

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Cisplatin is one of the most effective chemotherapy agents, used in just under half of pediatric cancer cases. Permanent hearing loss is a common side effect of this medication, but until now, studies have been too small and too varied to accurately characterize this risk. Today in *The Lancet Child & Adolescent Health*, investigators at Children's Hospital Los Angeles published results of the largest study of cisplatin-induced hearing loss to date. The study establishes the first benchmarks for the prevalence of hearing loss, and reveals that the risk of hearing loss is affected not only by how much drug is given, but by how that drug is delivered—dosing schedules, complementary treatments, and more. These findings will allow oncologists to deliver more information to patients, and to plan treatment schedules to minimize this side effect.

The large number of variables involved means that [permanent hearing loss](#) can occur in anywhere from 20-90% of cisplatin-treated patients. This variable range is due to the fact that circumstances differ for many patients (their age, cancer type and other factors). But the new study reveals that another important aspect of chemotherapy can impact a child's risk for hearing loss.

"We found that how we infuse the drug can significantly alter the risk of side effects," says Etan Orgel, MD, MS, who designed and led the study. "Cisplatin has been used to treat cancers in children and adults for more than fifty years, but for the first time, we have insights into how something as simple as adjusting our dosing approach may prevent hearing loss and still maintain effective treatments."

Dr. Orgel and a team of investigators, including CHLA's Diana Moke,

MD, MS, collected information from over 1,400 patients treated in hospitals across the United States and Canada. A data pool of this size is no small feat. "Pediatric cancers are rare, so they're hard to study," says Dr. Moke, who treats children with many of the included cancers. "We have gathered data from the largest group ever of cisplatin-treated children and adolescents with a wide variety of cancers," she says. "This information will help us have important conversations with families about the risks they face during therapy."

Overall, the study showed that 44% of pediatric patients treated with cisplatin suffered from moderate to severe hearing loss. But the data showed that not all treatment schedules came with the same risk. Children who received higher doses of the chemotherapy were more likely to experience hearing loss, even when the total amount of cisplatin over the course of the therapy was the same. The group also uncovered another, previously unknown, risk factor for hearing loss: concurrent use of vincristine, a second chemotherapy agent often added to treatment regimens.

The team addressed another barrier to understanding cisplatin-induced hearing loss: variation in interpreting audiology scores. Many international medical centers categorize hearing loss differently, making direct comparisons impossible. To overcome this issue, the team reviewed all of the study data using the same international consensus system for cisplatin-induced hearing loss (developed by the International Society of Pediatric Oncology), enabling investigators to compare [hearing](#) loss using more than 2,000 tests from patients treated at 19 different institutions.

Uncovering how real-world variables affect risk of side effects allows oncologists to better serve each child. "Studies like these are a crucial first step in developing a truly individualized approach to each patient," says Bruce Carleton, PharmD, who led the Canadian arm of the study.

"Data provided by this study will help oncologists identify patients that might be at higher risk of [hearing loss](#) so that protective strategies can be considered."

"We've developed these powerful tools to effectively fight [cancer](#)," says Dr. Orgel. "Now we can focus in on how to use these tools in a way that maintains their power but minimizes their footprint."

More information: Diana J Moke et al. Prevalence and risk factors for cisplatin-induced hearing loss in children, adolescents, and young adults: a multi-institutional North American cohort study. *The Lancet Child & Adolescent Health* February 11, 2021
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