Bone Conduction: How it Works

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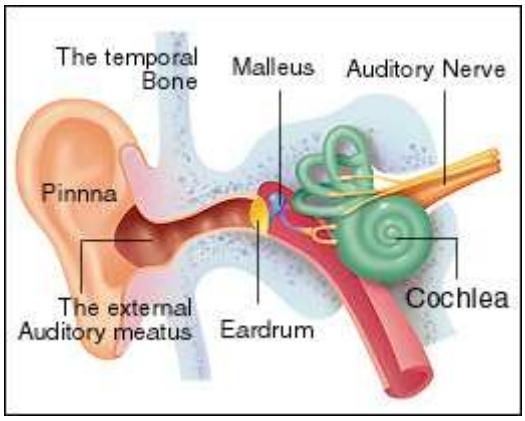
We all hear sounds through both our bones (bone-conducted or bone-transmitted) and our eardrums (air-conducted or air-transmitted). Most sounds are heard by our eardrums. The eardrum converts the sound waves to vibrations and transmits them to the cochlea (or inner ear). However in some cases vibrations are heard directly by the inner ear bypassing your eardrums. In fact, this is one of the ways you hear your own voice. This is also how whales hear.

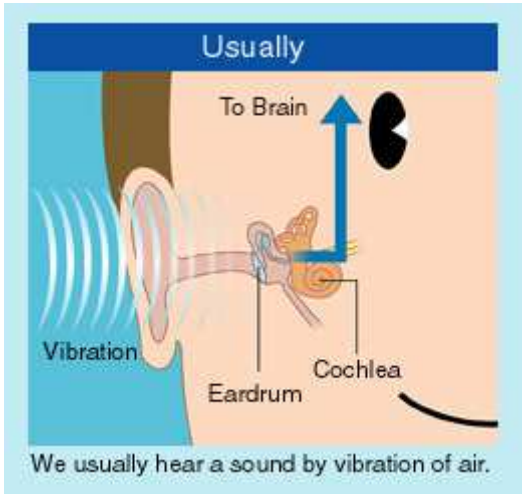
Ludwig van Beethoven, the famous 18th century composer who was almost completely deaf, discovered Bone Conduction. Beethoven found a way to hear the sound of the piano through his jawbone by attaching a rod to his piano and clenching it in his teeth. He received perception of the sound when vibrations transfer from the piano to his jaw. This has proven that sound could reach our auditory system through another medium besides eardrums and the other medium is our bones.




Beethoven took advantage of Bone Conduction as well.

How we usually Hear

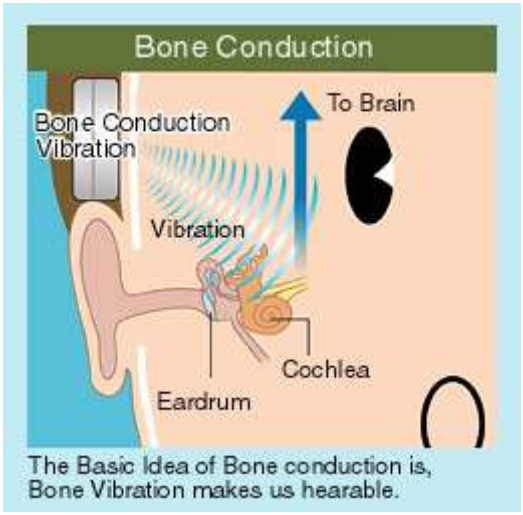
Normal sound waves are actually tiny vibrations in the air. The vibrations travel through the air to our eardrums. The eardrums in turn vibrate, decoding these sound waves into a different type of vibrations that are received by the Cochlea, also known as the inner ear. The Cochlea is connected to our auditory nerve, which transmits the sounds to our brain.



We usually hear a sound by vibration of air.

How we Hear with Bone Conduction

Bone Conduction bypasses the eardrums. In bone conduction listening, the bone conduction devices (such as headphones) perform the role of your eardrums. These devices decode sound waves and convert them into vibrations that can be received directly by the Cochlea so the eardrum is never involved. The “sound” reach the ears as vibrations through the bones (or skull) and skin.



Benefit for people with hearing loss

Most cases of hearing loss are due to damages to the eardrums. Since bone conduction does not use the eardrums, people with hearing difficulties would be able to hear clearly again with bone conduction, provided that their cochlea is in healthy and normal condition.
Generally, hearing loss could be described into three categories. That would be conductive hearing loss, perceptive hearing loss and mixed hearing loss. Conductive hearing loss is associated with faulty transmission of sound and is mostly due to damages to the eardrums. Bone conduction is able to aid a conduction hearing loss because a bone conduction device performs the role of the eardrums. Perceptive hearing loss is associated with difficulty in sensing the vibrations by the auditory nerves at the cochlea. Bone conduction is less effective for perceptive hearing loss. As for mixed hearing loss, it is best to suggest a trial in advance to find out whether bone conduction could be an aid to mixed hearing loss because it differs among individual.

KIKEERU

AUDIOBONE AQUA with High-Performance Sound Collector

"KIKEERU" collect the sound by High-Performance Sound Collector and send the signal to Bone Conduction Headphone. It is safety and easy to use for the elderly. This product is popular in Japan.

SET1 Features & Specifications of Bone Conduction Headphone "AUDIOBONE AQUA"

Bone conduction headphones of new style, ultra-light weight, high quality and waterproof! Acceptable for CD, MD players and digital music players, and no need amplifiers. Just can be used like compact headphones and earphones.

●It is designed by sound quality that a traditional bone conduction has been difficult to reproduce. Reference frequency is 50Hz to 12,000 Hz. Spread to high frequency, the sound of power is increasing.
●35g ultra lightweight design! Minimize the burden arising from a sense of weight.
●Features of the system is as bone conduction. Can be attached to the ear without shutting ear. Safety to ear during prolonged use.
●A unique form that is designed based on human engineering, creating a great fit by oscillators.

■ AUDIO BONE AQUA specifications
Type; Stereo bone conduction headphones (waterproof)
Color; Black
Eligibility input; 30mW
Maximum input; 100mW
Impedance; 8Ω
Sound pressure sensitivity; 88db/mW (db1.0dyne)
Frequency standards; 50 to 12,000 Hz
The length of the code; 120cm
Plug; stereo Φ3.5
Weight; 35g (Possible for the neck down.)

SET2 High-Performance Sound Collector

● It is a high-performance sound collector for collecting ambient sound good.
● Compact, easy to operate. It is reassuring to the elderly.



■ High-performance version of the sound collector
Product Type: sound collector
Model: MA-700
Power: AAA batteries per bottle (1.5V)
Reference frequency: 250 ~ 10000Hz
Sound pressure level: 125dB
Maximum acoustic gain: 44dB
Tone effects: 10dB
Earphone impedance: 8Ω
Battery life: about 100 hours (battery included)
Dimensions: H.65xW.42xD.14.5mm
Weight: 26g