

auditory system & sleep

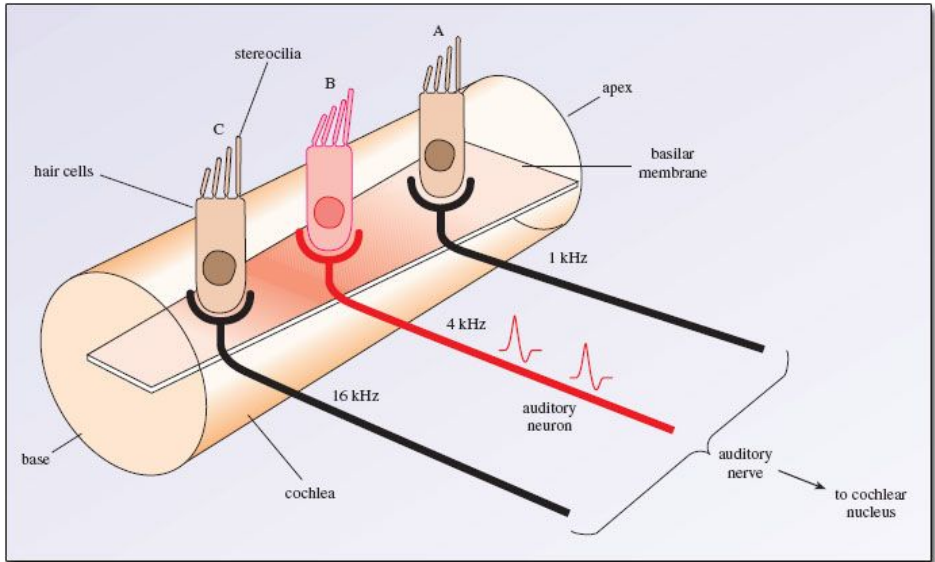
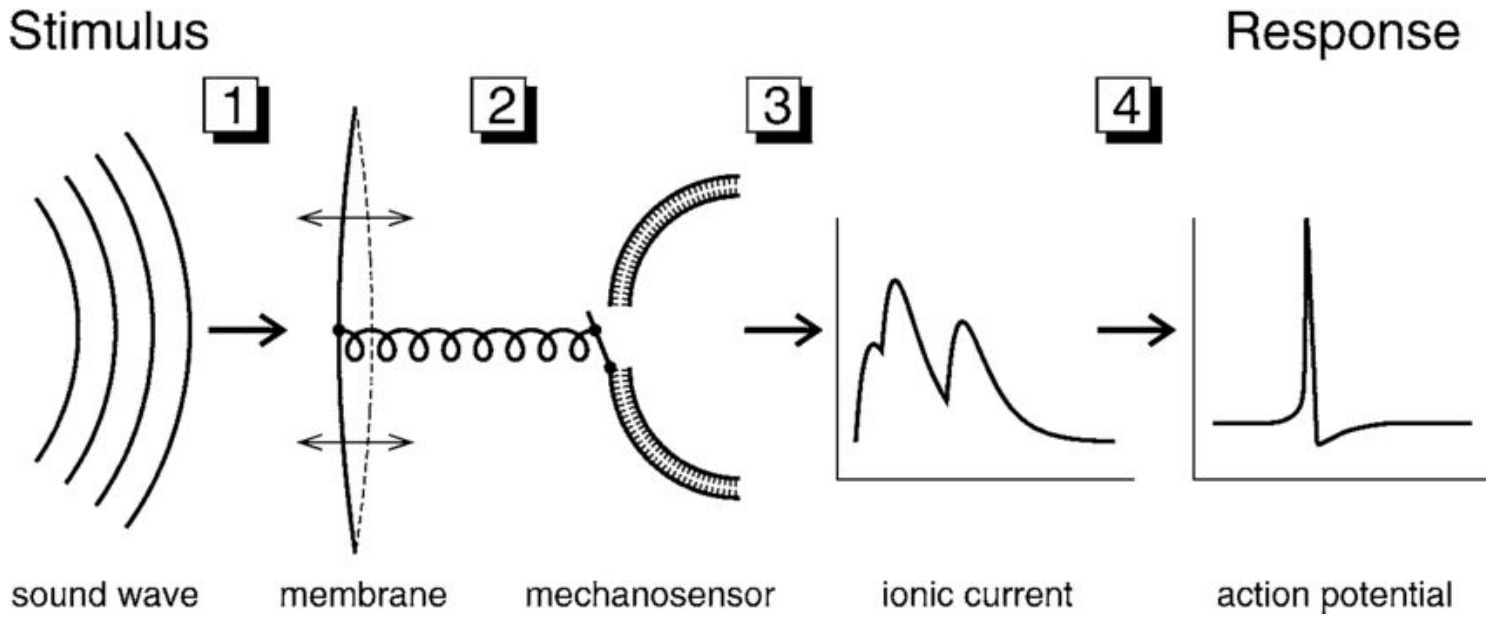
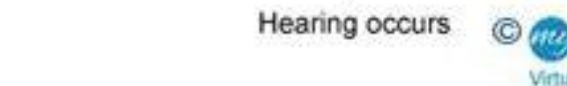
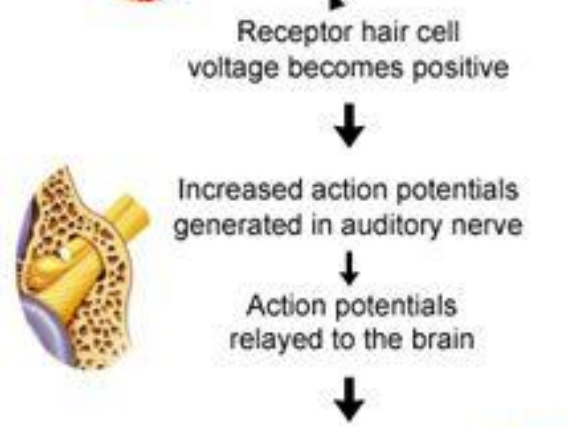
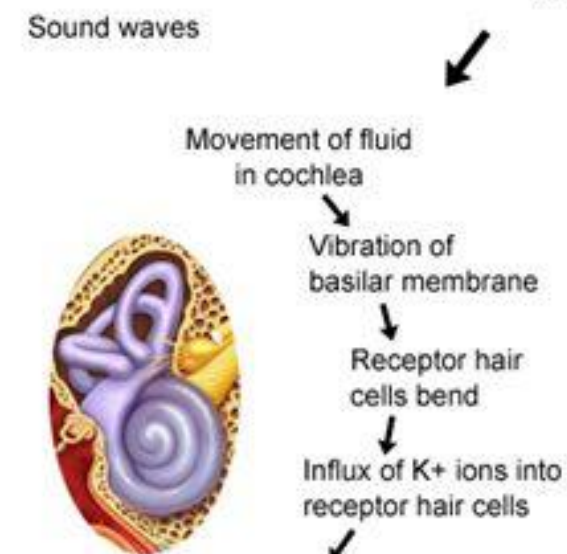
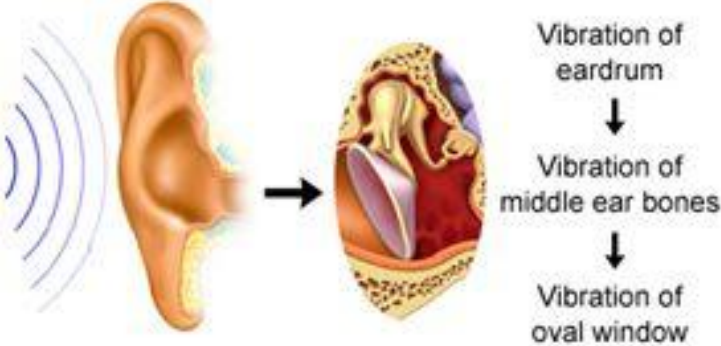
COGS17 - WEEK 4
7/22/19

office hours this week

- Wednesday, 12-1:30pm
in room CSB230
- Tuesday / Thursday, by appointment

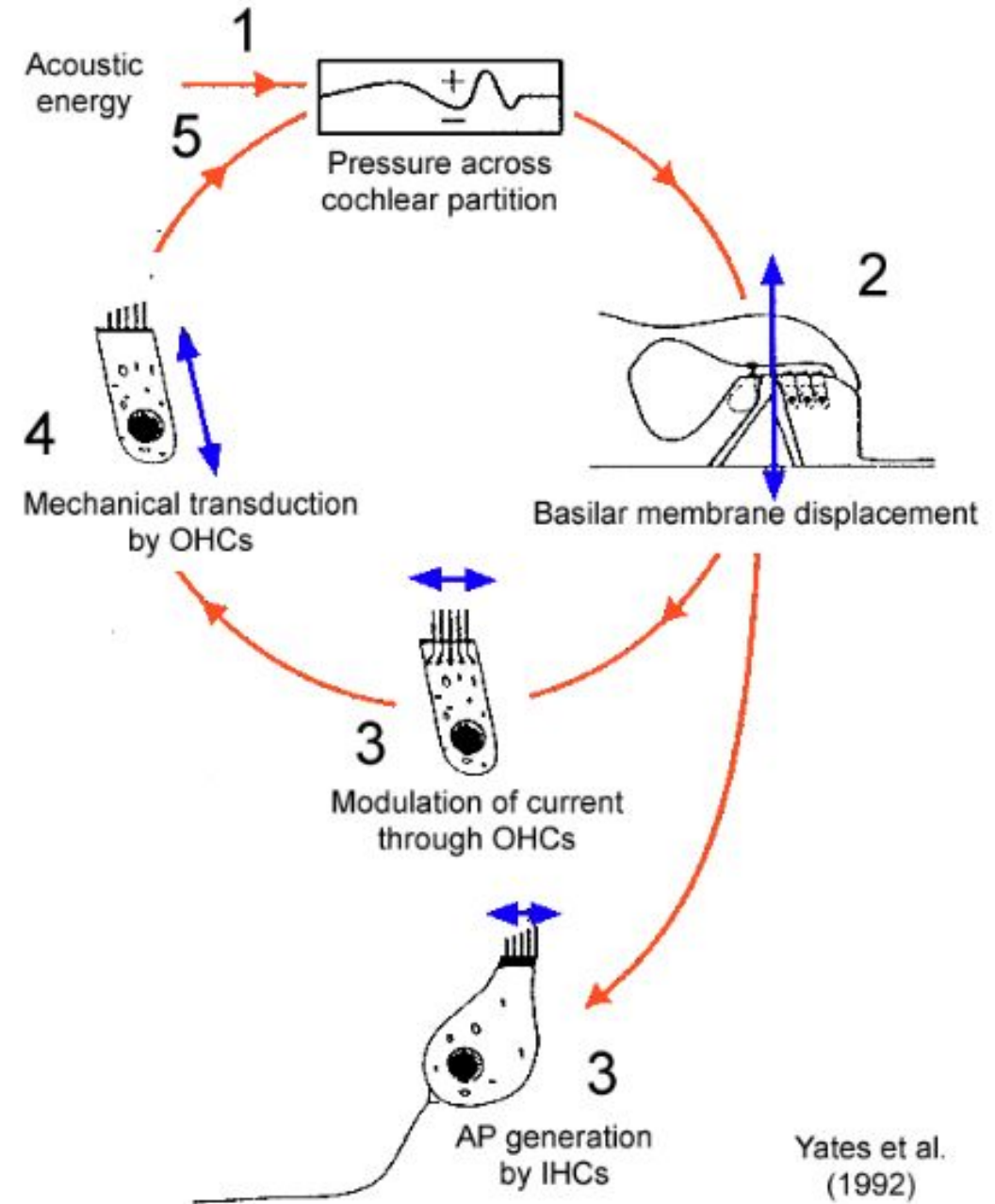
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sound transduction



cochlear amplification

- Outer hair cells contract and exert force on the basilar membrane
 - prestin is a protein present in their membrane that allows them to contract
- this action generates a positive feedback mechanism
- This action **amplifies** the vibration of the membrane



auditory pathways

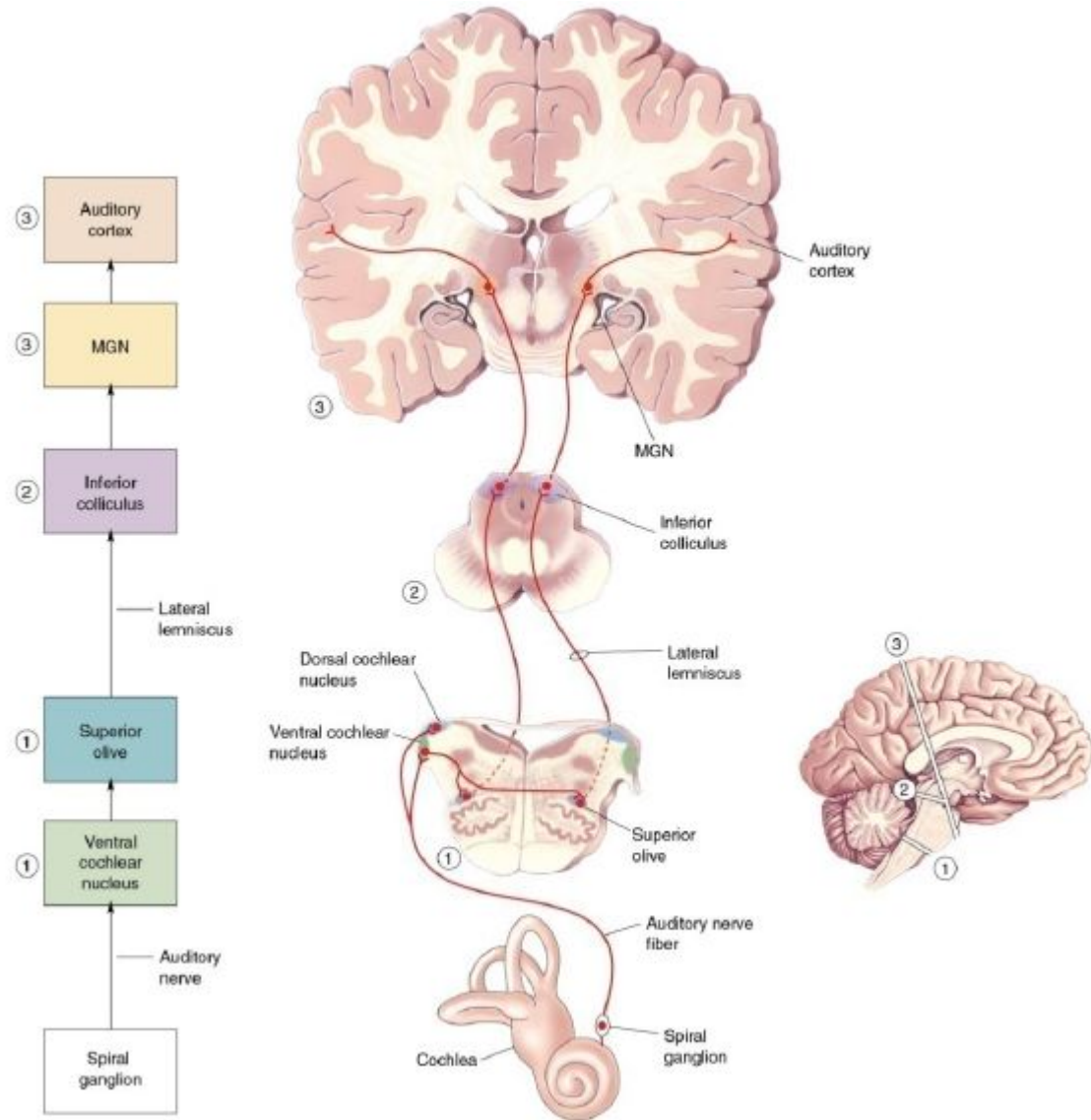
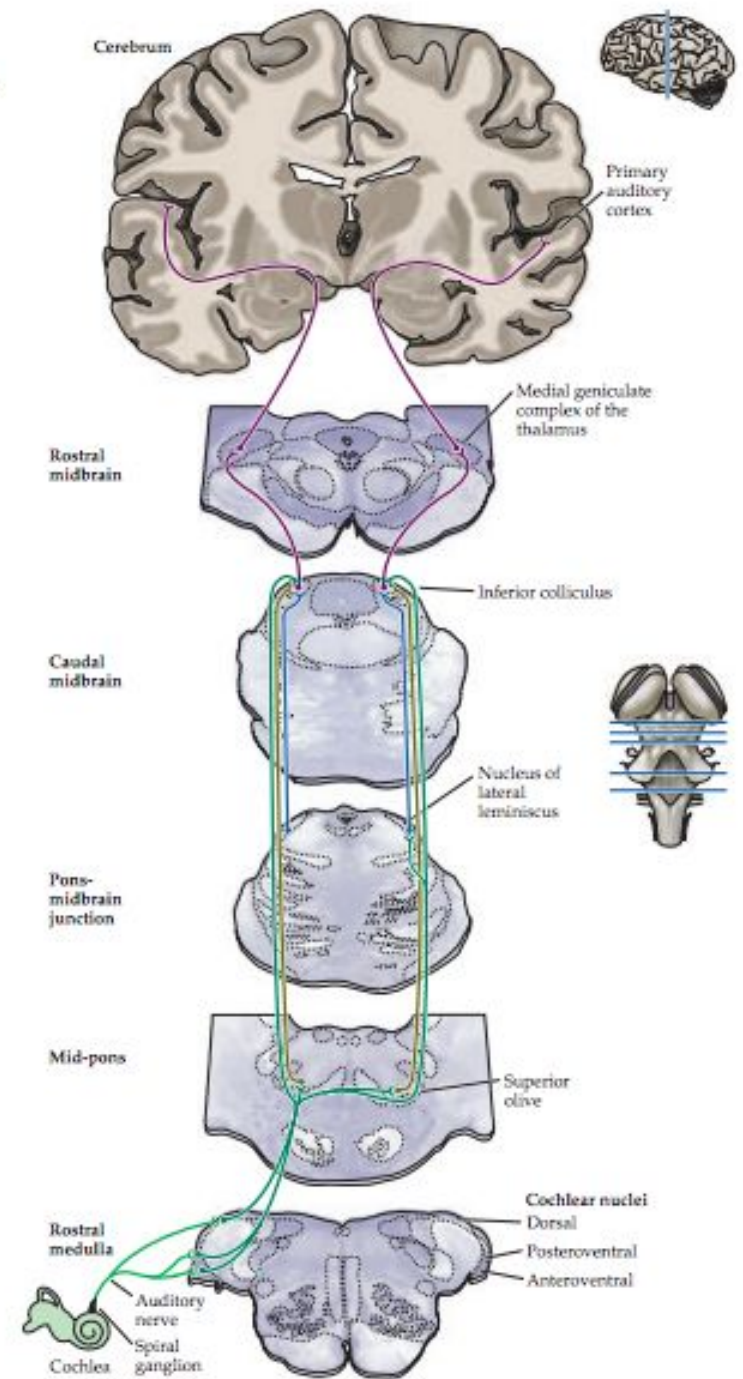
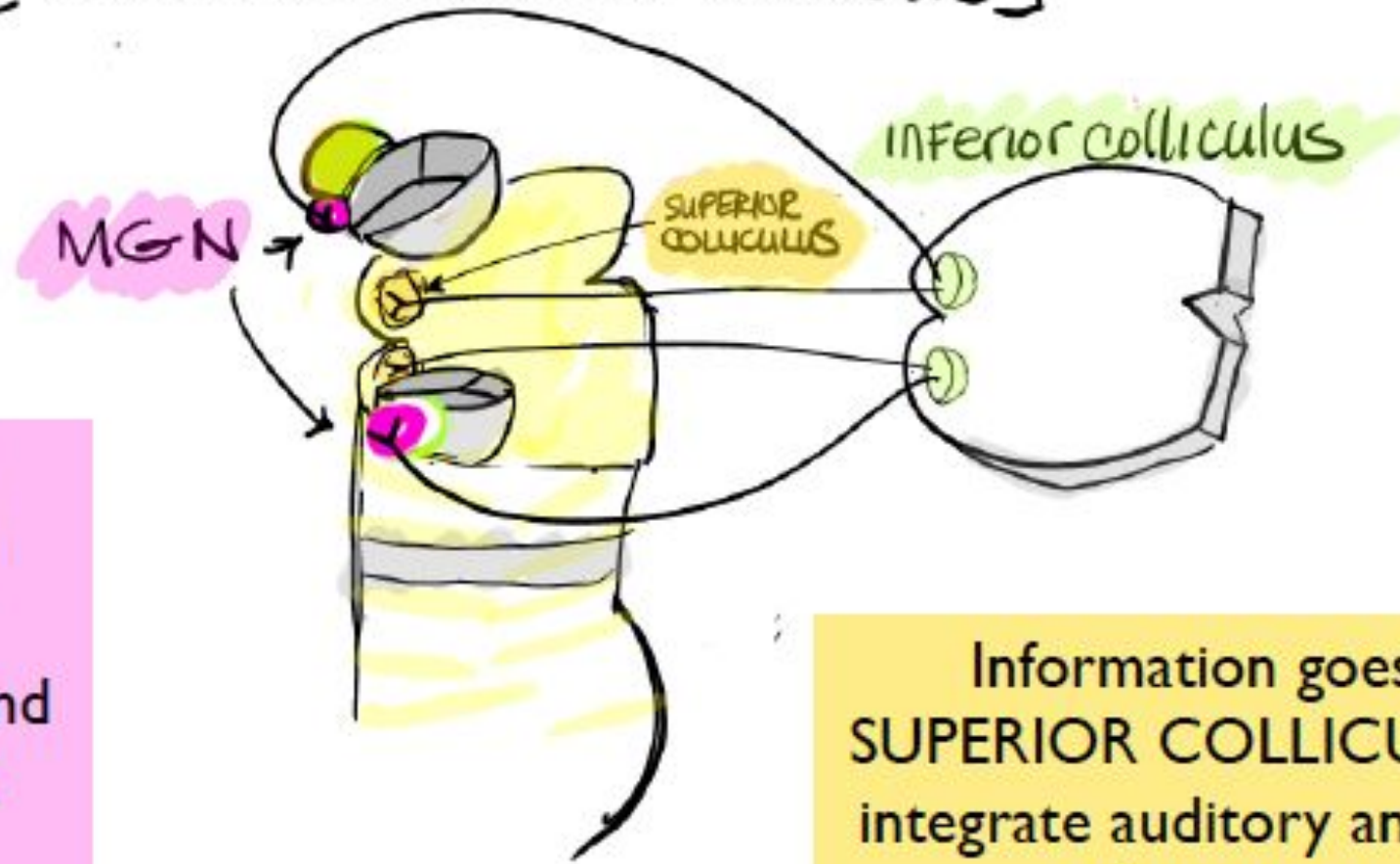


Figure 12.12 Diagram of the major auditory pathways. Although many details are missing from this diagram, two important points are evident: (1) the auditory system entails several parallel pathways, and (2) information from each ear reaches both sides of the system, even at the level of the brainstem.



[THALAMUS
MEDIAL GENICULATE NUCLEUS]



MGN cells
respond to
specific
frequencies and
to complex
sounds

Information goes to
SUPERIOR COLLICULUS to
integrate auditory and visual
information.



Encoding
information about
stimulus intensity

Firing rates of
neurons
Number of
active neurons

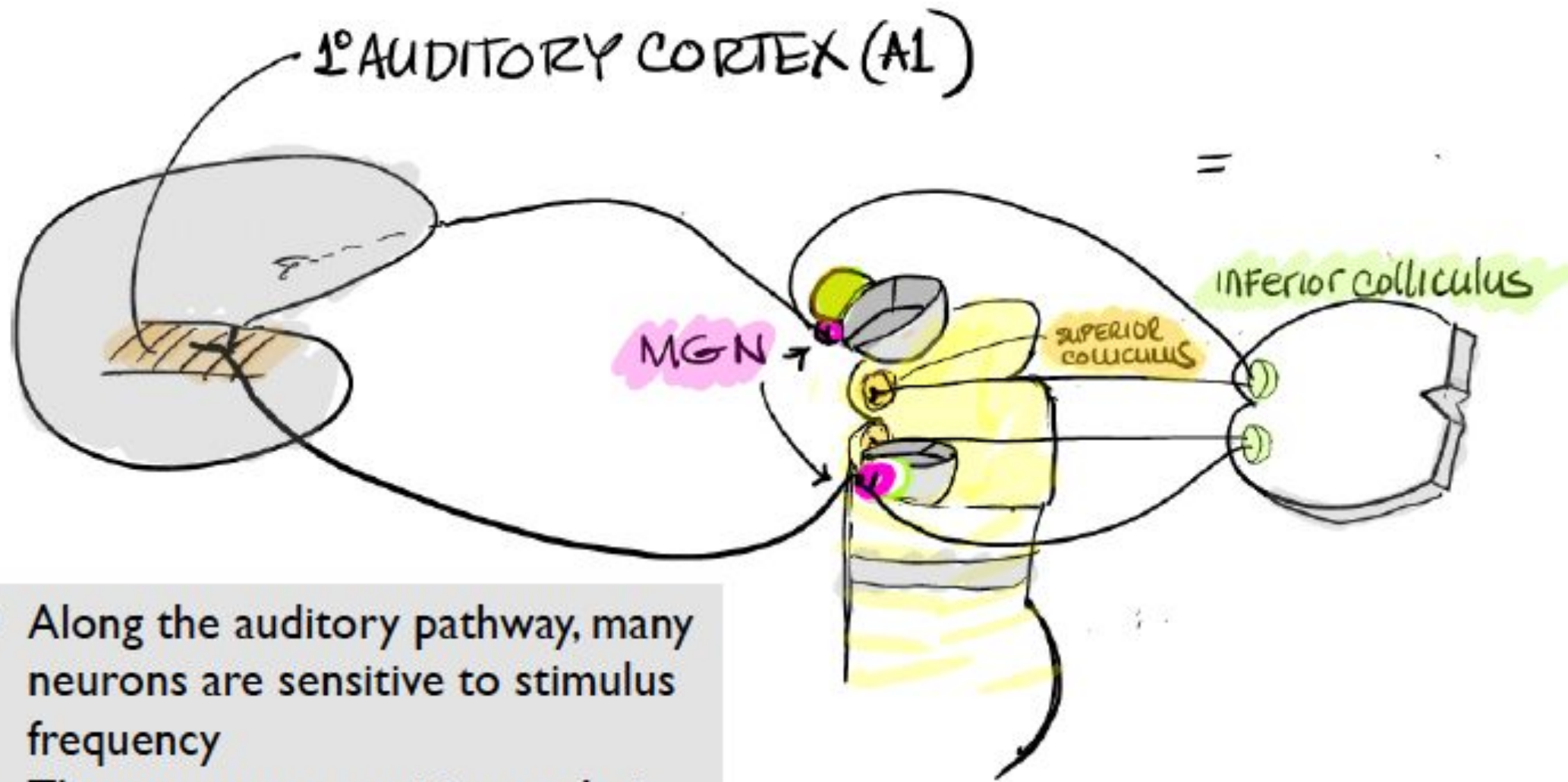


Membrane potential of
activated hair cells more
depolarized or hyperpolarized



Loudness perceived is
correlated with number of
active neurons.

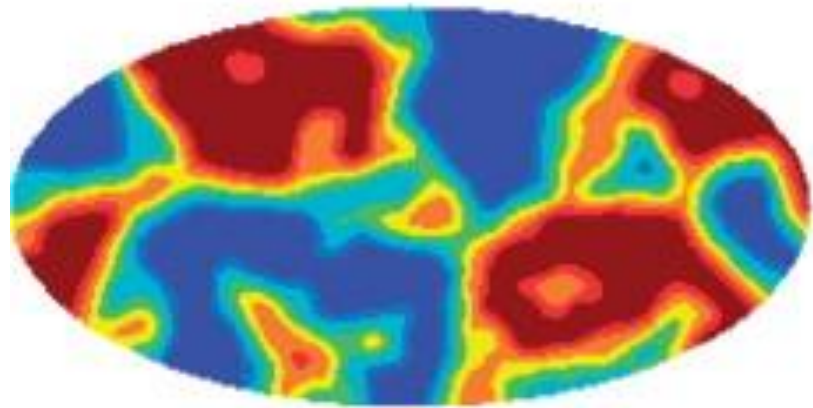
ENCODING SOUND INTENSITY



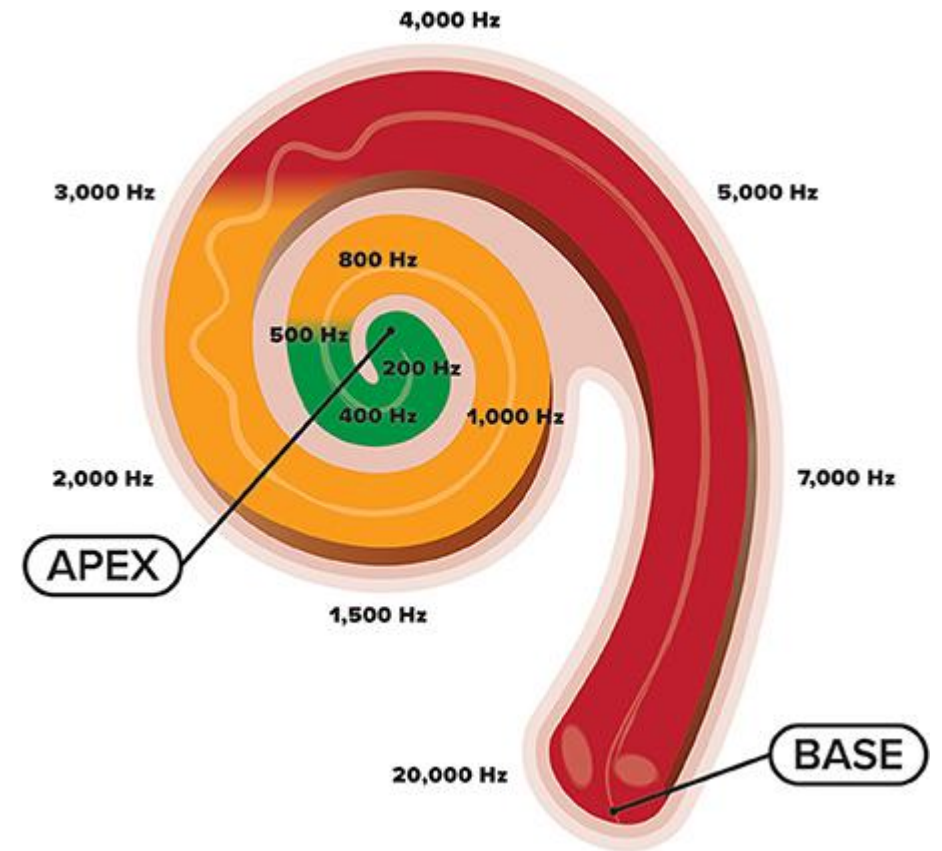
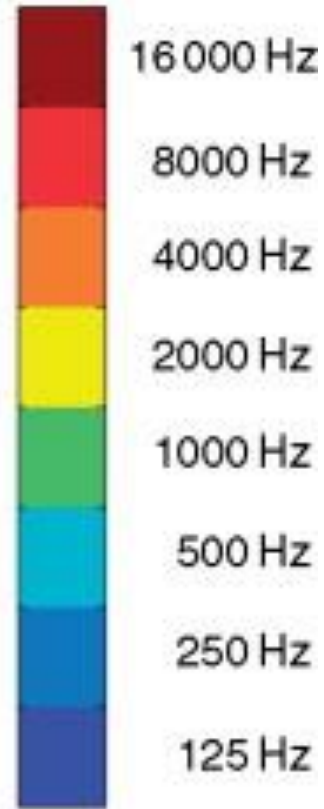
- Along the auditory pathway, many neurons are sensitive to stimulus frequency
- They are most sensitive to their characteristic frequency.

Tonotopy

Tonotopy



One type of nontonotopy



Sleep Waves

EEG RECORDINGS DURING SLEEP

