

TOOLS for SCHOOLS™

Program



Becoming Familiar with Cochlear Implants

Name

Title



Advanced Bionics



Mission

At Advanced Bionics we are *dedicated* to improving lives by developing technologies and services that help our recipients achieve their full potential.

- Our commitment to putting patients first and providing the best possible hearing *performance* remains at the forefront of all that we do.
- The trust patients place in us inspires us to act with *integrity and transparency* as we strive for excellence each and every day in all that we do.

To learn more about Advanced Bionics visit AdvancedBionics.com



Advanced Bionics



PHONAK | Partners for Better Hearing

TOOLS for SCHOOLS™



Tools for Schools

Today's presentation is just one of many valuable FREE resources provided by Advanced Bionics' Tools for Schools™ program (TFS™).

The goal of the TFS program is to:

- Help school aged children with cochlear implants succeed in the classroom.
- Ease your workload and save you time.
- Educate parents and professionals about CI technology.
- Provide support for effective teaming between the School, CI center and Home.

Visit www.advancedbionics.com/tfs to learn more.



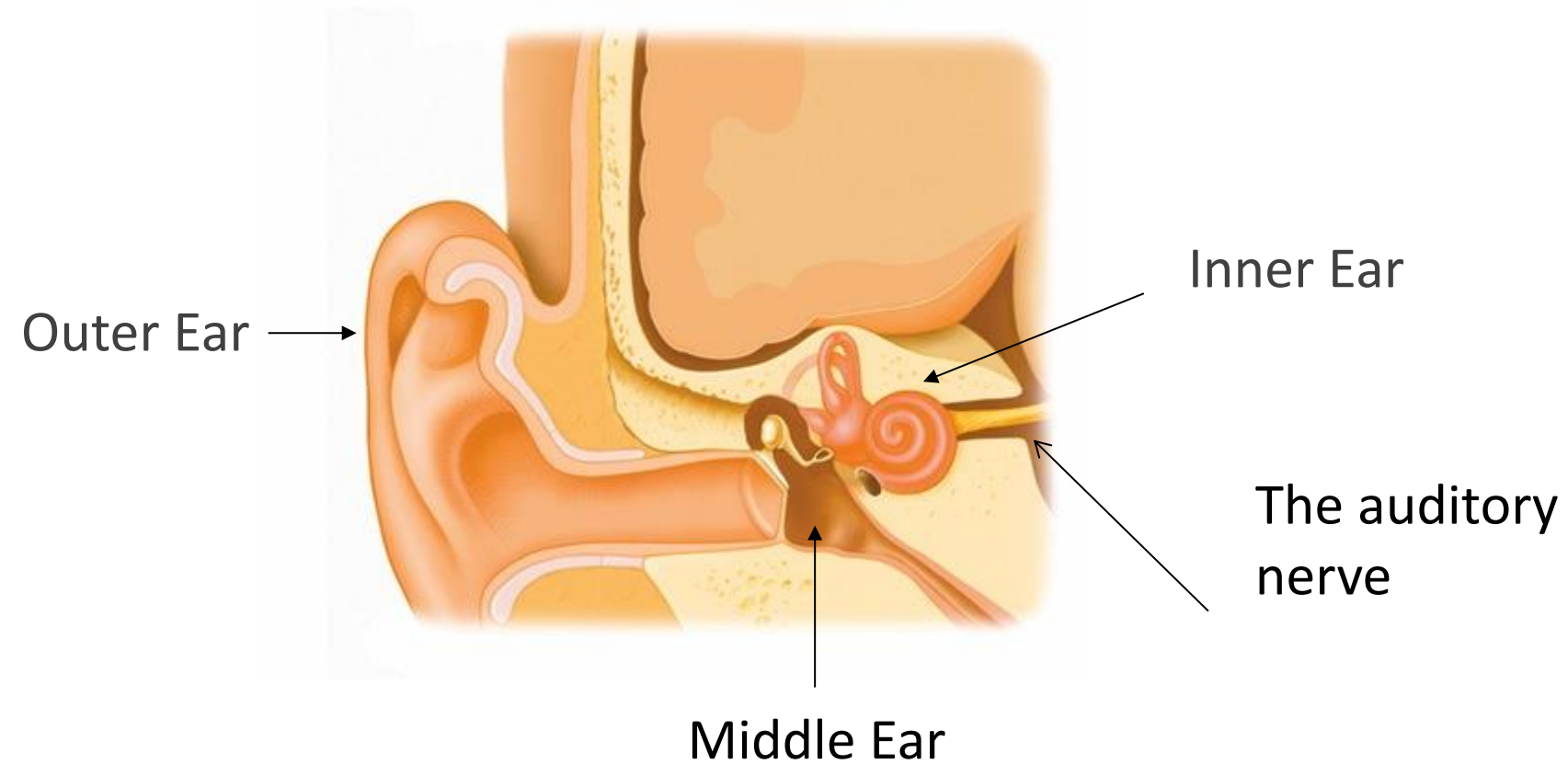
What You Will Learn Today

- **How the ear works**
- How to interpret the audiogram
- Types of Hearing Loss
- Treatment options for hearing loss
- Cochlear Implant Candidacy
- Cochlear Implant Basics
- Today's Cochlear Implant System
- Management of a child with a cochlear implant



How the Ear Works

The Ear Consists of These Main Parts



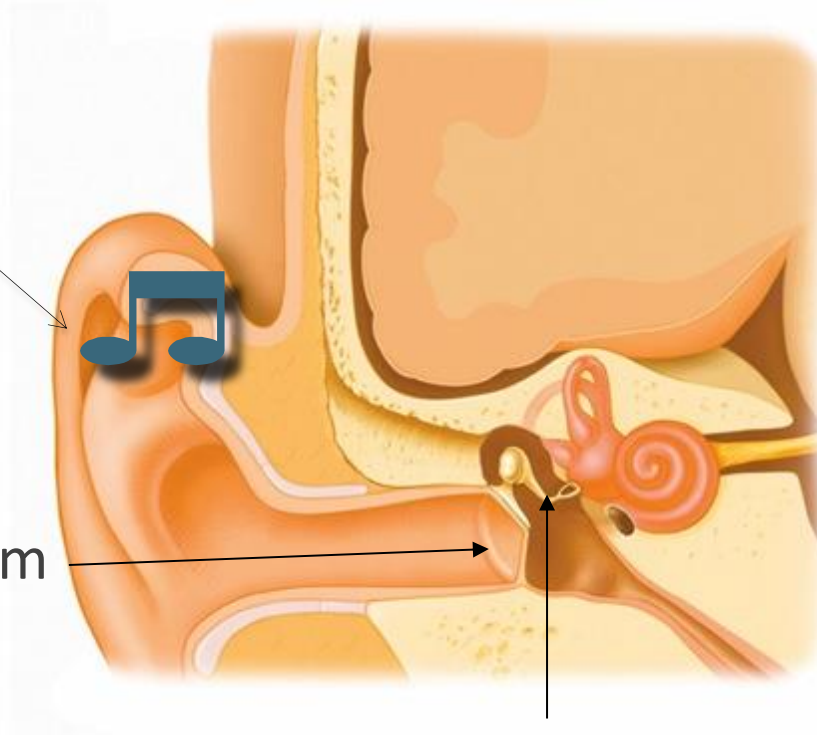


How the Ear Works

The Outer and Middle Ear

Pinna

Ear Drum

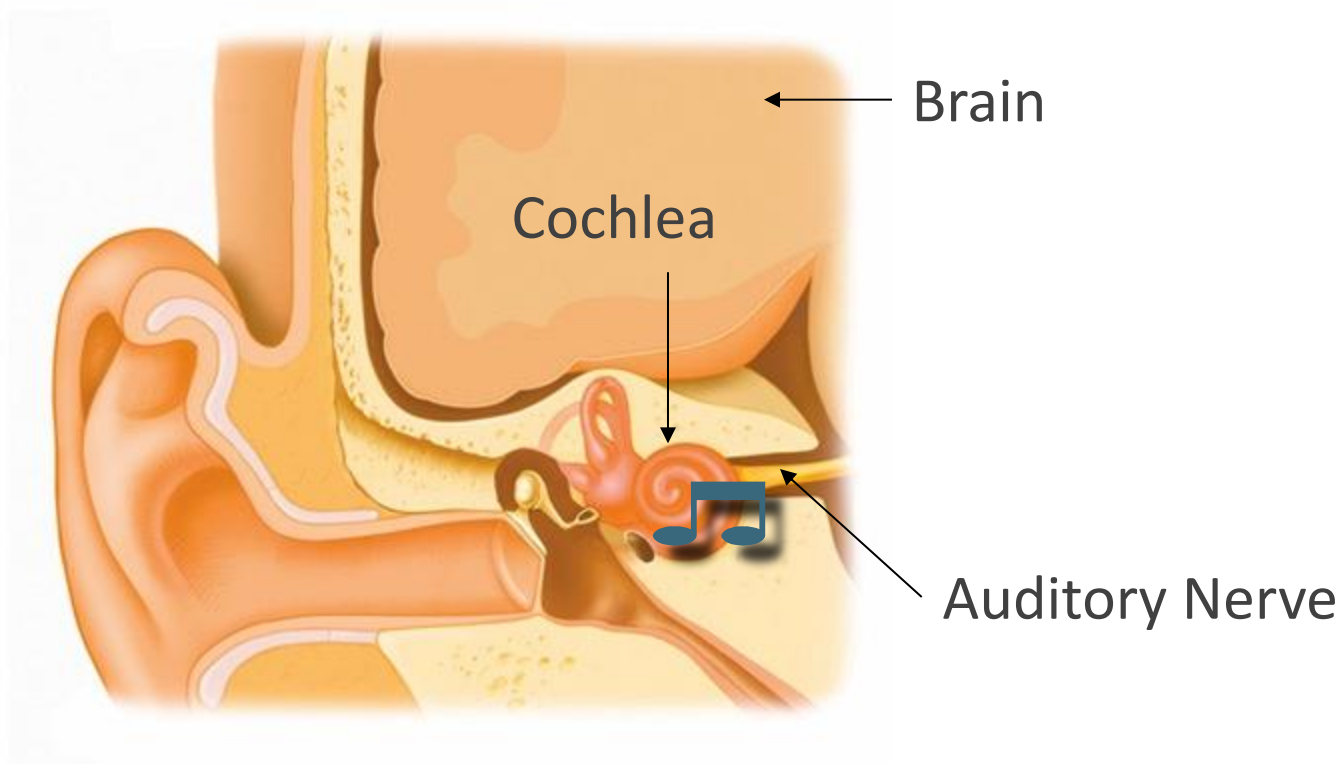


Bones of the
Middle Ear



How the Ear Works

The Inner Ear and Auditory Nerve





What You Will Learn Today

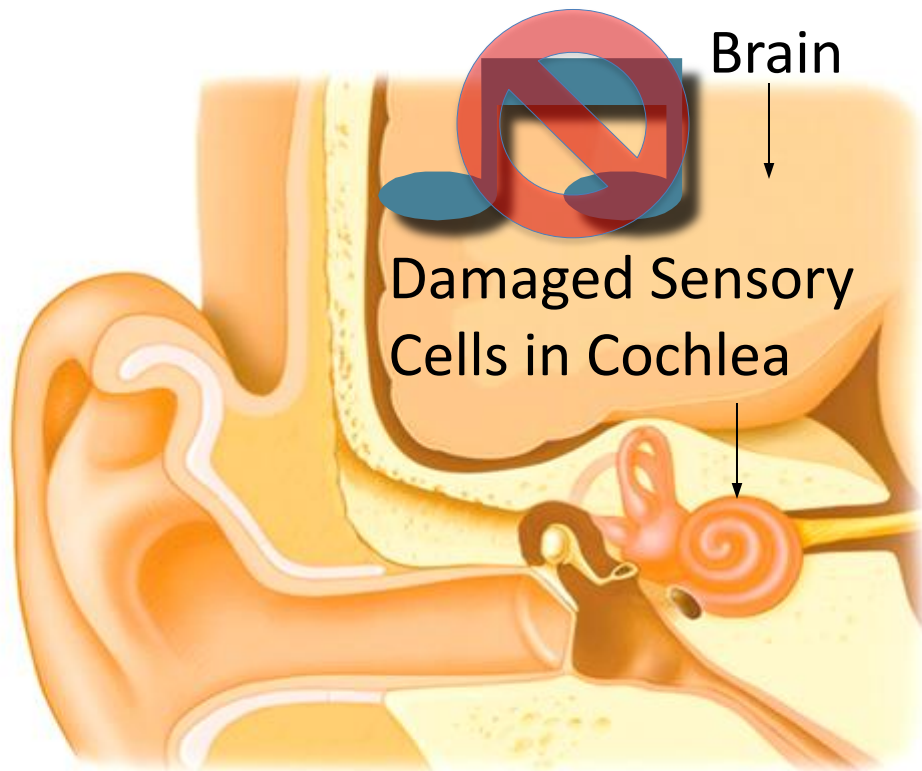
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How the Ear Works

Hearing Loss

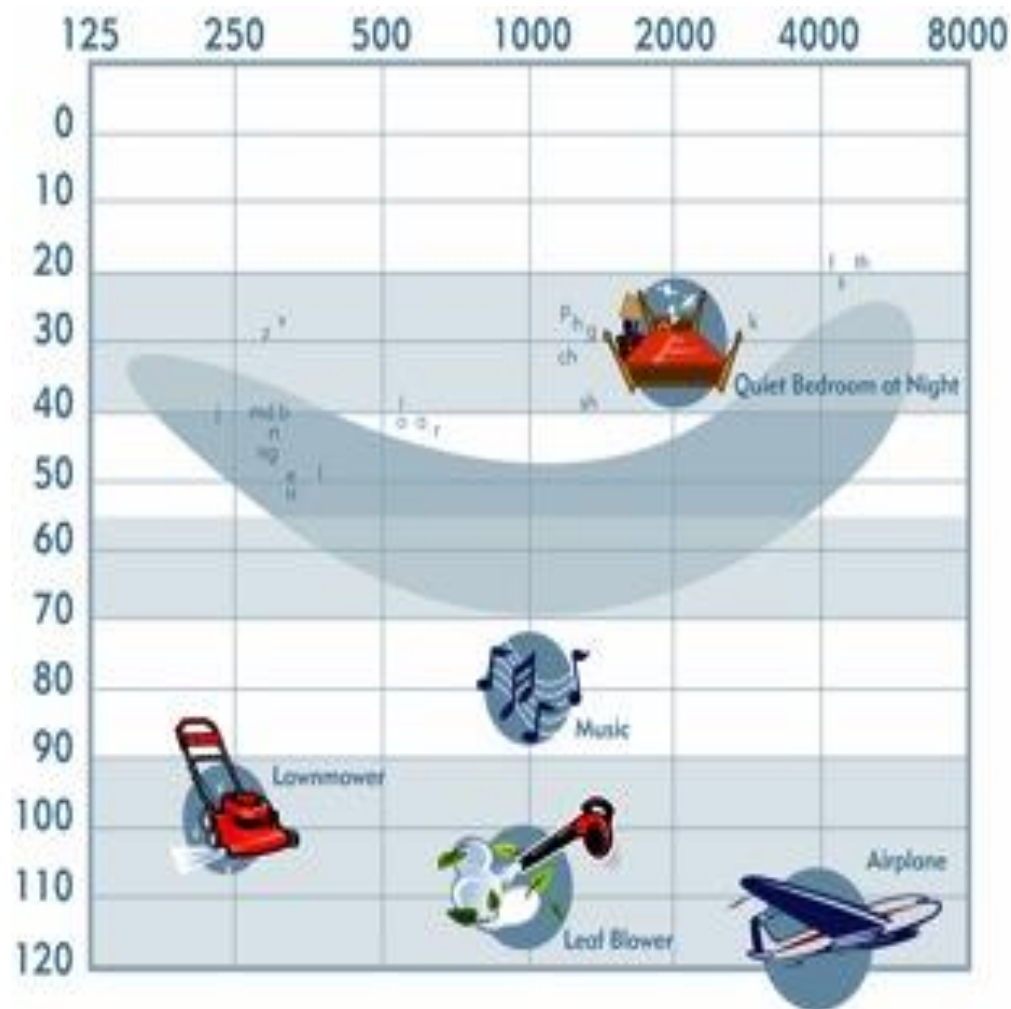
Without functioning sensory cells in the cochlea, sound information cannot reach the brain for processing





The Audiogram

Audiogram: A graph that shows an individual's type and degree of hearing loss.

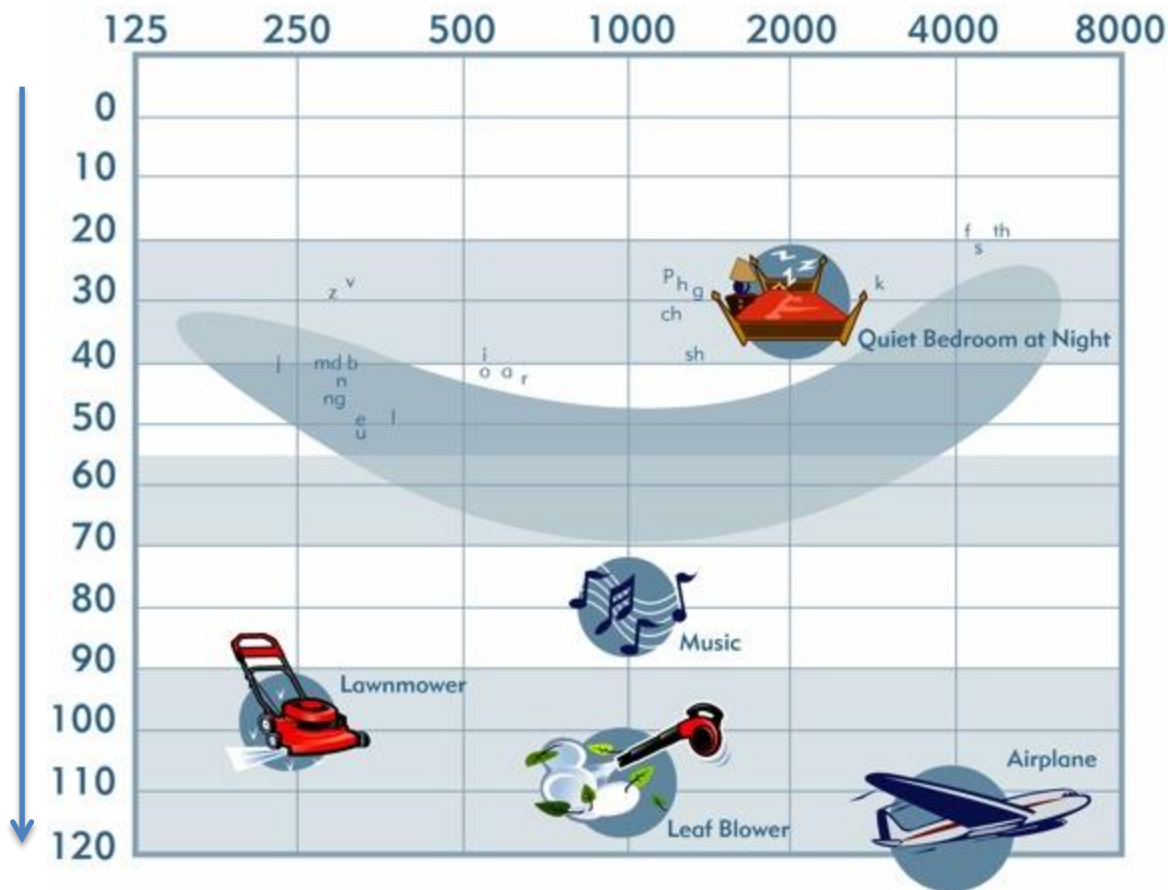




The Audiogram

Frequency Low Pitch to High Pitch

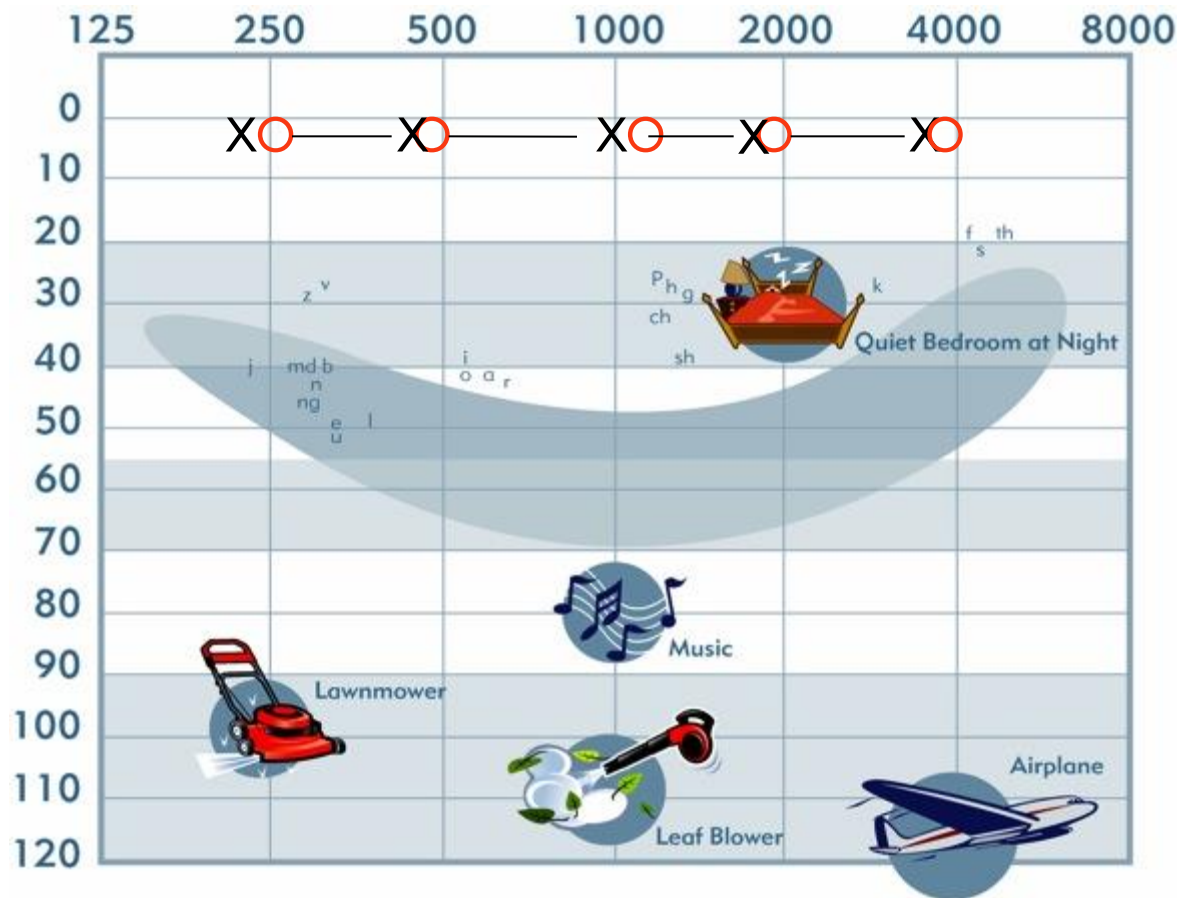
Loudness
Soft to
Loud





The Audiogram

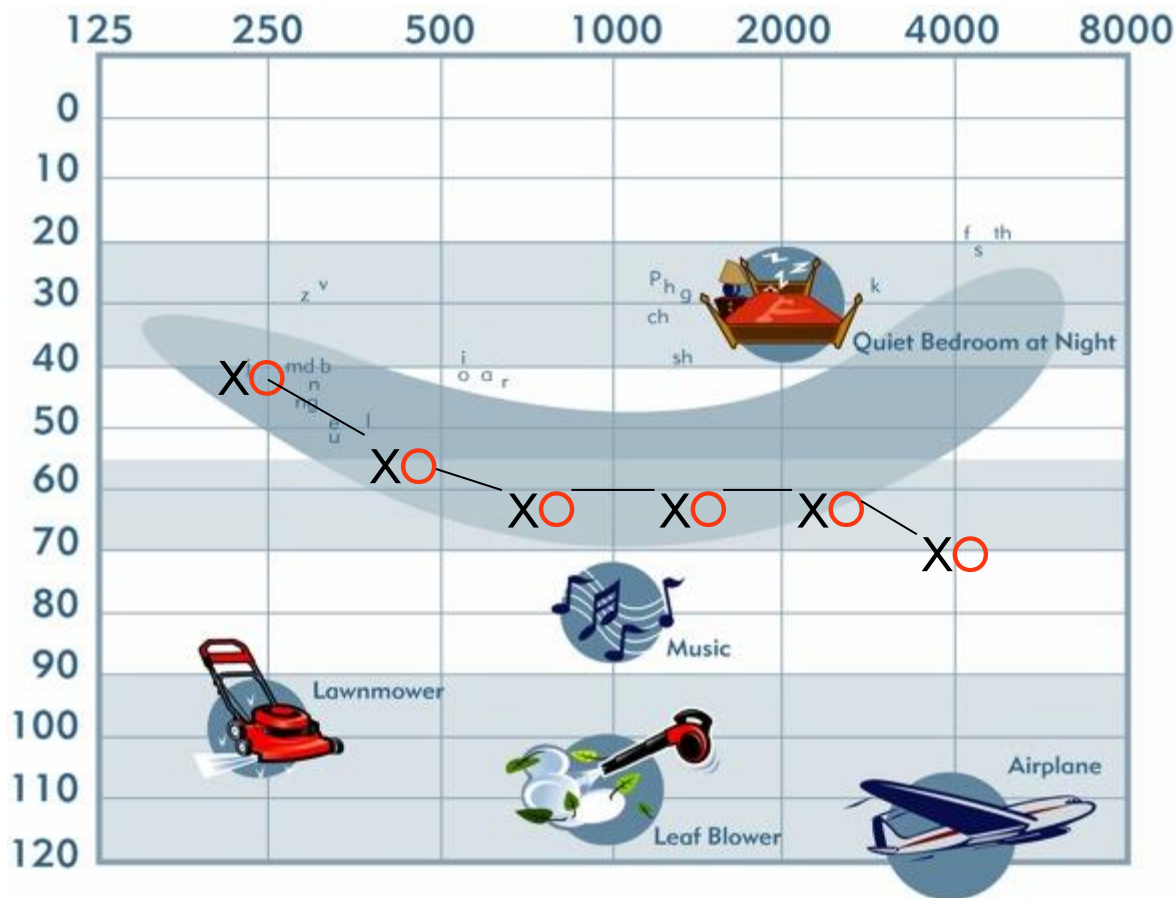
Normal Hearing





The Audiogram

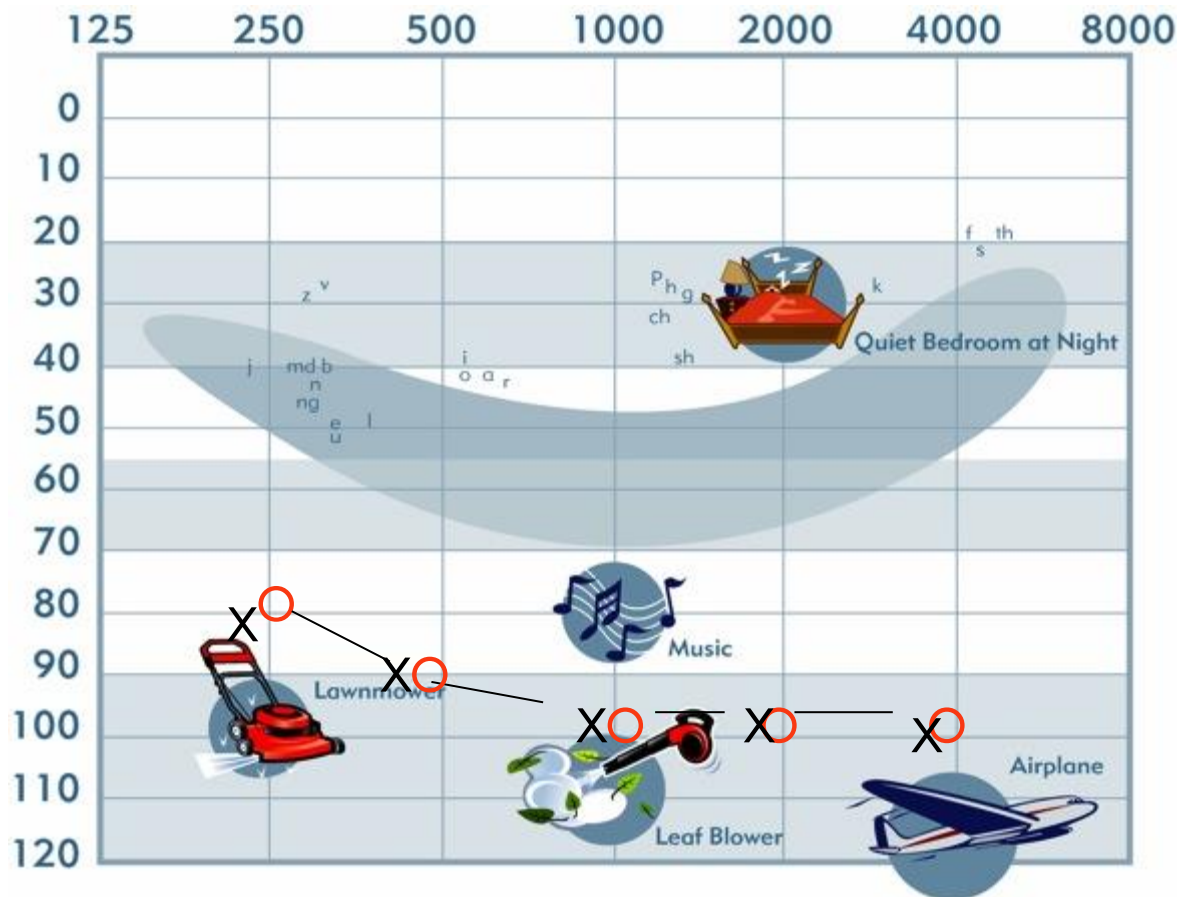
Moderate-to-Severe Loss





The Audiogram

Severe-to-Profound Loss





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Types of Hearing Loss

Sensorineural

damage to the inner ear (cochlea), or to the nerve pathways from the inner ear to the brain

Conductive

sound is not conducted efficiently through the outer ear canal to the eardrum and the tiny bones (ossicles) of the middle ear

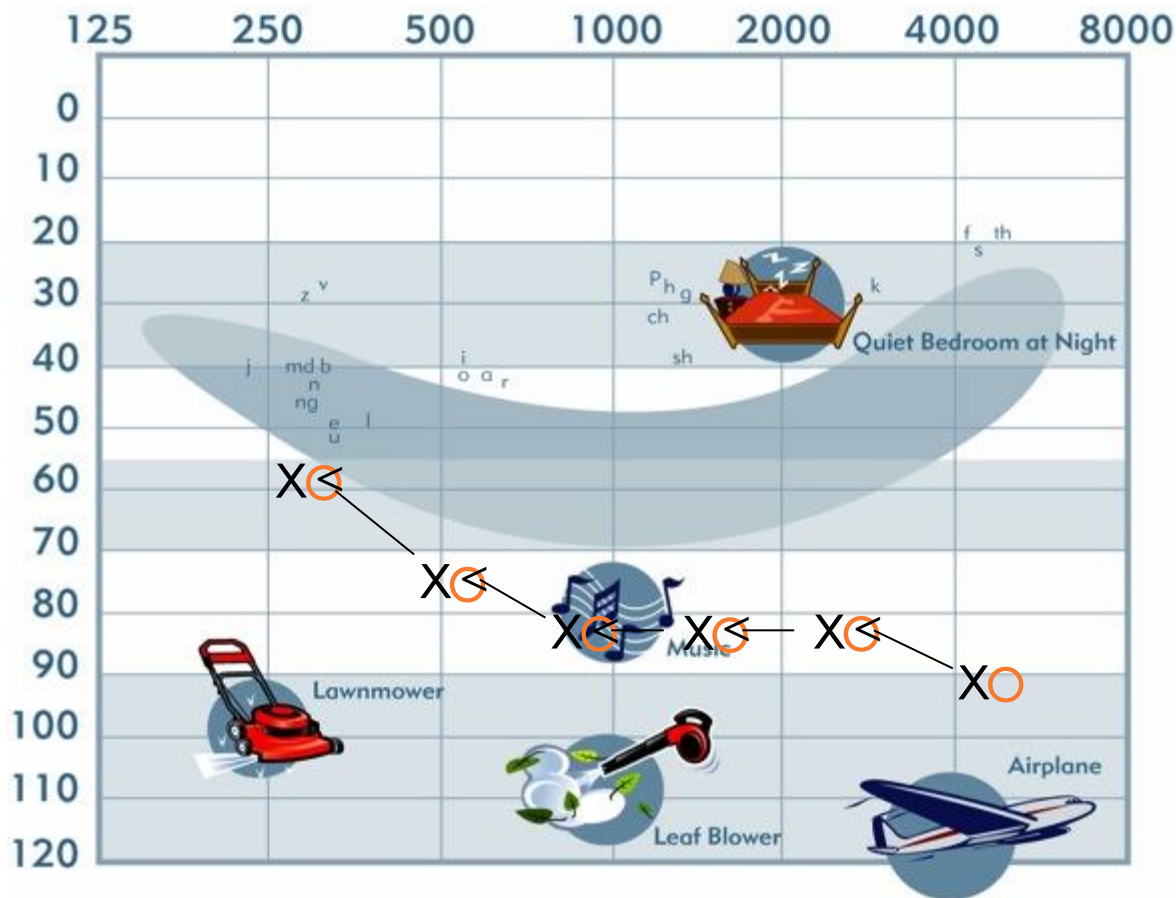
Mixed

a conductive hearing loss occurs in combination with a sensorineural hearing loss



Types of Hearing Loss

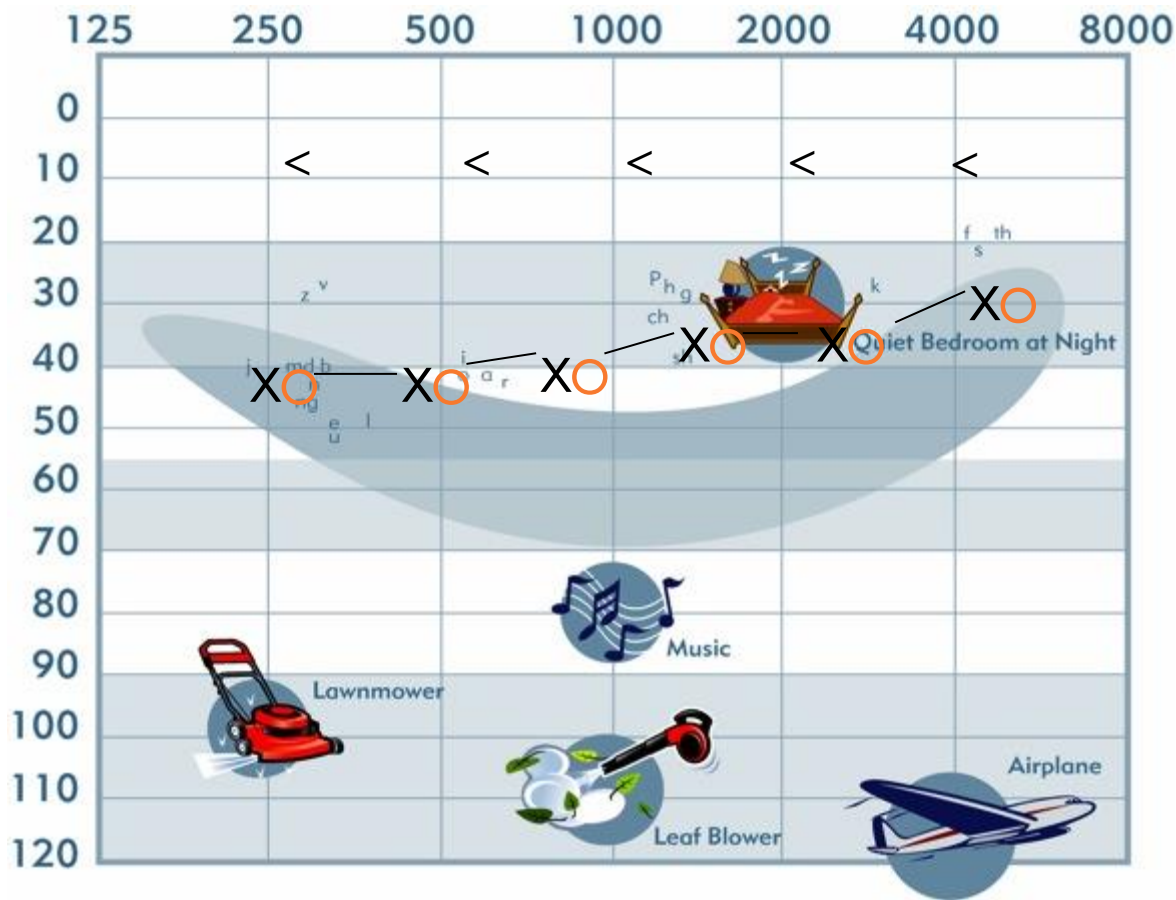
Sensorineural Hearing Loss





Types of Hearing Loss

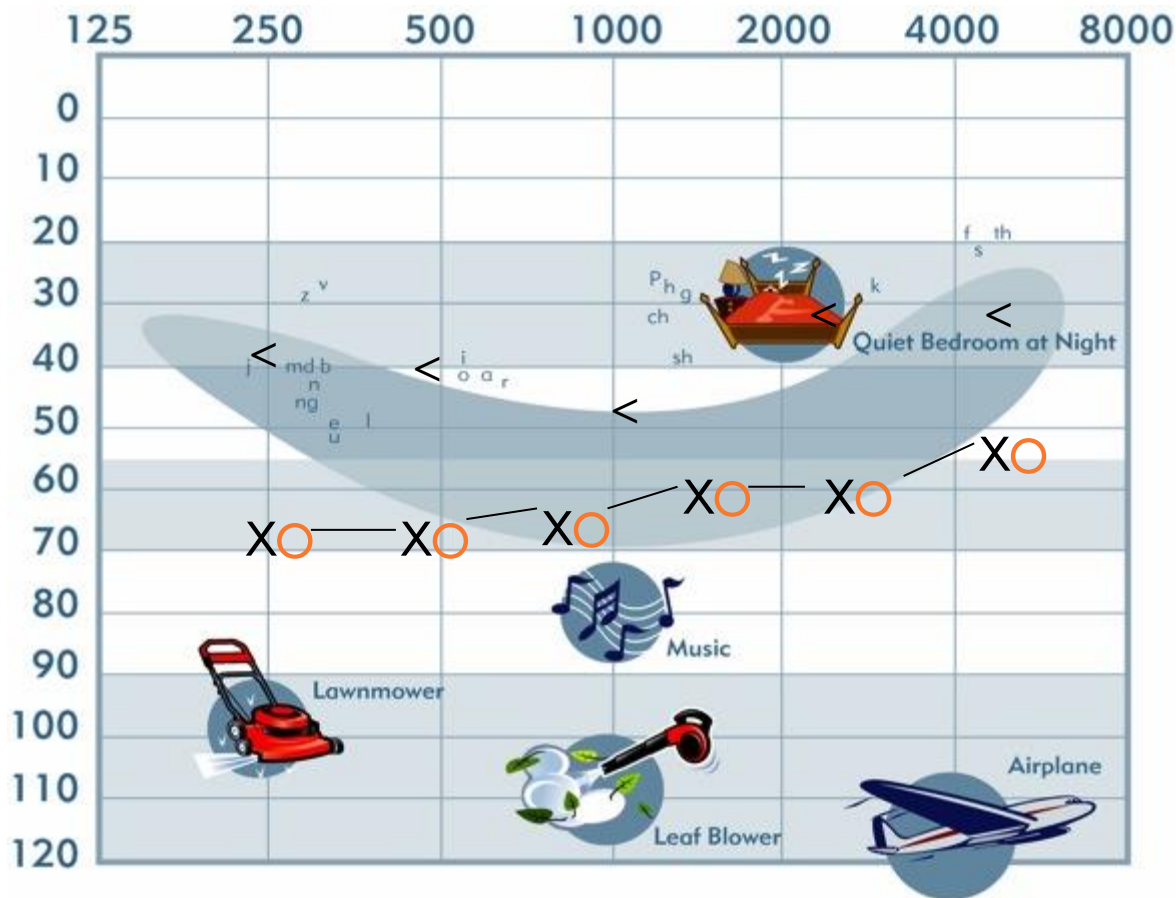
Conductive Hearing Loss





Types of Hearing Loss

Mixed Hearing Loss





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Treatment Options for Hearing Loss



Hearing Aids



Cochlear Implants Systems



Treatment Options for Hearing Loss

Types of Hearing Aids

Behind-the-Ear



In-the-Canal



In-the-Ear





Treatment Options for Hearing Loss

How is a Cochlear Implant Different From a Hearing Aid?

Hearing Aid	Cochlear Implant
Acoustically amplify sound	Convert sound into electrical signals
Rely on the responsiveness of remaining undamaged inner ear sensory cells	Bypass the inner ear sensory cells and stimulate the hearing nerve directly



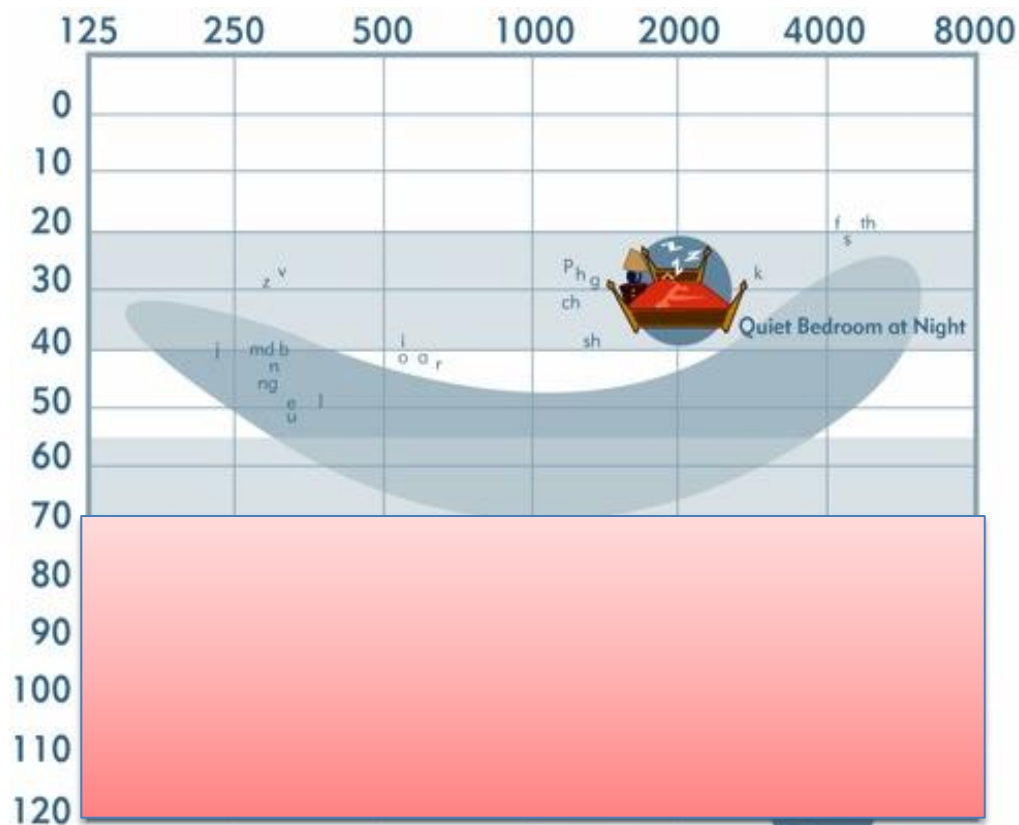
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Who is a Candidate for a Cochlear Implant?

Range of hearing for a cochlear implant candidate





Who is a Candidate for a Cochlear Implant?

Children (12 months - 2 years)

- Profound, bilateral sensorineural deafness (≥ 90 dB HL)
- Little or no benefit from hearing aids

Children (2 years - 17 years)

- Severe-to-profound, bilateral sensorineural deafness
- Little or no benefit from hearing aids

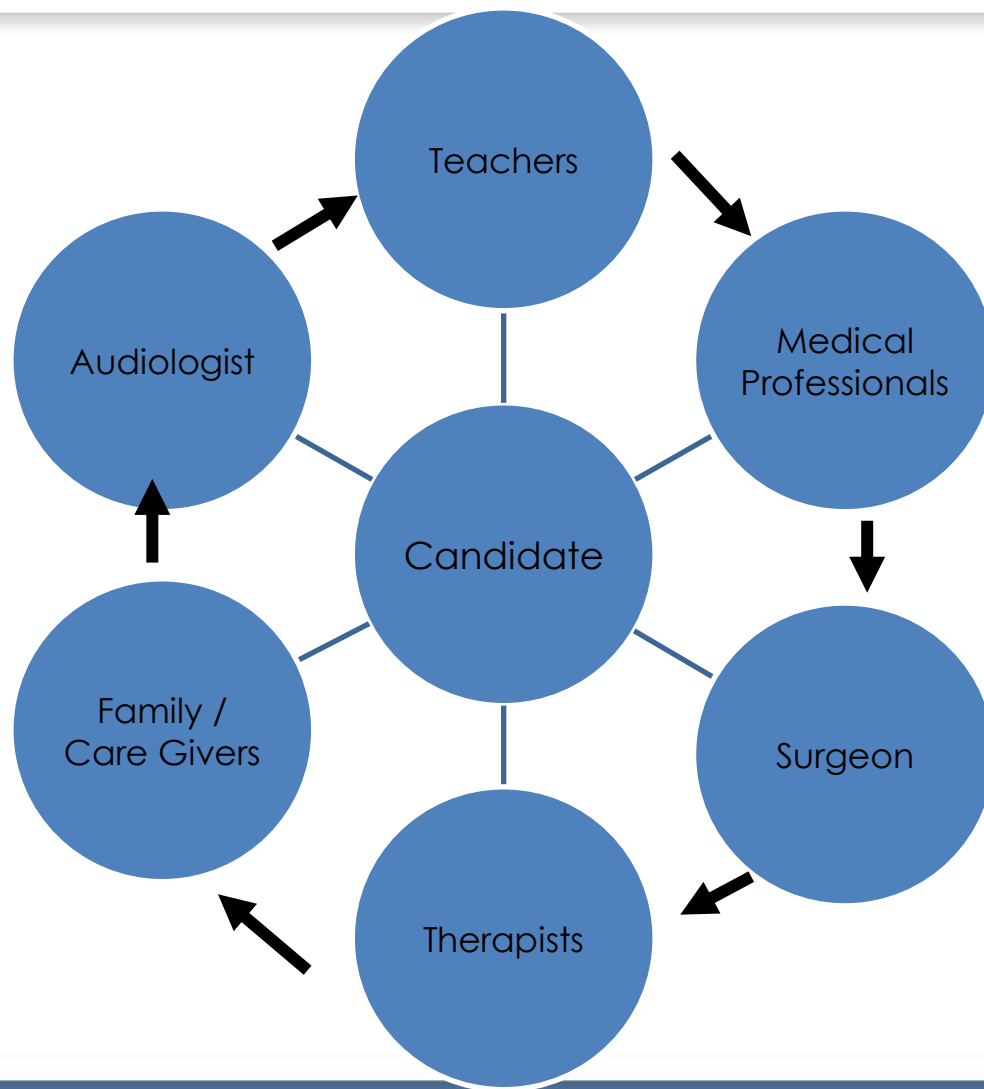
Adults (18 years+)

- Severe-to-profound, bilateral sensorineural hearing loss
- Less than 50% speech recognition with hearing aids on open-set sentence recognition



The Candidacy Evaluation

A Team Decision!





The Candidacy Evaluation

Typical Components for Pediatric Evaluation

- Audiologic Evaluation
- Medical Evaluation
- Speech Language Evaluation
- Psychological Evaluation
- Educational Evaluation





The Candidacy Evaluation

Audiological Evaluation

Determine the type and degree of hearing loss

- Air & bone conduction thresholds for each ear
- ABR & OAEs

Assess the child's current amplification system

- Aided sound field testing
- Aided ear specific testing recommended
- Aided speech perception testing

Counseling

- Address realistic expectations
- Device selection
- Post-operative follow-up





The Candidacy Evaluation

Medical Evaluation

- Determine the cause of hearing loss
- Assess status of middle ear & cochlea
- CT scan/MRI
- Counseling
 - Hearing loss
 - The surgical procedure
 - Typically out-patient and performed by an otolaryngologist (ENT) or otologist (ear specialist)
 - Post-surgical considerations





The Candidacy Evaluation

Bilateral Cochlear Implants

Bilateral Implants (one for each ear)

- Hearing with two ears
- Simultaneous vs. Sequential
- Benefits:
 - ✓ Improved directionality
 - ✓ Improved hearing in noise
 - ✓ Clarity of speech
 - ✓ Developmental





The Candidacy Evaluation

Speech & Language Evaluation

Assess Vocabulary - knowledge of single words

- Understanding words
- Using words

Assess Language - communication

- Understand what is spoken
- Using spoken words

Assess Speech- using sounds to form words clearly

Assess Listening skills – making sense of sounds and voice

Assess Reading skills

Counseling on consistent use of amplification and communication expectations pre-CI and post CI





The Candidacy Evaluation

Developmental Evaluation

Assessment of non-verbal & verbal IQ

- Verbal IQ assessed when appropriate

Counseling for family

- Impact of hearing loss on the family unit

Assessment of child's learning style

Assessment of any other underlying issues

Serves as a baseline evaluation





The Candidacy Evaluation

Educational Evaluation

Areas to consider:

- Communication methodology
- Support services
- Speech/language and auditory skill development
- Professional training





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Cochlear Implant Basics

A cochlear implant system consists of two main parts:



Internal Implant



or



External Sound Processor



Copy this link into your browser to view a video on how a cochlear implant works.

<https://www.youtube.com/watch?v=zeg4qTnYOpw>

Or visit YouTube and search for “How a Cohlear Implant Works by Advanced Bionics”



Cochlear Implant Basics

Sound Processor (1)

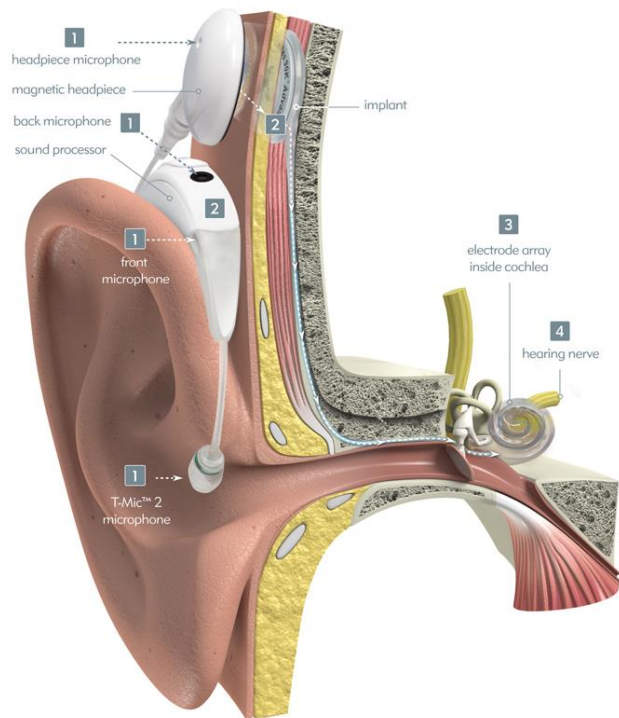
- Captures sound from the environment
- Processes sound into digital information
- Transmits information across the skin through the headpiece to the implant

Implant

- Converts transmitted information into electrical signals (2)
- Delivers signals to the electrodes (3)
- Stimulates the hearing nerve

Hearing Nerve

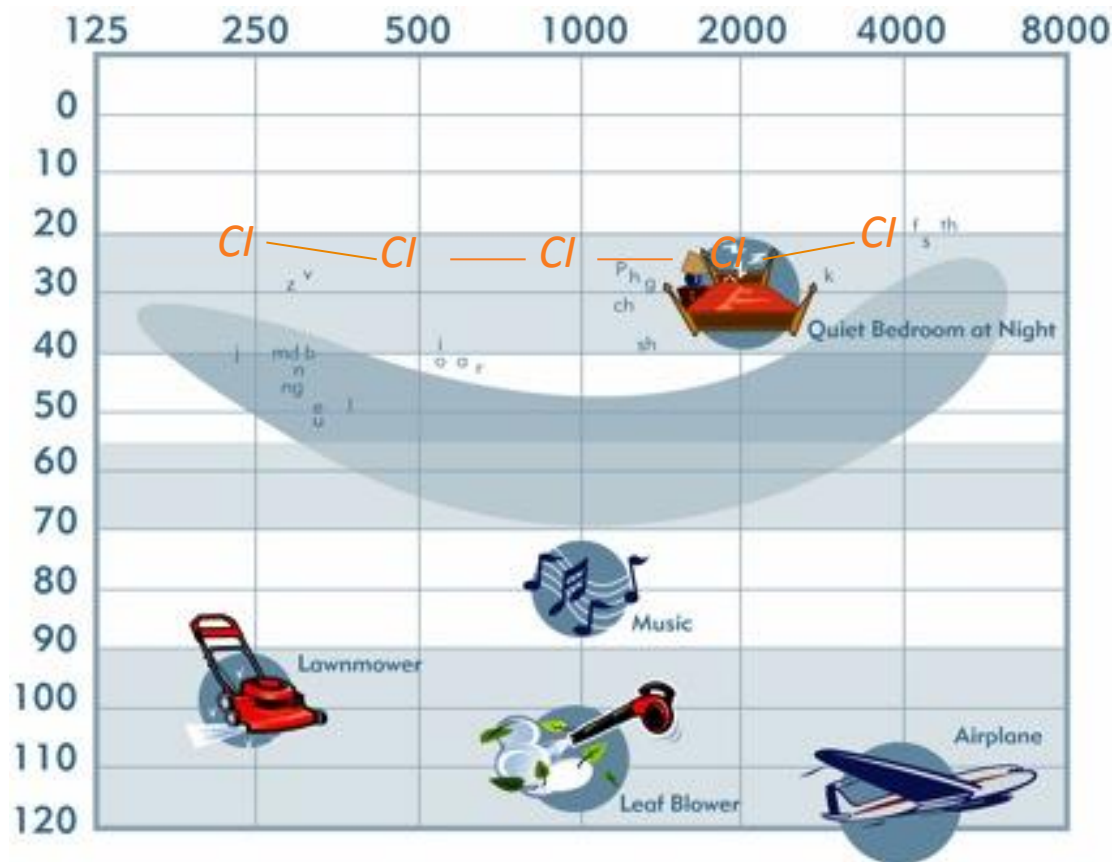
- Transmits the signal which will be perceived by the brain as sound (4)





Cochlear Implant Basics

Typical Post CI Audiogram





What You Will Learn Today

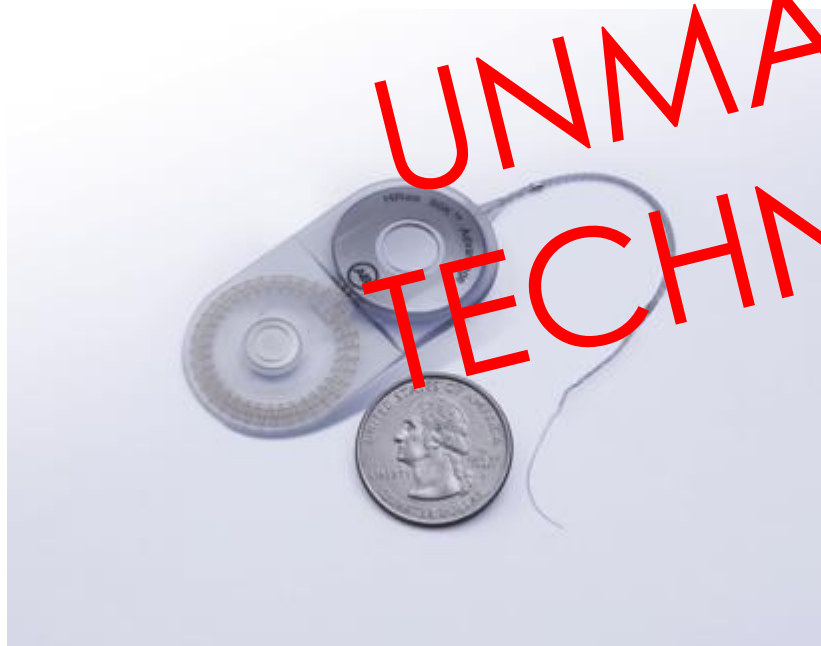
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Today's Cochlear Implant System

Internal Device

The HiRes 90K™ Advantage Implant



- Unlimited ways to deliver stimulation
- 16 independent current sources
- Low-profile design
- Removable magnet
- Industry's highest case impact resistance- up to 6 Joules^{1,2}
- Industry's fastest stimulation rates

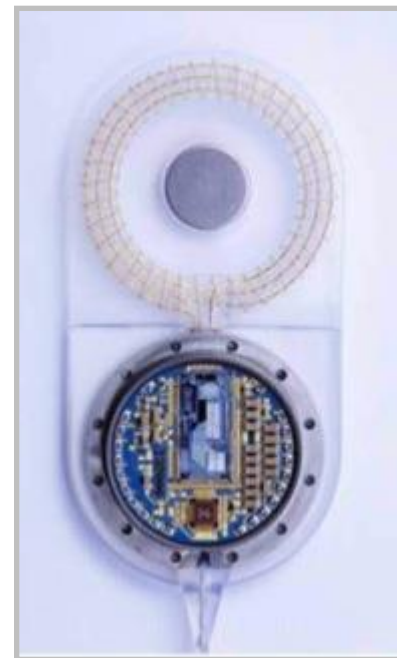


Today's Cochlear Implant System

High Implant Reliability HiRes 90K™ Advantage Implant

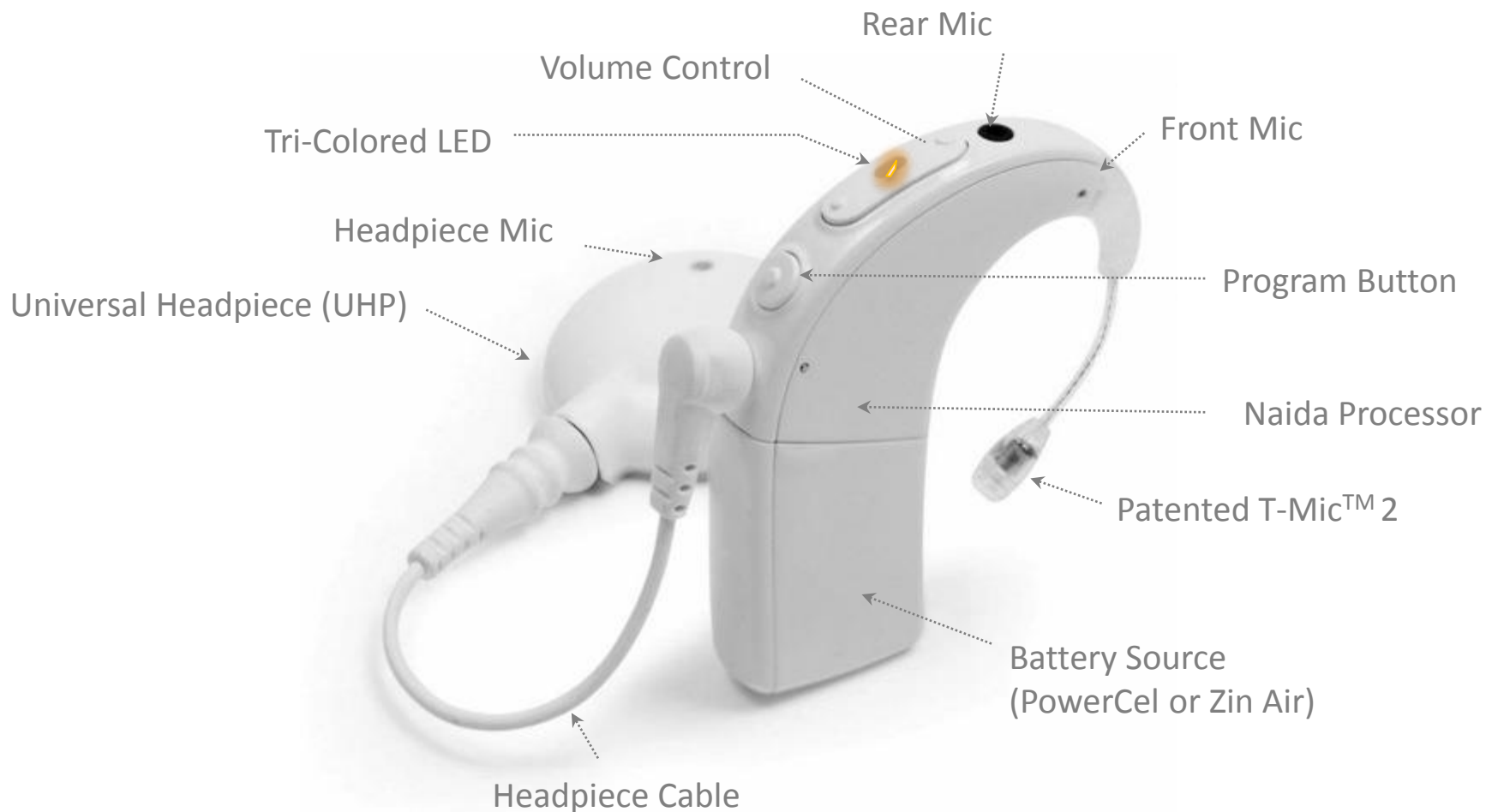
AB cochlear implants implanted today demonstrate high reliability with a 99.81% two-year cumulative survival rate (CSR)*.

Advanced Bionics reports all device failures in adherence to the global standard as defined by ISO 5841-2:2014¹ and the principles outlined in the European & Global Consensus on Cochlear Implant Failures and Explanations





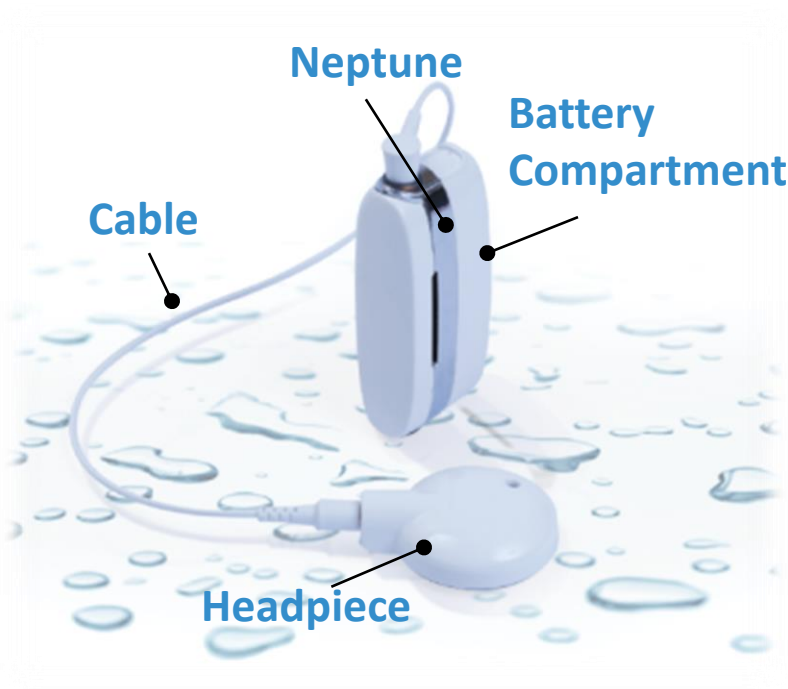
Today's Cochlear Implant System





Today's Cochlear Implant System

Neptune™ Processor Features



- Waterproof
- Removable Controls
- Powered by 1 AAA Battery
 - Cost Effective
 - Full day of use with a single disposable or rechargeable battery
- Universal Headpiece (UHP) and AquaMic
- Compatible with HiRes 90K™ and CII implant devices



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- **Maximizing success with a cochlear implant**



Maximizing Success

- Audiologic Management
- Rehabilitation
- Family Support
- School Support





Maximizing Success

Audiologic Management

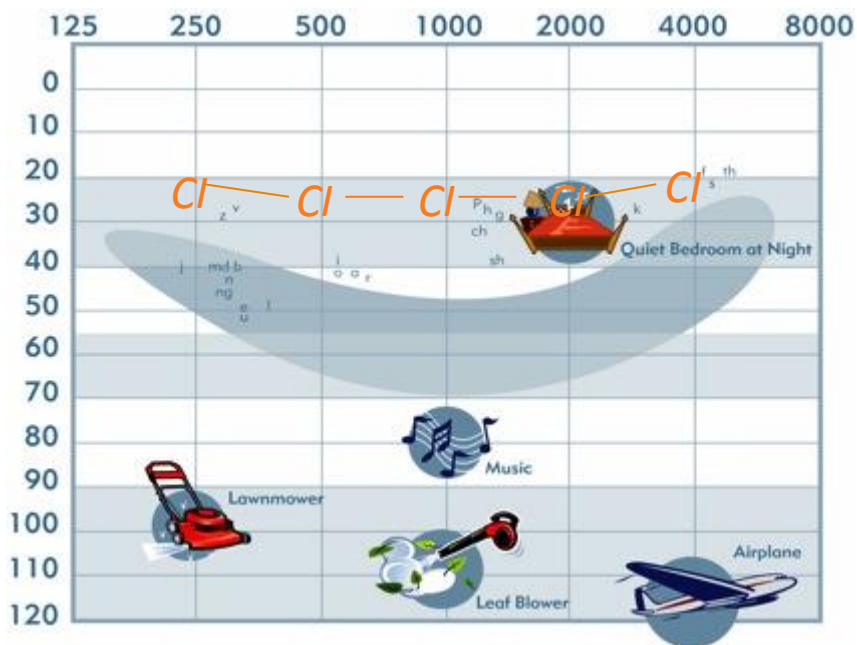
- Goal is to assure access to sound adequate for auditory development
- Programming or “mapping” of the cochlear implant system
- Assessments at regular intervals to track auditory development
- Age-appropriate techniques & materials





Maximizing Success

Audiologic Management





Maximizing Success

Rehabilitation is KEY





Maximizing Success

Parent Commitment





Maximizing Success

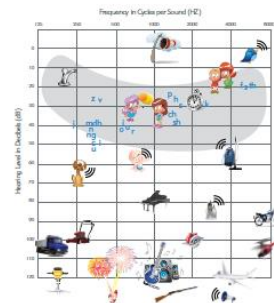
School Support

- Understand what a cochlear implant is and how to complete equipment troubleshooting
- Provide an environment where there are strong expectations for listening and spoken language
- Perform behavioral listening checks on a daily basis
- Know where to find support and resource materials
- Maintain communication between the student's parents, teachers and cochlear implant center





AB Makes it Simple for Schools



FREE resources!! www.advancedbionics.com/tfs



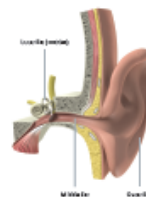
How the Ear Works
Sound waves enter the ear and travel through the ear canal to the eardrum. The eardrum vibrates and sends signals to the brain through the cochlea.

The Outer Ear
The outer ear (or pinna) captures sound and then directs the sound down the ear canal to the eardrum.

The Middle Ear
Sound waves enter the eardrum and travel through the middle ear. The middle ear contains three small bones (the ossicles) that amplify the sound and send it to the cochlea.

The Inner Ear
The inner ear contains the cochlea, which is a spiral-shaped structure that contains the hair cells. These hair cells convert the sound waves into electrical signals that the brain can understand.

The Auditory Nerve
The auditory nerve (or hearing nerve) is responsible for carrying the electrical signals from the inner ear to the brain. It is the highest part of the brain that is involved in hearing.



What is "Hearing" Hearing?
Hearing is the process of receiving and interpreting sound. It involves the ear and the brain. The ear captures sound waves and sends them to the brain, which interprets them as sound.

An audiogram is a graph that shows the hearing levels of a person. It is used to determine if a person has hearing loss and to determine the type of hearing loss.

ABhearing.com



The Sounds of Speech

English Consonants

Consonant	IPA Symbol	Approx. Frequency (Hz)	Approx. Intensity (dB)
p	p	1000	100
b	b	1000	100
t	t	1000	100
d	d	1000	100
n	n	1000	100
m	m	1000	100
ng	ŋ	1000	100
l	l	1000	100
r	r	1000	100
sh	ʃ	1000	100
ch	tʃ	1000	100
th	θ	1000	100
ss	s	1000	100
zz	z	1000	100
tt	t	1000	100
dd	d	1000	100
nn	n	1000	100
mm	m	1000	100
ll	l	1000	100
rr	r	1000	100
hh	h	1000	100
kk	k	1000	100
gg	g	1000	100
ff	f	1000	100
vv	v	1000	100
ww	w	1000	100
yy	y	1000	100
ee	e	1000	100
oo	o	1000	100
aa	a	1000	100
ii	i	1000	100
uu	u	1000	100
eh	ɛ	1000	100
oh	ɔ	1000	100
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ih	i	1000	100
uh	u	1000	100
eh	ɛ	1000	100
oh	ɔ	1000	100



Tools for Toddlers™ Program

Do you know about Advanced Bionics' Tools for Toddlers program (TFT™)?

TFT provides free resources created specifically to help support early intervention and pre-school aged children.



Visit the Tools for Toddlers Program at

www.advancedbionics.com/tfs

TFT resources can be found on the lower section of the TFS page



LITERACY STRATEGIES for the Very Young Child

By Kristin S. Henning, MS, CCC-SLP LSSJ, CASHA, TF

When you begin planning therapy for the infant with hearing loss, the first thought may be that books are not appropriate due to a child's lack of reading and attention. However, the opposite is actually true. You can and should begin introducing books to children as early as you can in the child's home. These are several activity designed to provide you with strategies on how to facilitate your literacy development in therapy young child.

Therapy for the Infant (0-6 Months)		
The Adult	The Child	Book Features
<ul style="list-style-type: none"> • Introducing the parent(s) • Exposure to print • Soundly with books • Soundly with children • Point to pictures • Use books with bright colors and tactile properties • Focus on the words (highlighting or otherwise) • Read in the presence of a book • Hold the book so you can see the page • Use simple phrases • Hold up your own words 	<ul style="list-style-type: none"> • Taken and returned • Soundly with the adult • By 6 months of age, the child will be holding and turning the book • Increased interest in pictures, bright and tactile colors • Interest in pictures of faces 	<ul style="list-style-type: none"> • Simple large pictures • Bright colors • Clearly labeled books • Bold and tactile • Childproof books

Therapy for the Infant (6-12 Months)		
The Adult	The Child	Book Features
<ul style="list-style-type: none"> • Continue with parent(s) • Follow child's lead - especially in reading books • Talk about pictures • Keep books on low shelves • Offer a reading log • Hold up "story" 	<ul style="list-style-type: none"> • Attempts to pick up • Recognizes familiar objects • Vocalizes in response to reading • Point pictures • Follow pictures of faces • Colors and shapes are the most interesting part of books to bring books 	<ul style="list-style-type: none"> • Bold books • Pictures of faces • Familiar objects • Bold books • Small photo photo albums • Memory albums • Books about nature and animals • Multisensory books



Exploring COMMUNICATION OPTIONS

As a parent(s) of a child with a hearing loss you will need to choose which communication method(s) is the best for your child and your family. Below you will find some basic information about all communication options available. We have also provided additional details below why you can learn more about each approach.

American Sign Language (ASL)

- Typically associated with the Deaf culture (Deaf and hard of hearing)
- A completely visual and nonverbal system
- A separate language comprised of its own unique signs and hand signs
- No written form
- ASL is not a replacement for communication
- Its focus is on grammar and syntax (spoken language)
- Expressive communication uses the entire body in conveying meaning

The Further Information about ASL, visit:
www.hardofhearing.com/asl

Total Communication

- Used to develop spoken language through speech reading with some form of manual communication
- Usually involves some form of manual communication (e.g. sign language)
- Expressive speech developed through a combination of hearing, sight, and tactile cues
- Teacher is often more than parent(s) in manual communication during early language years
- Usually involves some form of manual communication
- Use of sign language is often used as a bridge to spoken language

The Further Information about Total Communication, visit:
www.hardofhearing.com/totalcommunication

Cued Speech

- Aided communication system of eight hand signals (used that represent different sounds of speech)
- Can be used while talking to make spoken language clear through gestures
- This system allows the child to distinguish sounds that look the same on the lips
- As used system
- Focus is on the primary language to be spoken
- Usually involves some form of manual communication

The Further Information about Cued Speech, visit:
www.hardofhearing.com/cuedspeech

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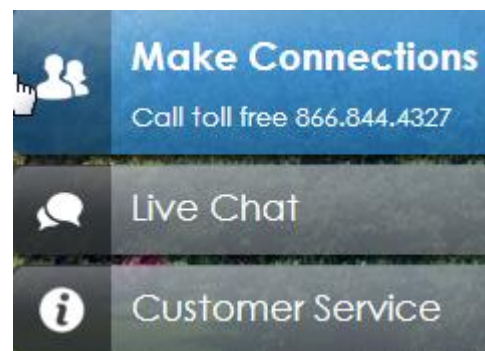
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