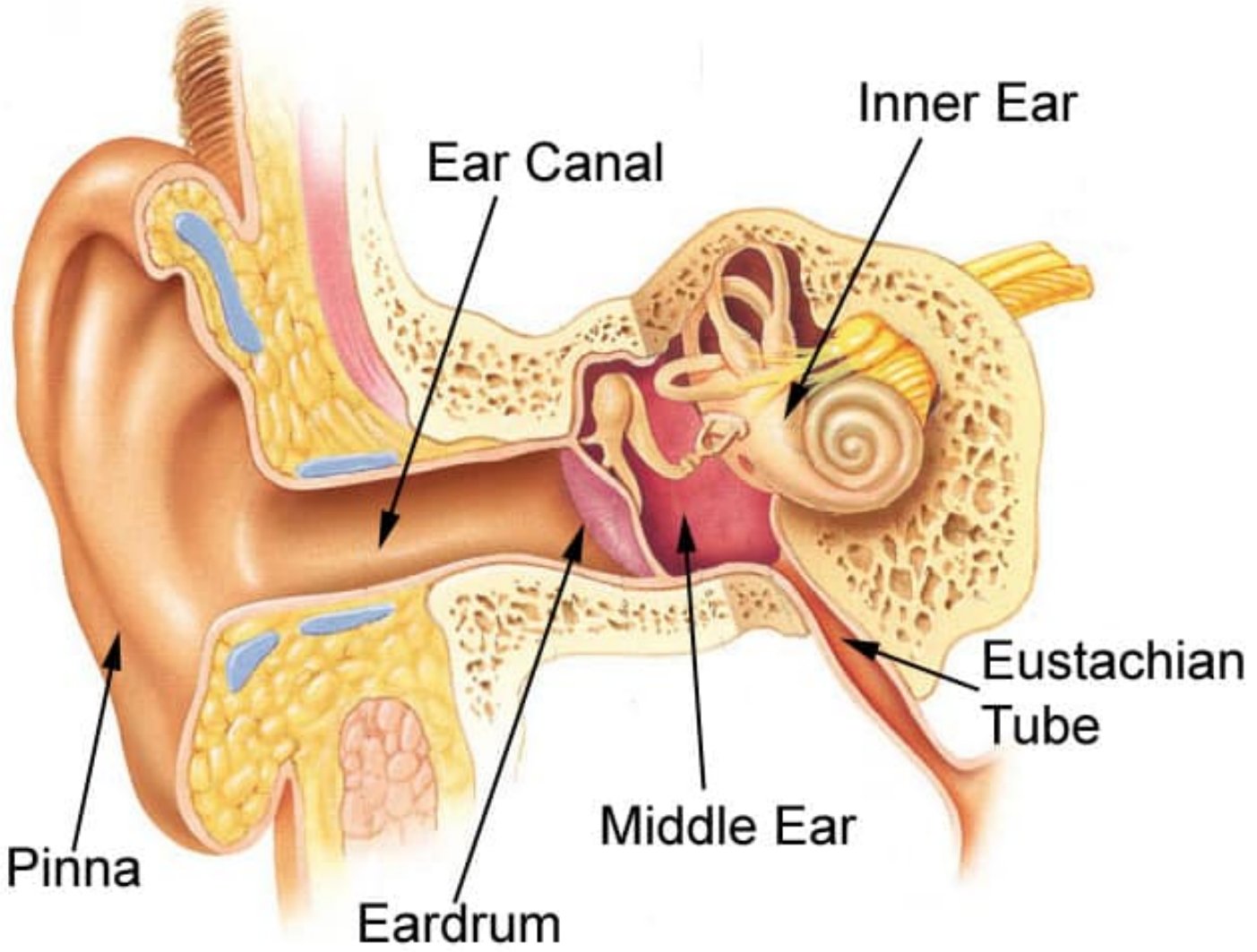
By: Nancy Gilston

History of Hearing

Our ear canals start to develop 2-3 weeks after conception and are fully formed by 10 weeks after conception. The auditory system becomes functional around 25 weeks of gestation.
In this development, the cochlea becomes the only place in our bodies where there is bone (temporal bone) housing bone (cochlea) and that otic capsule of the cochlea is a different bone metabolism than any other bone in our bodies. It is harder and denser.


Inner Ear
Ear Canal
Eustachian
Tube
Middle Ear
Pinna
Eardrum

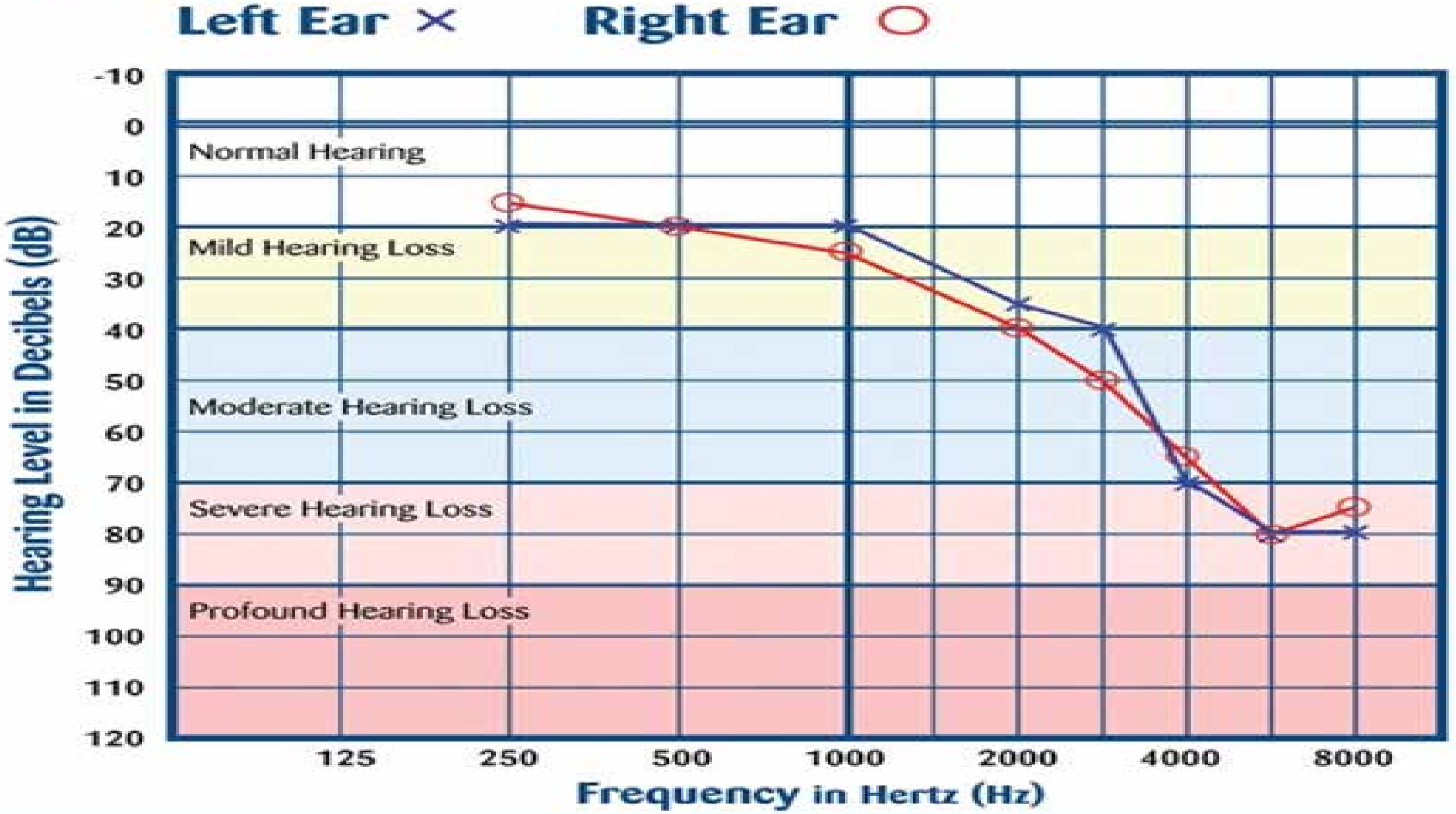
The pathway for hearing is dependent on the vibrations of sound to send signals from the outer ear through the ear canal and the middle ear structures of the Incus, Malleolus and Stapes through the Round Window to stimulate the hair cells of the cochlea. Those hair cell signals send the information to our brains so that we can code the sounds to make sense.

The outer portion of the cochlea contains the higher frequency information and as the cochlea turns in on the shell the mid and lower frequencies are located.

It is possible, when we bang away with loud sounds in the environment, whether that is from music, or sirens or industrial noises, there is a chance that outer hair cells could become impaired. As a result, high frequency hearing loss is often associated with noise exposure.

One way to avoid hearing loss is to protect your ears from noise exposure. Cover your ears when sirens go by, subway platforms. If you are at a loud wedding or concert and not wearing ear protection (specific for noise exposure) you should limit your time of exposure by leaving the wedding or venue for a few minutes, so you don’t have constant exposure. OSHA standards say if you expose yourself to 85 decibels for 6 hours you will have a loss. If you increase the dB value of time of exposure, then you will decrease the amount of time needed to cause the hearing loss.

AUDIOGRAM


Left Ear ×
Right Ear ○
-10
0
10
20
30
40
50
60
70
80
90
100
110
120
Normal Hearing
Mild Hearing Loss
Moderate Hearing Loss
Severe Hearing Loss
Profound Hearing Loss
Hearing Level in Decibels (dB)
125
250
500
1000
2000
4000
8000
Frequency in Hertz (Hz)

Home

- 50 Refrigerator
- 50-60 Electric Toothbrush
- 50-75 Washing Machine
- 50-75 Air Conditioner
- 50-80 Electric Shaver
- 55 Coffee Percolator
- 55-70 Dishwasher
- 60 Sewing Machine
- 60-85 Vacuum Cleaner
- 60-95 Hair Dryer
- 65-80 Alarm Clock
- 70 TV Audio
- 70-80 Coffee Grinder
- 70-95 Garbage Disposal
- 75-85 Flush Toilet
- 80 Pop-Up Toaster
- 80 Doorbell
- 80 Ringing Telephone
- 80 Whistling Kettle
- 80-90 Food Mixer or Processor
- 80-90 Blender
- 110 Baby Crying
- 110 Squeaky Toy Held Close to Ear
- 135 Noisy Squeeze Toys

Work

- 40 Quiet Office, Library
- 50 Large Office
- 65-95 Power Lawn Mower
- 80 Manual Machine, Tools
- 85 Handsaw
- 90 Tractor
- 90-115 Subway
- 95 Electric drill
- 100 Factory Machinery
- 100 Woodworking Class
- 105 Snow Blower
- 110 Power Saw
- 110 Leaf Blower
- 120-125 Chainsaw, Hammer On Nail
- 120 Pneumatic Drills, Heavy Machine
- 120 Jet Plane at Ramp
- 120 Ambulance Siren
- 130 Jackhammer, Power Drill
- 130 Air Raid
- 130 Percussion Section at Symphony
- 140 Airplane Taking Off
- 150 Jet Engine Taking Off
- 150 Artillery Fire at 500 Feet
- 189 Rocket Launching from Pad

Recreation

- 40 Quiet Residential Area
- 70 Freeway Traffic
- 85 Heavy Traffic, Noisy Restaurant
- 90 Truck, Shouted Conversation
- 95-110 Motorcycle
- 100 Snowmobile
- 100 School Dance, Boom Box
- 110 Music Club, Disco
- 110 Busy Video Arcade
- 110 Symphony Concert
- 110 Car Horn
- 110-120 Rock Concert
- 112 Personal Music Player on High
- 117 Football Game Stadium
- 120 Band Concert
- 125 Auto Stereo
- 130 Stock Car Races
- 143 Bicycle Horn
- 150 Firecracker
- 156 Cap Gun
- 157 Balloon Pop
- 162 Fireworks (at 3 Feet)
- 163 Rifle
- 166/170 Handgun, Shotgun

Over-the-Counter and Custom Earplugs

An audiogram is a way to determine what you hear, particularly in speech frequencies 250-8K Hertz.

To look at the graph, frequencies run across, and decibels of loudness runs down. So as the numbers of decibels increases, there is a more significant hearing loss.

Generally, noise induced hearing loss will occur in the frequencies between 4K and 6K Hertz. Sometimes there will be a recovery at 8K Hertz. That may be because in that anatomy the hair cells turned back inside the shell and were better protected.

Now, there may be other factors that could contribute to hearing loss.

Genetic

Chemical

Physical

Metabolic

Chemical-

Because there are medications that are ototoxic. Some Myacine drugs that at ototoxic but may be used to save someone's life.

There are some chemotherapy drugs that are ototoxic.

Physical-

Would be if you had a serious blow to the side of your head and fractured your temporal bone, it would impact your hearing.

Metabolic-

Here's where my experience with Dr. Kenneth Brookler has been invaluable to me. He is a neurotologist who spent his career studying the ear, knowing that the ear is the only place where there is bone housed in bone.

Metabolic Factors to Consider

Blood tests including Lipid Panel:

Specifically, HDL : Tryglycerides

Thyroid Function

Vitamin D Hydroxy 25

Factors in Blood Tests to Look At

RATIO OF HDL TO TRIGLYCERIDES– IS IT 1:1?

LEVEL OF D IN BLOOD. IS IT IN 50'S, 60'S, 70'S?

AND THYROID FUNCTION CAN BE A FACTOR

What Can We Do to Protect

1

Ear protection– best would be ear protection that has filters to block high frequencies

2

Diet—Lower the carb intake and sugars and increase good fat and proteins

3

Monitor your hearing to see if it is stable

4

If there is a loss and it is impacting your communication, consider amplification with hearing aids

In Summary:

Factors to protect your hearing contain many moving parts.

Diet, lifestyle, genetics, sound exposures are all contributing factors.


Questions and Answers?