

# PLACE OF STIMULATION AND PATIENT SATISFACTION

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# THE QUESTION

How is patient performance effected by electrical stimulation of different regions of the cochlea?

# MATERIAL & METHOD - 1

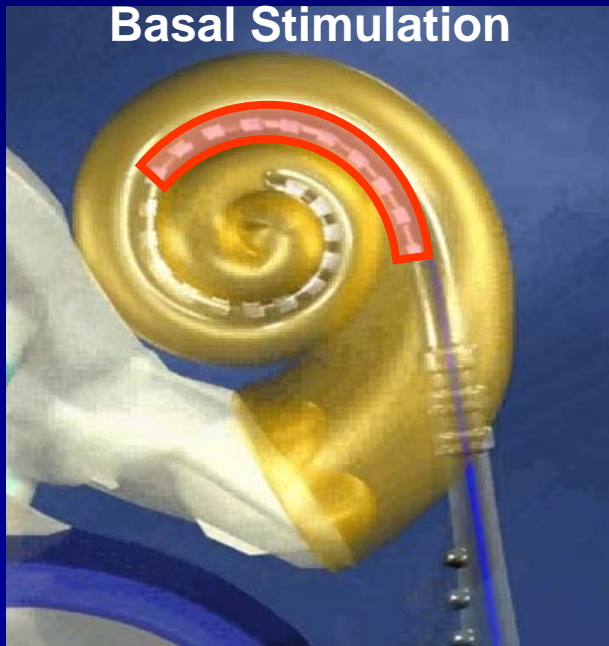
PATIENTS:	6 post lingual adults
IMPLANT:	Nucleus CI24m/ Full Insertion
S. PROCESSOR:	SPRINT
STRATEGY:	CIS
ACTIVE CHANNEL:	12
RATE:	1200 Hz

# MATERIAL & METHOD - 2

3 MAPS WERE PROGRAMMED FOR EACH PATIENT

MAP 1:

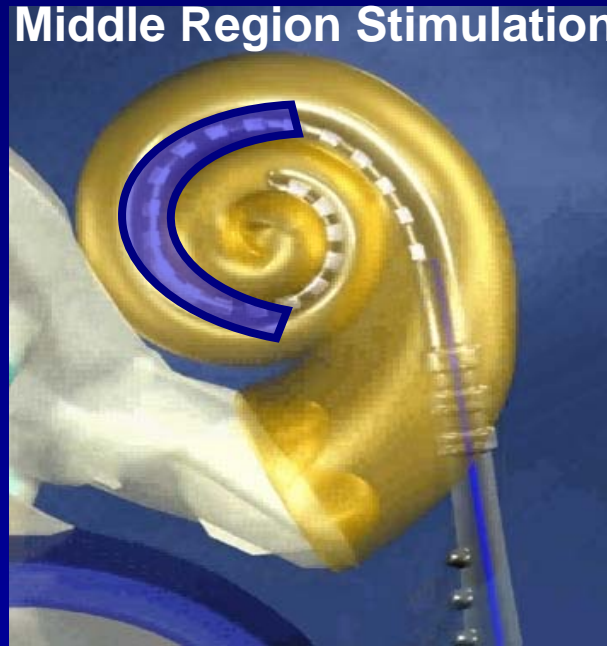
Basal Stimulation



ELECTRODES: 1 – 12

MAP 2:

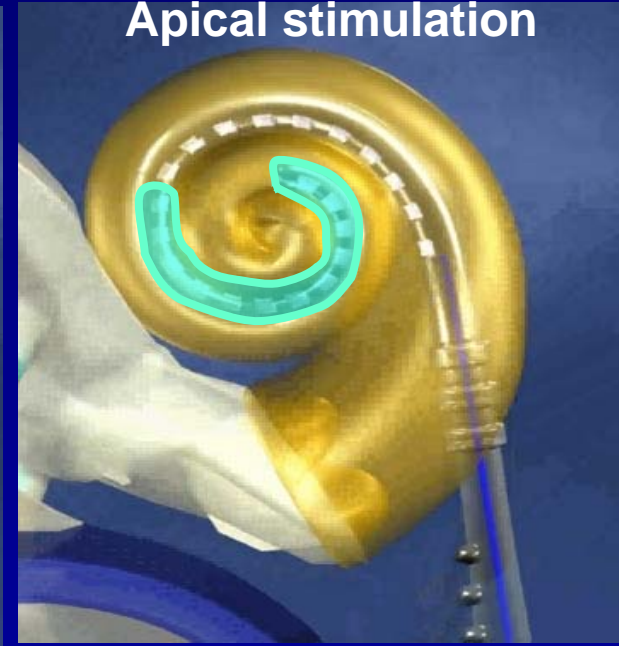
Middle Region Stimulation



ELECTRODES: 6 – 17

MAP 3:

Apical stimulation



ELECTRODES: 11 - 22

# MATERIAL & METHOD - 3

## MAPS WERE EVALUATED BY

- Free field threshold test  
(Pure Tone 250 – 6000 Hz).
- Open set speech discrimination test  
(tree-syllable words).
- Patients' subjective assessment  
(Questionnaire for daily life)

*2nd & 3rd tests were given after 10 days of training period.*

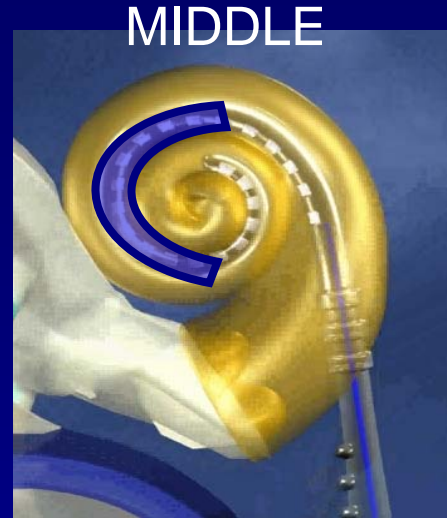
# RESULTS - 1

## Free Field Thresholds

PATIENTS

	250 HZ	500 HZ	1000 HZ	2000 HZ	4000 HZ	6000 HZ
EM - BASAL	40	40	35	35	35	30
EM - MIDDLE	35	40	40	35	30	30
EM - APICAL	40	40	40	35	35	30
OK - B	45	40	40	40	40	40
OK - M	45	45	45	45	40	45
OK - A	45	45	45	40	45	40
IH - B	40	40	40	40	45	45
IH - M	45	45	45	45	45	45
IH - A	45	45	45	40	45	45
MA - B	45	45	45	40	40	40
MA - M	50	40	45	40	35	30
MA - A	45	45	45	45	40	30
HK - B	45	50	50	45	45	40
HK - M	45	50	50	45	40	30
HK - A	45	55	40	45	45	30
HR - B	40	40	50	40	40	25
HR - M	40	45	50	40	45	30
HR - A	35	45	45	45	50	30

# RESULTS - 2



## PATIENTS' ASSESSMENT

**BEST: -**  
**SECOND: 1 User**  
**WORST: 5 User**

**BEST: 5**  
**SECOND: 1**  
**WORST: -**

**BEST: 1**  
**SECOND: 4**  
**WORST: 1**

## SPEECH DISCRIMINATION

**MEAN: 49.2 %**  
**RANGE: 85 - 30 %**

**MEAN: 71.6 %**  
**RANGE: 100 - 45 %**

**MEAN: 65 %**  
**RANGE: 85 - 35 %**

# DISCUSSION

## Possible Explanations:

- Density of the SGCs are not equally distributed in the modiolus.  
If every electrode activates more SGC in the basal turn, than frequency discrimination decreases.

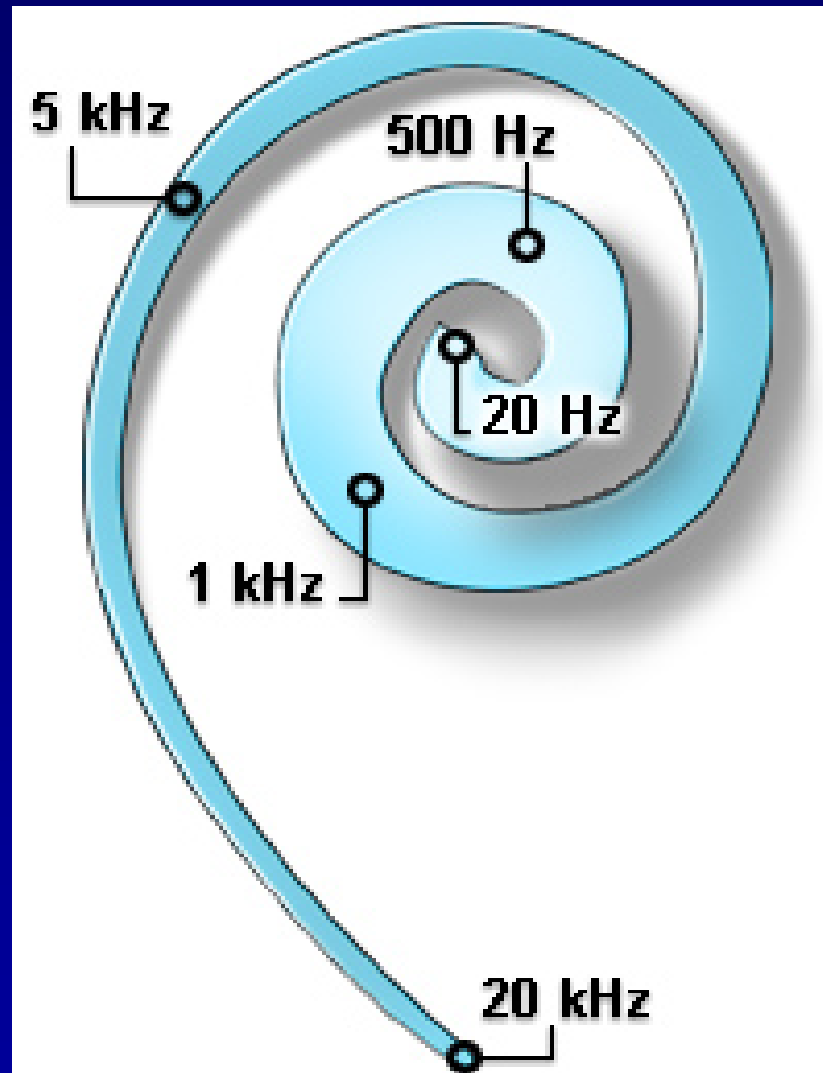
# DISCUSSION

“CORRECT TONOTOPIC REPRESENTATION IS NECESSARY FOR COMPLEX PITCH PERCEPTION”

“... More importantly, none of the subjects was able to extract the fundamental frequency from multiple low-frequency harmonics presented to high-frequency regions of the cochlea. (...) tonotopic representation is crucial to complex pitch perception and provide a new tool in the search for the neural basis of pitch.”

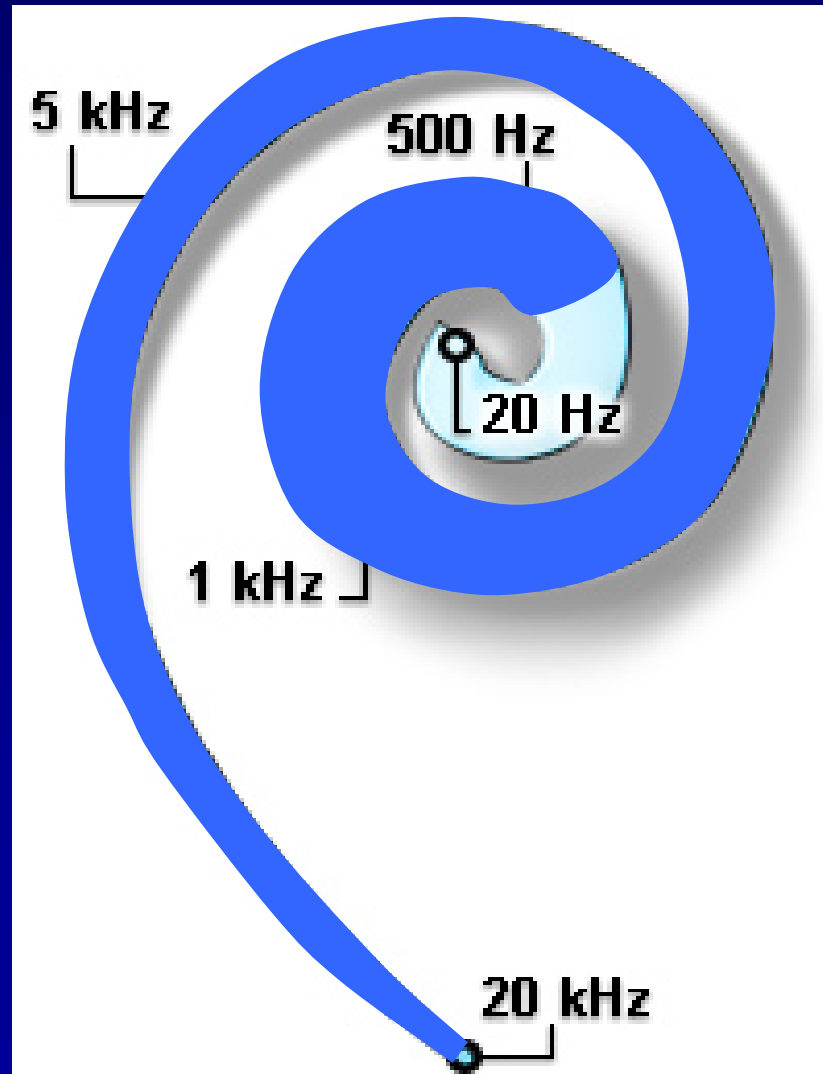
Source: Andrew J. Oxenham et.al. 2003

# DISCUSSION



Basilar membrane

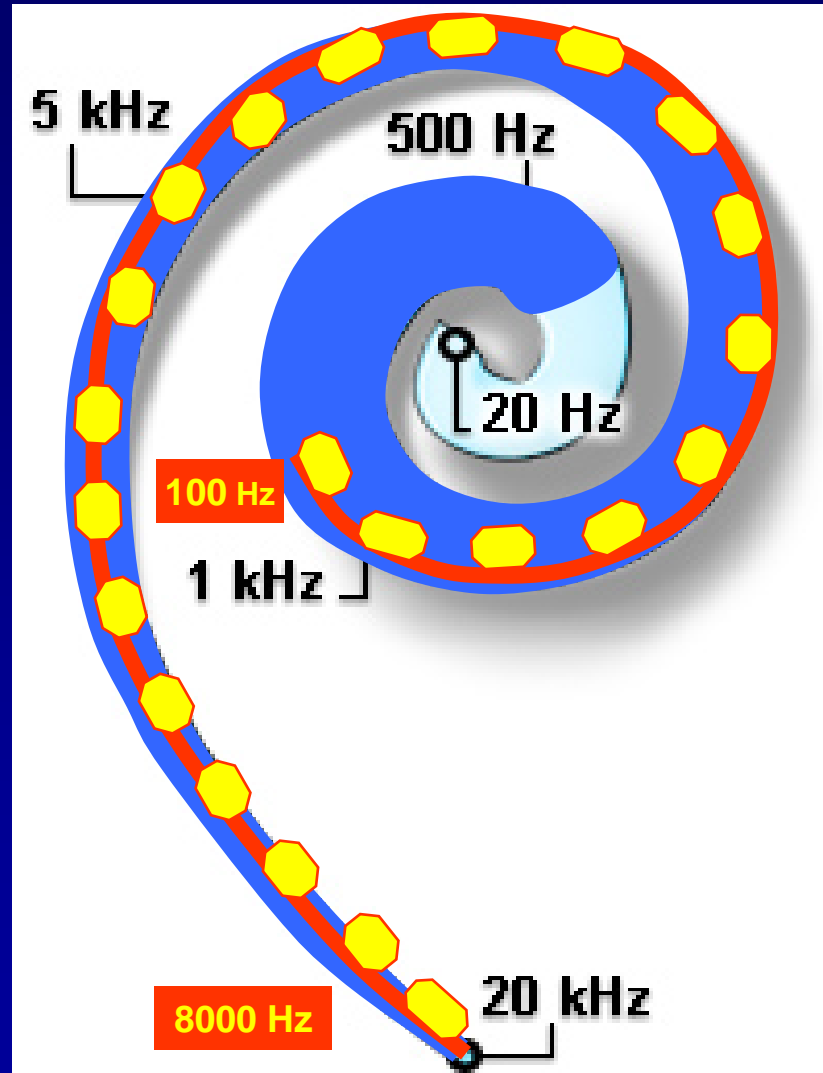
# DISCUSSION



Basilar membrane

Spiral Ganglion Cells

# DISCUSSION

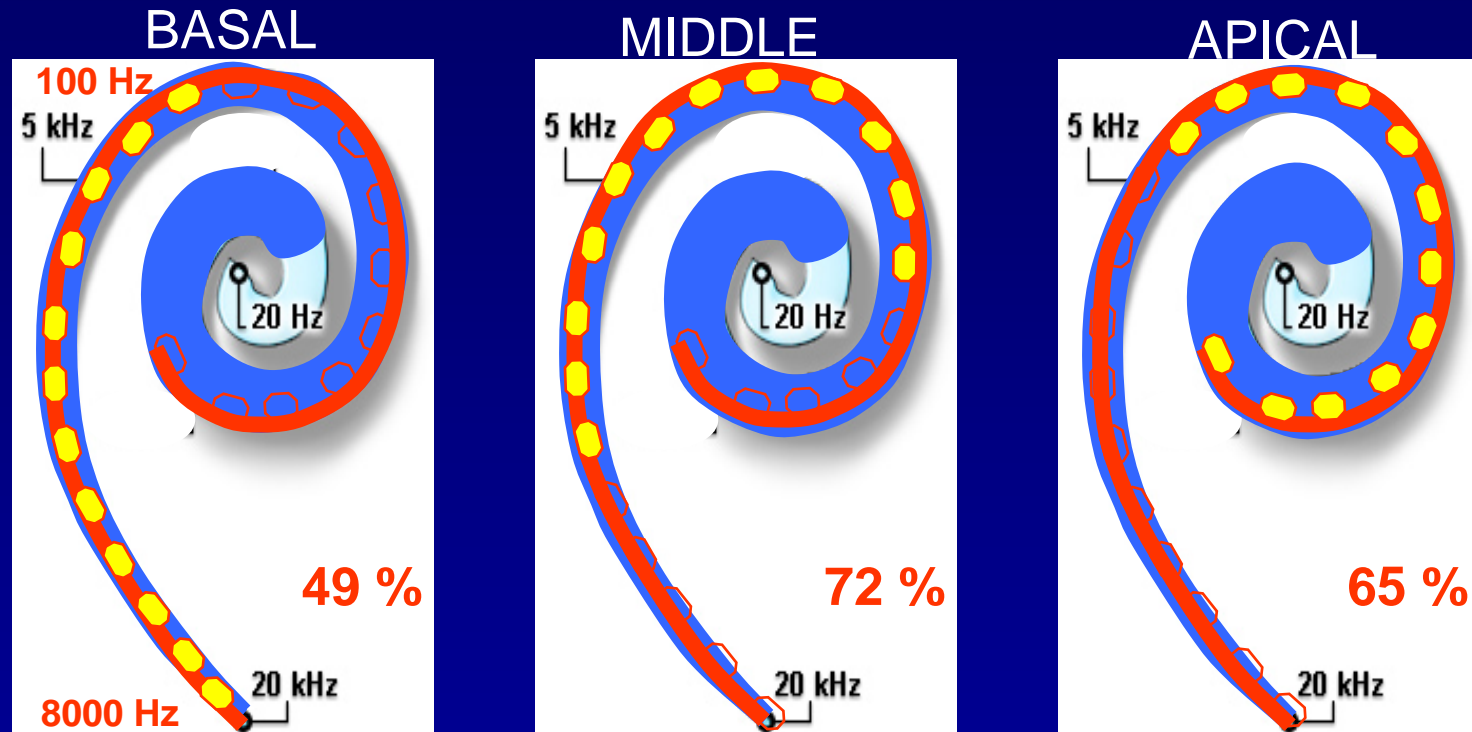


Basilar membrane

Spiral Ganglion Cells

Nucleus 24M

# CONCLUSION



Middle region stimulation may be best fit to tonotopic organization of spiral ganglion cells.

# CONCLUSION

- Basal and apical region stimulation alone is not optimal for Nucleus 24M users.
- In some cases basal electrodes may be turned off to improve speech perception.