

FDA Public Health Web Notification¹: Risk of Bacterial Meningitis in Children with Cochlear Implants

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(You are encouraged to copy and distribute this notification)

The Food and Drug Administration (FDA) is notifying healthcare providers about a recent study showing that children with cochlear implants are at greater risk of developing bacterial meningitis caused by *Streptococcus pneumoniae* than children in the general population. The study, conducted by FDA, the Centers for Disease Control (CDC) and others, was published in the July 31, 2003 issue of *The New England Journal of Medicine*².

Recommendations to decrease the risk of meningitis in cochlear implant recipients

1. Follow CDC's vaccination recommendations. CDC has issued recommendations about which vaccines cochlear implant patients should receive and when the vaccines should be given. These recommendations are available on CDC's website at www.cdc.gov/nip/issues/cochlear/cochlear-gen.htm (see Appendix A for a summary of CDC's vaccine recommendations).
2. Check the patient's vaccination record. Healthcare providers and families should review vaccination records of cochlear implant recipients to ensure that the patient is current on all the CDC recommended vaccinations.
3. Recognize the signs of meningitis early. Cochlear implant recipients, along with their families and healthcare providers, need to be aware of the signs of meningitis. This can help ensure early detection and treatment of this life-threatening illness. Early intervention is vital in successfully treating the infection and minimizing permanent neurological damage.
4. Diagnose and treat middle ear infections promptly. In some of the meningitis cases reported to FDA, cochlear implant recipients had signs of middle ear infection (otitis media) prior to surgery or before the meningitis developed. For this reason,

¹ CDRH Web Notifications are intended to augment the existing Safety Notification program by providing a mechanism to quickly disseminate device-related safety information that may be beneficial to healthcare providers. Unlike other forms of Notifications, such as Safety Alerts or Public Health Advisories, Web Notifications usually do not make specific recommendations and are typically used in situations where the available information and our understanding of an issue are still evolving.

² Reefhuis J, et al. Risk of Bacterial Meningitis in Children with Cochlear Implants, USA 1997-2002. *N Engl J Med* 2003; 349:435-45.

healthcare providers should diagnose and treat otitis media promptly in patients with cochlear implants.

5. Consider prophylactic antibiotics. Healthcare providers should consider prophylactic antibiotic treatment perioperatively in children receiving cochlear implants.

Factors that may predispose cochlear implant recipients to develop meningitis

The FDA/CDC study reviewed the medical records of 4,264 children under the age of six at the time of implantation. The focus of the investigation was young children because they account for the majority of known meningitis cases and represent the population that will receive most cochlear implants in the future. Of these patients, 26 were reported to have meningitis. Because the number of meningitis cases is small, we are limited in our ability to determine the risk of developing meningitis with various cochlear implant models.

The FDA/CDC study, however, did show that cochlear implants with electrode positioners were associated with a greater risk of developing meningitis than implants without positioners. The study was unable to determine how the positioner increased the risk for developing meningitis.

Advanced Bionics Corporation, the manufacturer of the cochlear implant devices that have a positioner, stopped distributing these models as of July 2002. Advanced Bionics currently distributes an FDA-approved cochlear implant without the positioner.

It is unknown at this point whether the risk of meningitis in patients whose implants have positioners might be reduced if the implant were removed or replaced by a model that does not have the positioner. Thus, it is unclear whether any potential benefits of explantation would outweigh the risks for operative complications, including perioperative meningitis.

Cases of meningitis in cochlear implant recipients reported to FDA

FDA first became aware of the possible association between cochlear implants and meningitis in June 2002. As of May 2003, we have learned of 118 cases of cochlear implant recipients worldwide who developed bacterial meningitis (55 cases in the United States and 63 cases in foreign countries). The patients ranged in age from 13 months to 81 years. The majority of U.S. patients were no older than five (5) years of age, while meningitis cases in the non-U.S. patients were distributed equally among children and adults.

Many of the 118 patients had certain pre-existing risk factors for meningitis, apart from the risks of the implant or the implantation procedure. These included a history of pre-implant meningitis, congenital inner ear deformity, and basilar skull fracture. In U.S. patients, the onset of meningitis symptoms ranged from less than 24 hours to greater than

six years post-implant. Thirty-two U.S. patients developed meningitis within one year post implantation, many within the first few weeks of surgery.

Meningitis

Meningitis is an infection in the cerebrospinal fluid (CSF) around the brain and spinal cord. There are two types of meningitis – viral and bacterial. Bacterial meningitis, the more serious of the two, is the type reported in cochlear implant recipients. Patients younger than five years of age and the elderly are most vulnerable to meningitis.

Early signs of meningitis include high fever, headache, stiff neck, nausea or vomiting, discomfort looking into bright lights, and sleepiness or confusion. A young child or infant with meningitis might be sleepy, cranky, or eat less. Healthcare providers should consider meningitis in cochlear implant recipients when such symptoms exist and begin appropriate diagnostic testing and treatment as soon as possible.

We have received CSF culture results from 69 cases reported worldwide. The results identified the following organisms: *Streptococcus pneumoniae* (pneumococcus, diplococcus) (46 cases); *Haemophilus influenzae* (including types B and non-B) (9 cases); *Escherichia coli* (4 cases); *Streptococcus viridans* (3 cases); staphylococcus (4 cases); and non-specific bacteria (4 cases).

Manufacturers who distribute cochlear implant devices in the U.S.

Currently three manufacturers have been approved by FDA to distribute cochlear implants in the U.S. They are:

- Advanced Bionics
- Cochlear Limited
- MED-EL

(See Appendix B on where to obtain additional information about cochlear implants distributed in the U.S.)

Reporting cases of meningitis in cochlear implant recipients

We encourage you to report cases of meningitis in cochlear implant recipients. You can report cases directly to the device manufacturer or you can report them to MedWatch, FDA's voluntary reporting program. You may submit reports to MedWatch one of four ways: online at: <http://www.accessdata.fda.gov/scripts/medwatch/>; by telephone at 1-800-FDA-1088; by FAX at 1-800-FDA-0178; or by mail to MedWatch, Food and Drug Administration, HF-2, 5600 Fishers Lane, Rockville, MD 20857.

FDA contact

Nancy Pressly
Office of Surveillance and Biometrics (HFZ-510)
1350 Piccard Drive, Rockville, Maryland 20850

Fax: 301-594-2968

Email: phann@cdrh.fda.gov

Additionally, a voice mail message may be left at 301-594-0650 and your call will be returned as soon as possible.

Appendix A: Summary of CDC's vaccine recommendations.

Complete information on CDC's vaccine recommendations is available at <http://www.cdc.gov/nip/issues/cochlear/cochlear-gen.htm>.

Table 1: CDC recommendations on who should receive the Pneumococcal Conjugate Vaccine (PCV7)¹ and when the vaccine should be given.

Age at first dose (months)	Primary series	Additional dose
2-6	3 doses, 2 months apart ²	1 dose at 12-15 months of age ³
7-11	2 doses, 2 months apart ²	1 dose at 12-15 months of age ³
12-23	2 doses, 2 months apart ⁴	Not indicated
24-59	2 doses, 2 months apart ^{4,5}	Not indicated
60 months or older	Not indicated ⁶	Not indicated ⁶

¹A schedule with a reduced number of total doses is indicated if children start late or have a lapse in vaccination. Children with a lapse in vaccination should be vaccinated according to the catch-up schedule. Note: pneumococcal conjugate vaccine shortage has been resolved. (See MMWR 2003; 52(19):446-447; at <http://www.cdc.gov/mmwr/preview/mmwrhtml/mm5219a6.htm>)

²For children vaccinated less than 1 year of age, minimum interval between doses is 4 weeks.

³The additional dose should be administered 8 weeks or later after the primary series has been completed.

⁴The minimum interval between doses is 8 weeks.

⁵PCV7 also can be considered for children 24-59 months of age who do not have cochlear implants, immunocompromised conditions or certain chronic illnesses; if PCV7 is administered to children without these conditions, only one dose of PCV7 is indicated.

⁶PCV7 is not generally recommended for children 5 years of age or older (see Table 2).

Table 2: CDC’s recommendations on who should receive the Pneumococcal Polysaccharide Vaccine (PPV23) and when the vaccine should be given:

Age at presentation (years)	First Dose	Second dose
Less than 2 years	Not indicated ¹	Not indicated ¹
2-4	Administer ²	Not indicated
5-64	Administer	Not indicated ³
65 years or older	Administer	Not indicated ⁴

¹PPV23 is not recommended for children less than 2 years of age.

²Children less than 5 years of age should complete the PCV7 series first; PPV23 should be administered 8 weeks or later after the last dose of PCV7. Recommendations of the Advisory Committee on Immunization Practices 2000;49(RR-9); at <http://www.cdc.gov/mmwr/PDF/rr/rr4909.pdf>.

³Revaccination is recommended for persons with certain risk factors other than a cochlear implant. CDC. Prevention of pneumococcal disease: recommendations of the Advisory Committee on Immunization Practices 1997;46(No. RR-8):1-24; at <ftp://ftp.cdc.gov/pub/Publications/mmwr/rr/rr4608.pdf>

⁴Revaccination is indicated if the person has not received vaccination within 5 years and was less than 65 years of age at the time of last vaccination.

Additional recommendations and information on vaccines

- Recommendations on the use of two Haemophilus b conjugate vaccines licensed for use with infants are located at the following website: <http://www.cdc.gov/nip/recs/child-schd-508.htm>
- Haemophilus b Conjugate Vaccine (Diphtheria CRM 197 Protein Conjugate) (HbOC), manufactured by Praxis Biologics, Inc., and Haemophilus b Conjugate Vaccine (Meningococcal Protein Conjugate) (PRP-OMP), manufactured by Merck Sharp and Dohme, are licensed for use with infants. This website cited above also updates recommendations for use of these and other Haemophilus b conjugate vaccines with older children and adults.
- Note: Although vaccination is usually protective against invasive infections by both pneumococcus and *H. influenzae*, 2 cases of pneumococcal meningitis and 2 cases of *H. influenzae* meningitis developed after the patients had received the appropriate vaccine.

- The CDC National Immunization Program (NIP) has set up a Hotline that provides advice on which vaccines are recommended for cochlear implant recipients. The Hotline numbers are:
 - a. English: 1-800-232-2522 (Monday to Friday; 8 am to 11 pm)
 - b. Spanish: 1-800-232-0233 (Monday to Friday; 8 am to 11 pm)
 - c. TTY: 1-800-243-7889 (Monday to Friday, 10 am to 10 pm)

The Hotline is closed on weekends and federal holidays.

Appendix B: Where to obtain information about the types of cochlear implant devices distributed in the U.S.

There is a summary of the safety and effectiveness data on FDA's website for some of the cochlear implant devices. The website is <http://www.fda.gov/cdrh/pmapage.html#resources>.

In addition, each US cochlear implant device manufacturer has a website where you can obtain specific information about their products. The websites are:

- Advanced Bionics: <http://www.advancedbionics.com/>
- Cochlear Limited: <http://cochlear.com>
- MED-EL: <http://www.medel.com/>