The Auditory Brainstem Implant and Neurofibromatosis Type II

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Background[1,2]**:** The auditory brainstem implant (ABI) is a device used in patients with progressive sensorioneural hearing loss which helps restore hearing, namely on patients who suffer from neurofibromatosis type II, a patology in which the coclear nerve may present itself severely damaged due to the presence of neoplasms.

Methodologies: Via the databases PubMed, b-on, SciELO and Academic Google, using the keywords: Brainstem implant; Neurofibromatosis Type II; Brainstem Implant and NF2; Risks of the Brainstem Implant; Vestibular Schwannoma and Benefits of the ABI.

Aim: Approach the impact of the auditory brainstem implant on neurofibromatosis type II.

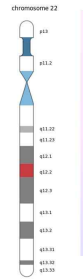
NEUROFIBROMATOSIS TYPE II [3]

Audiological Assessment [11]
- Simple Tonal Audiometry;
- Auditory brainstem evoked potentials;
- Speech perception tests (vocal audiometry);

Tinnitus
Balance alterations
Unilateral hearing loss
Bilateral hypoacusis

VESTIBULAR SCHWANNOMA
DECREASED MERLIN PROTEIN FUNCTION
VISION ALTERATIONS
NEUROFIBROMATOSIS TYPE II Autosomal Dominant Disease
≈1:40.000 births

Early onset cataracts
Optic nerve sheath tumors
Hamartomas
Retinal membranes



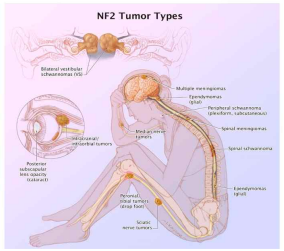


Fig.2. Neurofibromatosis type II: location of tumors

DIAGNOSIS[4] AND SURGERY[9]

DIAGNOSTIC [4]

Examination of skin lesions → Neurological examination
Ophthalmologic al examination → Specific investigation of auditory and vestibular function
Magnetic resonance imaging of the skull and spine

Facial nerve
Vestibulocochlear nerve
Glossopharyngeal nerve
Anatomical Landmarks [7]
Choroid Plexus
Skull base
Cerebellopontine angle

Surgical approach techniques:
- Suboccipital approach;
- Translabyrinthine approach

(RE)HABILITATION METHODS [5]

Conventional hearing aids
- Hearing rehabilitation through sound amplification

CROSS
- Used in patients with unilateral hearing loss

BICROSS
- Used in patients with bilateral hearing loss

Bone conduction
- Used in patients with unilateral hearing loss

BAHA
- Used to restore hearing through bone conduction

Auditory Brainstem Implant
- Used in patients with bilateral hearing loss

The **Auditory Brainstem Implant** [6] is a neuroprosthetic device consisting of an external and an inner part that contains a receiving implant/ stimulator.

History of ABI [6]
- The first auditory brainstem implant was developed by William House and William Hitselberger in 1979 using a monochannel electrode in the House Ear Institute;
- Later on evolved into a multichannel electrode;
- In 2000, the U.S Food and Drug Administration approved it for patients with neurofibromatosis type II.

Function[6]: Provide auditory sensations by electrically stimulating neurons in the dorsal cochlear nucleus.

THE AUDITORY BRAINSTEM IMPLANT IS INTENDED FOR PATIENTS WHO HAVE CASES OF [7]:
- Agenesis or traumatic avulsion (absence) of the bilateral cochlear nerve
- Auditory neuropathy and total bilateral cochlear ossification
- Patients with neurofibromatosis type II
- Patients who for anatomical or functional reasons can´t receive electrical stimulation through the inner ear

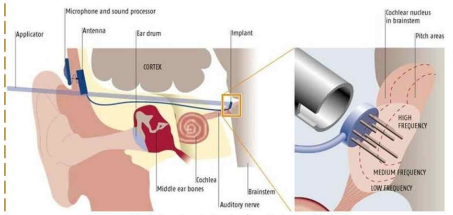


Fig.3. The Penetrating Auditory Brainstem Implant

Sound/information path after Implant Placement [8]**:**
- ❑ Microphone;
- ❑ Speech Processor;
- ❑ Internal receiver;
- ❑ Electrodes;
- ❑ Brain.

COLLATERAL EFFECTS [9]

- Tingling sensations on the tongue, face and contralateral side of the body
- Contractions of the muscles of the face due to stimulation of IATC
- Headache
- Vertigo
- Facial nerve palsy
- Appearance of subduration hematomas
- Meningitis
- Septicemia

Conclusion [1,3]**:** The ABI propitiates auditory sensation and better quality of life to the individuals with neurofibromatosis type II who can´t use other conventional devices.

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Imagens: https://www.mdpi.com/1422-0067/22/2/690/htm; https://www.newscientist.com/article/dn4540-first-brainstem-implants-aim-to-tackle-deafness/; https://www.sciencephoto.com/media/797314/view; https://rsaude.com.br/tubarao/materia/voce-conhece-a-protese-osteo-ancorada-baha/20404; https://implantecoclear.ufes.br/pt%c3%b3teses-de-condu%c3%a7%c3%a3o-%c3%b3ssea; https://biofisicadelsonido.wordpress.com/2017/01/11/protesis-auditiva-el-audifono/; https://slimster.nl/horen/hoortoestellen/unitron/

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