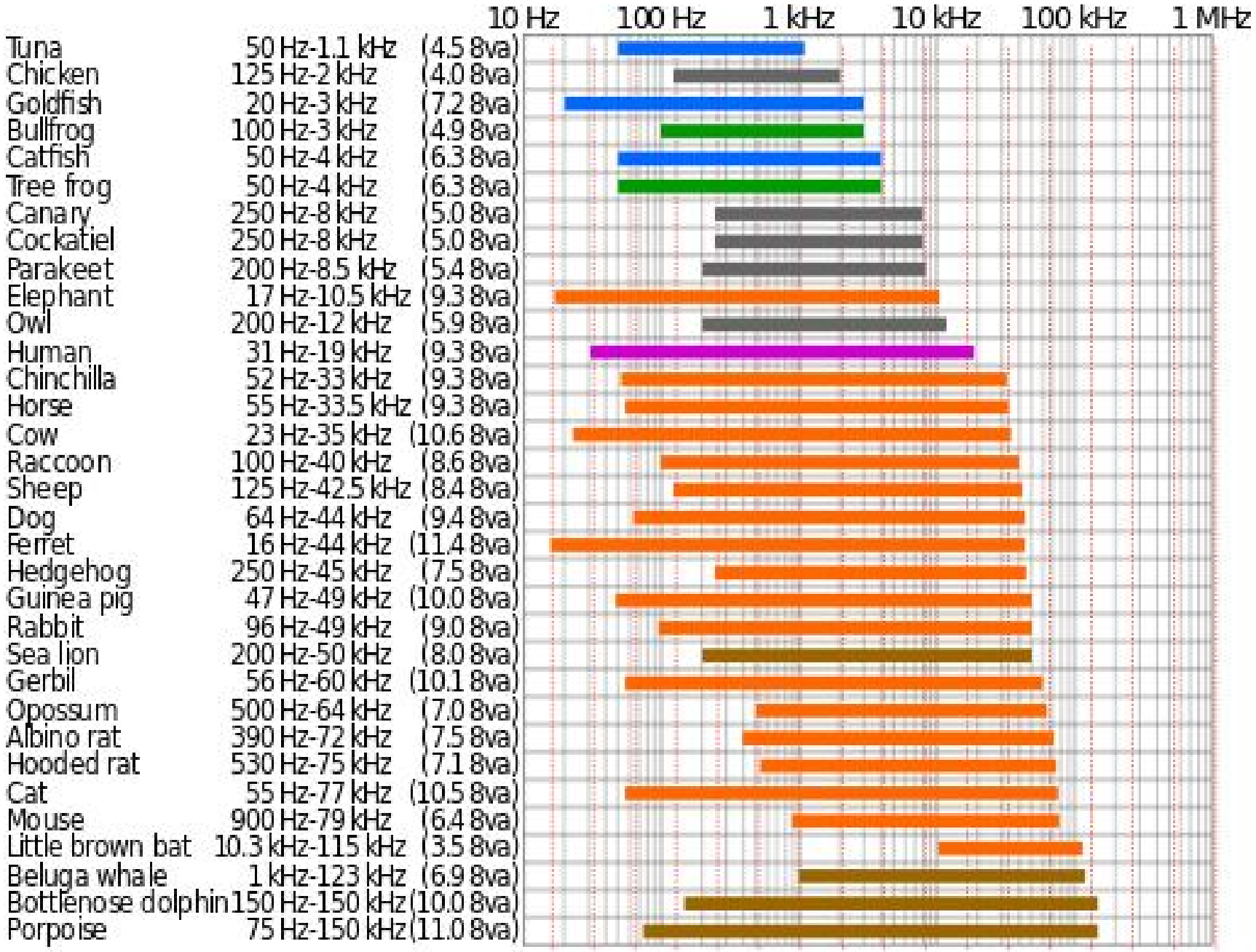
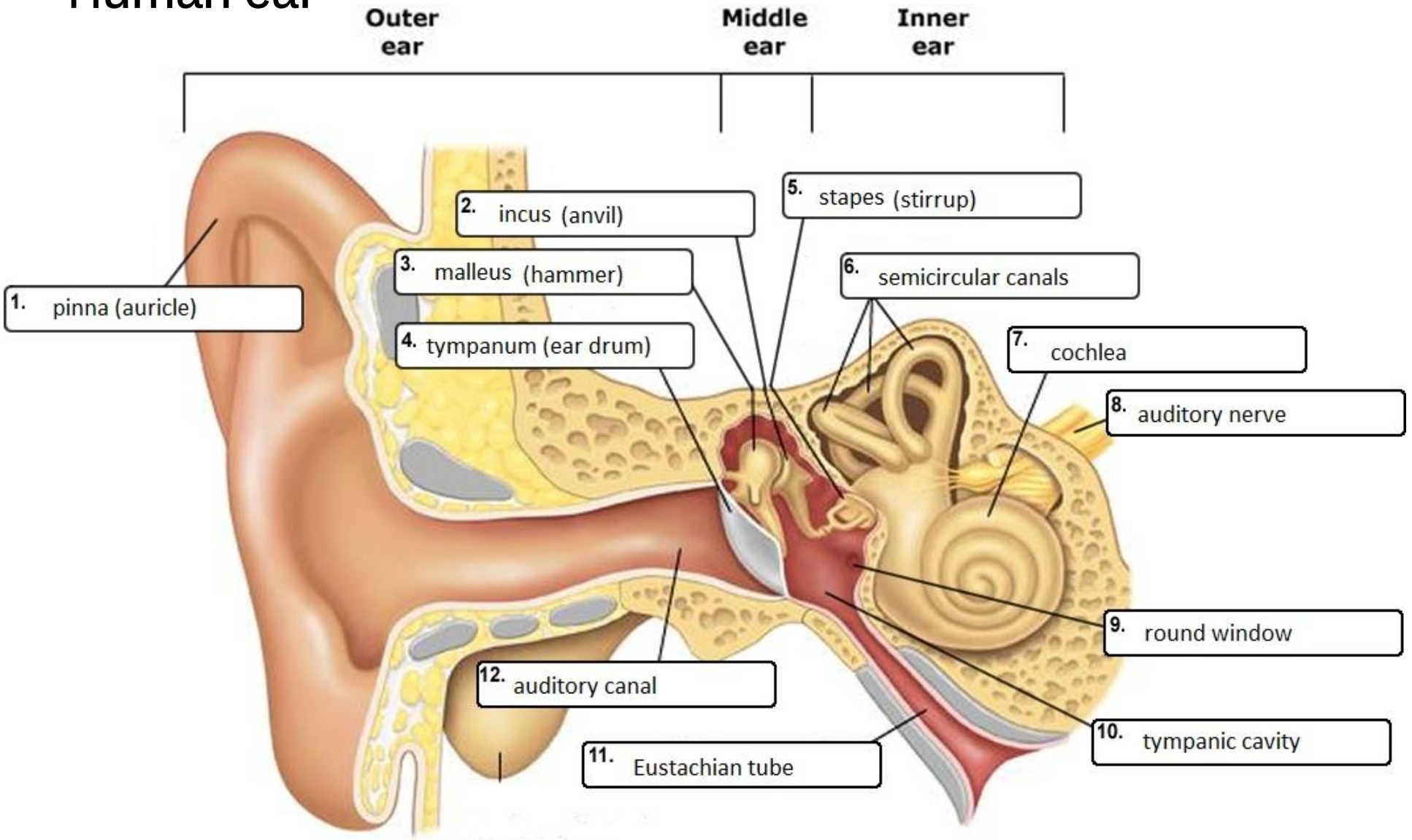
Hearing

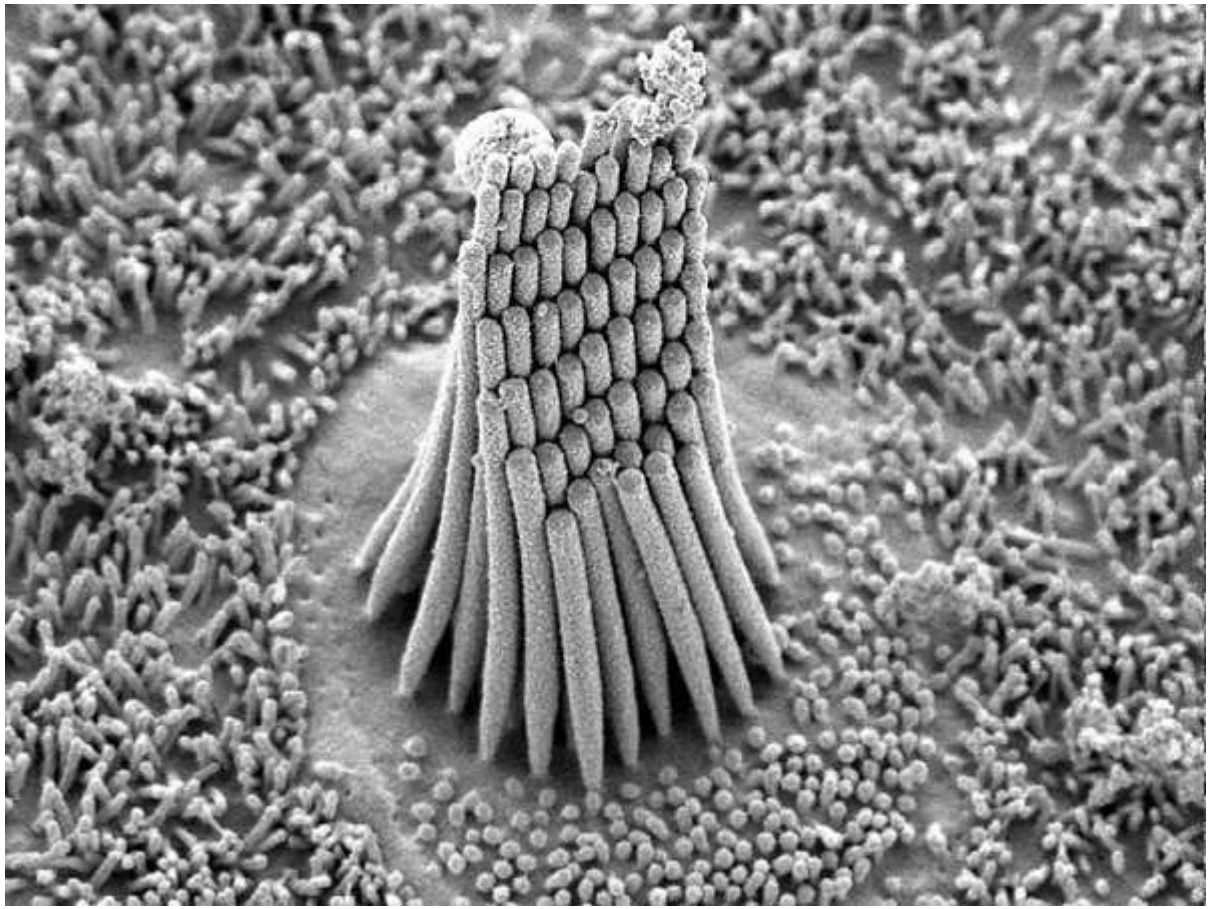

10 Hz
100 Hz
1 kHz
10 kHz
100 kHz
1 MHz
Tuna 50 Hz-1.1 kHz (4.5 8va)
Chicken 125 Hz-2 kHz (4.0 8va)
Goldfish 20 Hz-3 kHz (7.2 8va)
Bullfrog 100 Hz-3 kHz (4.9 8va)
Catfish 50 Hz-4 kHz (6.3 8va)
Tree frog 50 Hz-4 kHz (6.3 8va)
Canary 250 Hz-8 kHz (5.0 8va)
Cockatiel 250 Hz-8 kHz (5.0 8va)
Parakeet 200 Hz-8.5 kHz (5.4 8va)
Elephant 17 Hz-10.5 kHz (9.3 8va)
Owl 200 Hz-12 kHz (5.9 8va)
Human 31 Hz-19 kHz (9.3 8va)
Chinchilla 52 Hz-33 kHz (9.3 8va)
Horse 55 Hz-33.5 kHz (9.3 8va)
Cow 23 Hz-35 kHz (10.6 8va)
Raccoon 100 Hz-40 kHz (8.6 8va)
Sheep 125 Hz-42.5 kHz (8.4 8va)
Dog 64 Hz-44 kHz (9.4 8va)
Ferret 16 Hz-44 kHz (11.4 8va)
Hedgehog 250 Hz-45 kHz (7.5 8va)
Guinea pig 47 Hz-49 kHz (10.0 8va)
Rabbit 96 Hz-49 kHz (9.0 8va)
Sea lion 200 Hz-50 kHz (8.0 8va)
Gerbil 56 Hz-60 kHz (10.1 8va)
Opossum 500 Hz-64 kHz (7.0 8va)
Albino rat 390 Hz-72 kHz (7.5 8va)
Hooded rat 530 Hz-75 kHz (7.1 8va)
Cat 55 Hz-77 kHz (10.5 8va)
Mouse 900 Hz-79 kHz (6.4 8va)
Little brown bat 10.3 kHz-115 kHz (3.5 8va)
Beluga whale 1 kHz-123 kHz (6.9 8va)
Bottlenose dolphin 150 Hz-150 kHz (10.0 8va)
Porpoise 75 Hz-150 kHz (11.0 8va)

Human ear

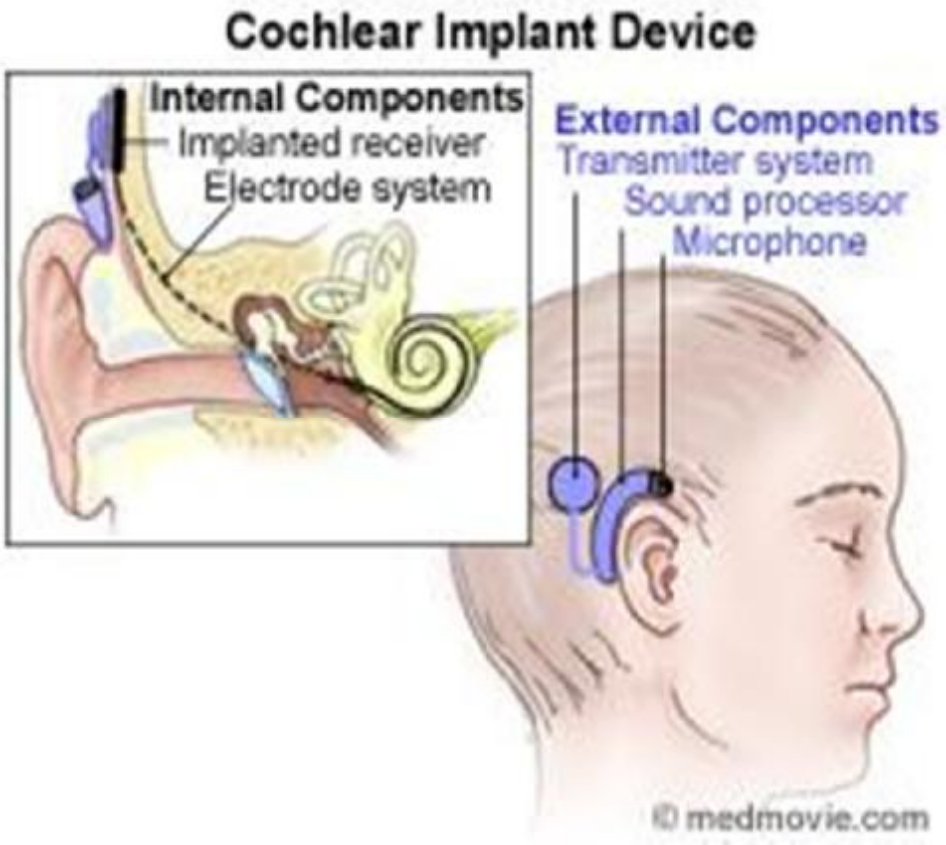

Outer ear
Middle ear
Inner ear
1. pinna (auricle)
2. incus (anvil)
3. malleus (hammer)
4. tympanum (ear drum)
5. stapes (stirrup)
6. semicircular canals
7. cochlea
8. auditory nerve
9. round window
10. tympanic cavity
11. Eustachian tube
12. auditory canal

Steps in Hearing

1. Sound waves enter external auditory canal
2. Eardrum vibrates
3. Auditory ossicles (malleus, incus, stapes) amplify vibrations
4. Stapes hits the membrane nearby and transmits vibrations to cochlea
5. Round window dissipates vibrations within the cochlea
6. Cochlea contain receptor cells (hair cells) that deform from vibrations
7. Impulses sent through the auditory nerve to brain
8. Auditory cortex of the temporal lobe interprets sensory impulses



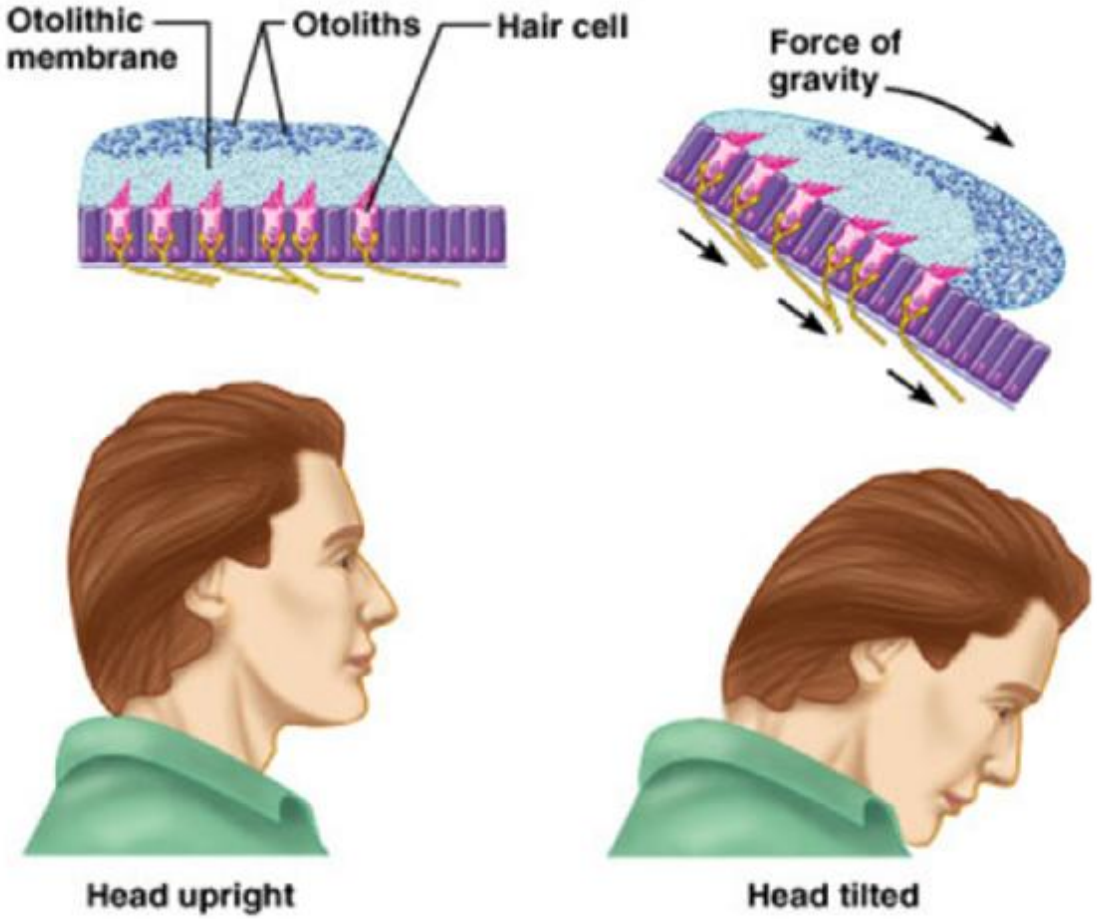
Hair cells in cochlea



A **cochlear implant** receives sound from the outside environment, processes it, and sends small electric currents near the auditory nerve.

These electric currents activate the nerve, which then sends a signal to the brain. The brain learns to recognize this signal and the person experiences this as "hearing".

Sense of equilibrum



Distance-controlled people

https://www.youtube.com/watch?v=lsV97Mm35Q8

How do ears work (review)

https://www.youtube.com/watch?v=46aNGGNPm7s