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Ototoxicity

Ototoxicidad

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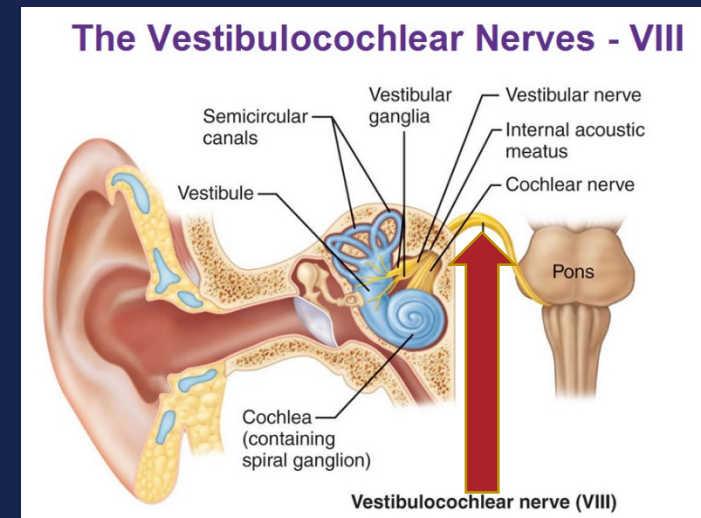
Ototoxicity (Ototoxicidad)



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- All aminoglycosides are toxic to the eighth cranial nerve (Octavo nervio cranial)
- May cause vestibular (vestibular) and auditory (auditivo) toxicity



Hearing Loss (Pérdida de la Audición)



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Considerations

- Hearing loss may be permanent
- Hearing loss may progress for months after injectables are stopped
 - *Monitor at 3 and 6 months after stopping injections*
- Varies in severity – affects one or both ears
- Hearing loss due to ototoxic drugs starts at high frequency



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Auditory (Auditivo)

Audiometry (Audiometria)

- Procedure that tests the ability to hear various sound frequencies
- Tests air and bone conduction
- Cochlea is the hearing part of the inner ear

Audiogram (Audiograma)

- Graph showing the results
- Pitch/frequency is referred to in Hertz (Hz)
- Loudness is measured in decibels (dB)

Vestibular Testing (Examen Vestibular)

Purpose

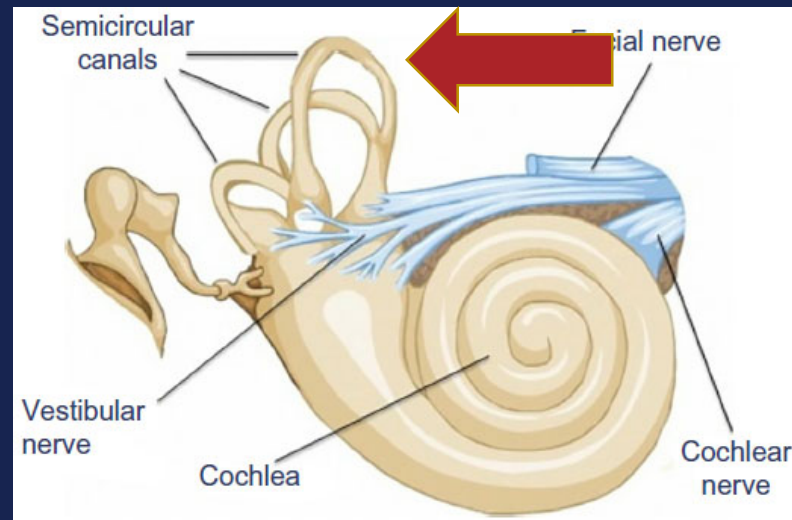
To check the balance system

Semicircular canals in the inner ear are part of our balance system



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Screening (Evaluación)



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Baseline (Detección inicial)

- Vestibular Exam
 - Ask about tinnitus, dizziness, check balance
 - Ask about visual disturbance

- Audiogram
 - Ask about family history of hearing loss and prior injectable medications

- Educate patients

- Report changes



Screening (Evaluación)



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Daily (Diario)

- Monitor toxicity signs and symptoms
- Report any changes

Monthly (Mensual)

- Perform vestibular and audiogram screenings
- Reinforce education

As Needed (según sea necesario)

- Anytime patient complains of hearing loss, tinnitus or dizziness

After Treatment (después del tratamiento)

- 3-6 months after stopping medication

Instructions for Performing Audiometry (Instrucciones para utilizar la audiometria)



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1. Visually inspect ears to check for wax build up or anything that could affect hearing.
2. Perform test in same location and atmosphere at all times when possible.
3. Sit patient upright looking away from you.
4. Don headphones on patient, give response switch.



Instructions for Performing Audiometry (Instrucciones para utilizar audiometria)



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Begin testing:

- 1) Set the frequency at 500Hz and set the intensity at 40dB.
 - *If heard, decrease dB by 10 until no response or until 20 dB is reached.*
 - *If 20dB is heard, record as 20 dB.*
- 2) If no response is heard, *increase dB by 5 dB's* and record once a response is heard.
 - *If no response at 40 dB, record as 40 dB+.*
- 3) Repeat procedure on both ears.
- 4) Continue to test using same pattern on each ear for all frequencies, up to 8000 Hz.

Toxicity (Toxicidad)

Auditory toxicity (Toxicidad auditivo)

- Normal threshold is at 25 decibels (dB) or lower in both ears
- Decrease in hearing at high frequencies (altas frecuencias)
- Decrease in hearing threshold by **20 dB** or more at any **one test frequency**
- Decrease in hearing threshold by **10 dB** or more at any **two adjacent frequencies**
- Loss of response at **three frequencies** where responses were previously heard



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Toxicity (Toxicidad)

Vestibular toxicity (Toxicidad vestibular)

- Dizziness, tinnitus or unsteady gait
- Fullness in the ears – early symptom



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Texas Department of State Health Services
Drug Resistant Tuberculosis Clinical Monitoring

Name: Doe, John

DOB: 1/1/1994

Hearing Assessment

Audiometry Testing: When patient is taking injectable aminoglycosides (i.e. **Amikacin**), for each of the four frequencies listed, record the lowest level in decibels (dB) at which the person responds. Record the findings for both the right and left ear. **Normal hearing thresholds are 25 dB or lower, in both ears.** Refer to an appropriately licensed professional if any two of the six frequencies are recorded as greater than 25 dB in either ear or the same ear or if there is a change of decreased hearing level from baseline. Start with 40 dB, if heard decrease by 10 dB until no response is obtained or until 20 dB is reached. If 20 dB is heard, record as 20 dB. Once no response is obtained, increase the dB level by 5 until a response is obtained and recorded. If a response is not heard at 40 dB, record as 40+ dB. **Ear: [R]=Right [L] = Left**

Ear	Base. 10/10/2018		Date 11/18/18		Date		Date		Date		Date		Date		Date		Date		Date		Comments
	R	L	R	L	R	L	R	L	R	L	R	L	R	L	R	L	R	L	R	L	
500 Hz	20	20	30	20																	Change from Base. 11/18
1000 Hz	20	20	30	20																	See progress notes
2000 Hz	20	20	25	20																	
4000 Hz	20	20	25	20																	
6000 Hz	20	20	25	20																	
8000 Hz	20	20	25	20																	
Initials	RM	RM	RM	RM																	

Vestibular Impairment Screening Instructions

Vestibular testing: This consists of a number of tests to determine if there is something wrong with the vestibular (balance) portion of the inner ear. These are performed at baseline and monthly while on medications that may damage the vestibular portion of the ear (**Amikacin**), and consist of questions and exams the nurse uses, outlined below. If signs of vestibular damage are identified, report to the treating physician as soon as possible.

- Assess Hearing- If patient reports abnormal hearing, mark "Impaired" and which ear (left [L] or right [R]) it is noticed in.**
 - How is your hearing? Does it seem normal or has it changed? Do your ears feel full or stuffy?
- Assess Balance- Teetering and/or falling is abnormal balance.**
 - Observe balance, teetering and/or falling when standing still. If normal, also observe with patient slightly lifting one foot then the other.
- Assess Walking- Any deviation from normal gait is abnormal.**
 - Observe for normal gait; note if any weaving and/or staggering is observed when walking.
- Assessing for Romberg- An increase loss of balance and falling/near falling is interpreted as a positive Romberg's test and is abnormal.**
 - Patient stands with feet together. Encircle the patient with both arms, but do not touch them. Reassure the patient "I will not let you fall". Have patient close their eyes. Observe if they remain still (normal) or begin to sway and lose balance and begin to fall (abnormal/positive).
- Observe Heel-to-Toe Walking- Mark abnormal if unable to perform easily.**
 - Stand beside standing patient. Demonstrate walking heel to toe. Do it together (be prepared to catch patient).
 - Observe for jerkiness, falling and/or excess swaying (a small degree of hesitancy is acceptable).



Texas Department of State Health Services
Drug Resistant Tuberculosis Clinical Monitoring

Vestibular Impairment Screening Results

Name: **Doe, John**
DOB: **1/1/1994**

Vestibular testing: Ask the questions from previous page and document which ear was assessed with results. If changes or abnormalities are noted, contact the treating physician. Circle results. Ear: [R]=Right [L] = Left

	Baseline: 10/10/2018	Date: 11/18/18	Date:	Date:	Date:	Date:	Date:	
1. How is Hearing?	<input checked="" type="checkbox"/> Normal <input checked="" type="checkbox"/> R <input checked="" type="checkbox"/> L <input type="checkbox"/> Impaired <input type="checkbox"/> R <input type="checkbox"/> L	<input type="checkbox"/> Normal <input type="checkbox"/> R <input type="checkbox"/> L <input checked="" type="checkbox"/> Impaired <input checked="" type="checkbox"/> R <input type="checkbox"/> L	<input type="checkbox"/> Normal <input type="checkbox"/> R <input type="checkbox"/> L <input type="checkbox"/> Impaired <input type="checkbox"/> R <input type="checkbox"/> L	<input type="checkbox"/> Normal <input type="checkbox"/> R <input type="checkbox"/> L <input type="checkbox"/> Impaired <input type="checkbox"/> R <input type="checkbox"/> L	<input type="checkbox"/> Normal <input type="checkbox"/> R <input type="checkbox"/> L <input type="checkbox"/> Impaired <input type="checkbox"/> R <input type="checkbox"/> L	<input type="checkbox"/> Normal <input type="checkbox"/> R <input type="checkbox"/> L <input type="checkbox"/> Impaired <input type="checkbox"/> R <input type="checkbox"/> L	<input type="checkbox"/> Normal <input type="checkbox"/> R <input type="checkbox"/> L <input type="checkbox"/> Impaired <input type="checkbox"/> R <input type="checkbox"/> L	<input type="checkbox"/> Normal <input type="checkbox"/> R <input type="checkbox"/> L <input type="checkbox"/> Impaired <input type="checkbox"/> R <input type="checkbox"/> L
Ears full/stuffy?	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No If Yes: <input type="checkbox"/> R <input type="checkbox"/> L	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No If Yes: <input checked="" type="checkbox"/> R <input checked="" type="checkbox"/> L	<input type="checkbox"/> Yes <input type="checkbox"/> No If Yes: <input type="checkbox"/> R <input type="checkbox"/> L	<input type="checkbox"/> Yes <input type="checkbox"/> No If Yes: <input type="checkbox"/> R <input type="checkbox"/> L	<input type="checkbox"/> Yes <input type="checkbox"/> No If Yes: <input type="checkbox"/> R <input type="checkbox"/> L	<input type="checkbox"/> Yes <input type="checkbox"/> No If Yes: <input type="checkbox"/> R <input type="checkbox"/> L	<input type="checkbox"/> Yes <input type="checkbox"/> No If Yes: <input type="checkbox"/> R <input type="checkbox"/> L	
2. Balance	<input checked="" type="checkbox"/> Normal <input type="checkbox"/> Abnormal: Teeters, Falls	<input checked="" type="checkbox"/> Normal <input type="checkbox"/> Abnormal: Teeters, Falls	<input type="checkbox"/> Normal <input type="checkbox"/> Abnormal: Teeters, Falls	<input type="checkbox"/> Normal <input type="checkbox"/> Abnormal: Teeters, Falls	<input type="checkbox"/> Normal <input type="checkbox"/> Abnormal: Teeters, Falls	<input type="checkbox"/> Normal <input type="checkbox"/> Abnormal: Teeters, Falls	<input type="checkbox"/> Normal <input type="checkbox"/> Abnormal: Teeters, Falls	
3. Walking	<input checked="" type="checkbox"/> Normal Gait <input type="checkbox"/> Abnormal: Weaves/Staggers	<input checked="" type="checkbox"/> Normal Gait <input type="checkbox"/> Abnormal: Weaves/Staggers	<input type="checkbox"/> Normal Gait <input type="checkbox"/> Abnormal: Weaves/Staggers	<input type="checkbox"/> Normal Gait <input type="checkbox"/> Abnormal: Weaves/Staggers	<input type="checkbox"/> Normal Gait <input type="checkbox"/> Abnormal: Weaves/Staggers	<input type="checkbox"/> Normal Gait <input type="checkbox"/> Abnormal: Weaves/Staggers	<input type="checkbox"/> Normal Gait <input type="checkbox"/> Abnormal: Weaves/Staggers	
4. Romberg	<input checked="" type="checkbox"/> Normal <input type="checkbox"/> Abnormal: Falls	<input checked="" type="checkbox"/> Normal <input type="checkbox"/> Abnormal: Falls	<input type="checkbox"/> Normal <input type="checkbox"/> Abnormal: Falls	<input type="checkbox"/> Normal <input type="checkbox"/> Abnormal: Falls	<input type="checkbox"/> Normal <input type="checkbox"/> Abnormal: Falls	<input type="checkbox"/> Normal <input type="checkbox"/> Abnormal: Falls	<input type="checkbox"/> Normal <input type="checkbox"/> Abnormal: Falls	
5. Heel to toe Walk	<input checked="" type="checkbox"/> Normal <input type="checkbox"/> Abnormal: Jerks/Hesitates/Sways	<input checked="" type="checkbox"/> Normal <input type="checkbox"/> Abnormal: Jerks/Hesitates/Sways	<input type="checkbox"/> Normal <input type="checkbox"/> Abnormal: Jerks/Hesitates/Sways	<input type="checkbox"/> Normal <input type="checkbox"/> Abnormal: Jerks/Hesitates/Sways	<input type="checkbox"/> Normal <input type="checkbox"/> Abnormal: Jerks/Hesitates/Sways	<input type="checkbox"/> Normal <input type="checkbox"/> Abnormal: Jerks/Hesitates/Sways	<input type="checkbox"/> Normal <input type="checkbox"/> Abnormal: Jerks/Hesitates/Sways	
Comments:	Normal	Shows decrease in hearing to right ear; see Audiometer test						
Performed by (Initials):	RM	RM						



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World Health Organization (WHO) Classification



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Figure 4: Hearing Loss Grades

40 dB	41-60 dB	61-80 dB	Over 81 dB
Slight/Mild	Moderate*	Severe	Profound
A person with this level of hearing loss will have trouble hearing and understanding soft speech, speech from a distance or speech against a background of noise.	A person with this level of hearing loss will have trouble hearing regular speech, even at close distances.	A person with this level of hearing loss may only hear very loud speech or loud sounds in the environment, such as a fire truck siren or a door slamming. Most conversational speech is not heard.	A person with this level of hearing loss may perceive loud sounds as vibrations

*In the case of moderate hearing loss, the range for children is 31-60 dB.

Stopping Injectables (Parar las Inyectables)

1. Tinnitus (tinnitus) or unsteadiness (inestabilidad) is attributable to vestibular toxicity
 - a. Persistent vertigo (vértigo persistente) and ataxia (ataxia) are intolerable, not reversible

2. For moderate or severe hearing loss (pérdida de la audición), stop injections early if possible
 - a. Prescribe an adequate regimen if injectable is stopped



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Resources

Management Of Drug Resistant TB

[https://www.challengetb.org/publications/tools/pmdt/Audiometry in the Management of Drug Resistant TB.pdf](https://www.challengetb.org/publications/tools/pmdt/Audiometry%20in%20the%20Management%20of%20Drug%20Resistant%20TB.pdf)

Audiometry Procedures Manual

https://www.cdc.gov/nchs/data/nhanes/nhanes_03_04/AU.pdf

Heartland National TB Center

Managing MDR TB treatment side effects
PITCA Hawaii Sept. 2017- Dr. Seaworth-
power point



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Thank you!

Gracias!

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Demonstration (Demostración)

**Vestibular Screening
(Evaluación Vestibular)**