

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

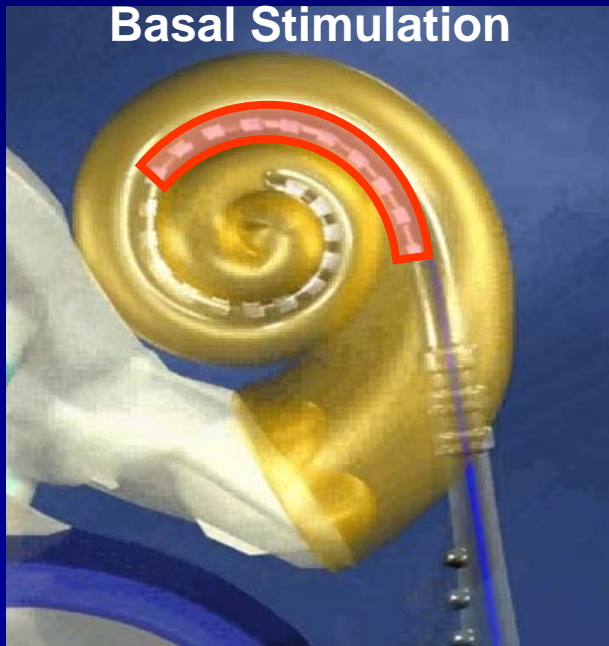
PATIENTS:	6 post lingual adults
IMPLANT:	Nucleus CI24m/ Full Insertion
S. PROCESSOR:	SPRINT
STRATEGY:	CIS
ACTIVE CHANNEL:	12
RATE:	1200 Hz

MATERIAL & METHOD - 2

3 MAPS WERE PROGRAMMED FOR EACH PATIENT

MAP 1:

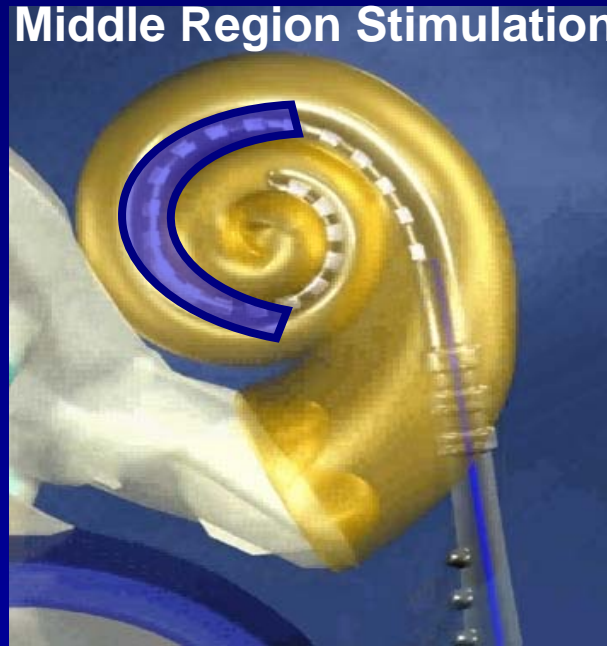
Basal Stimulation



ELECTRODES: 1 – 12

MAP 2:

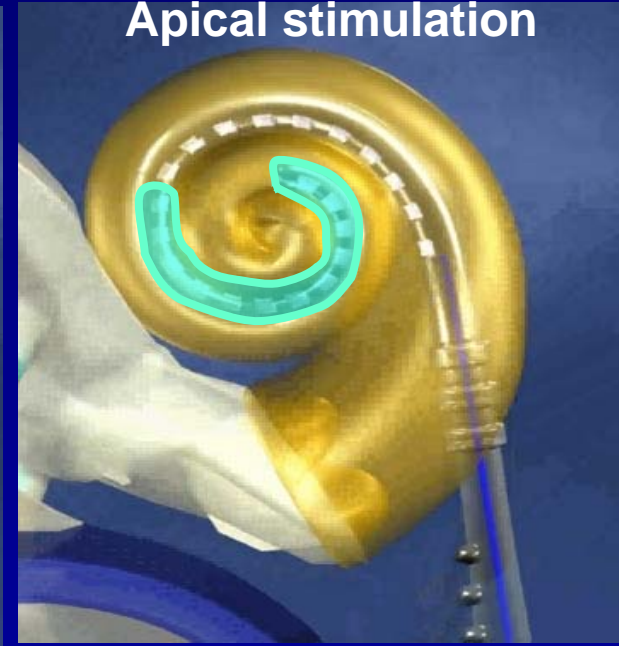
Middle Region Stimulation



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.

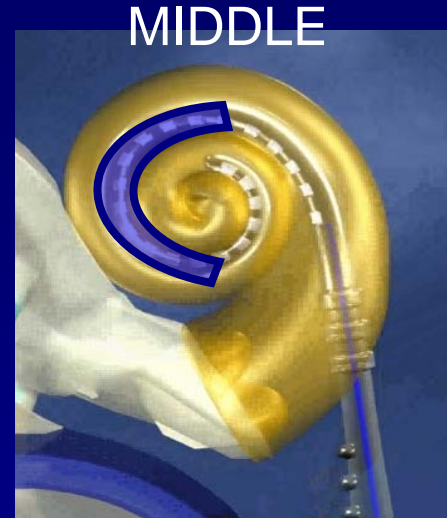
RESULTS - 1

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.

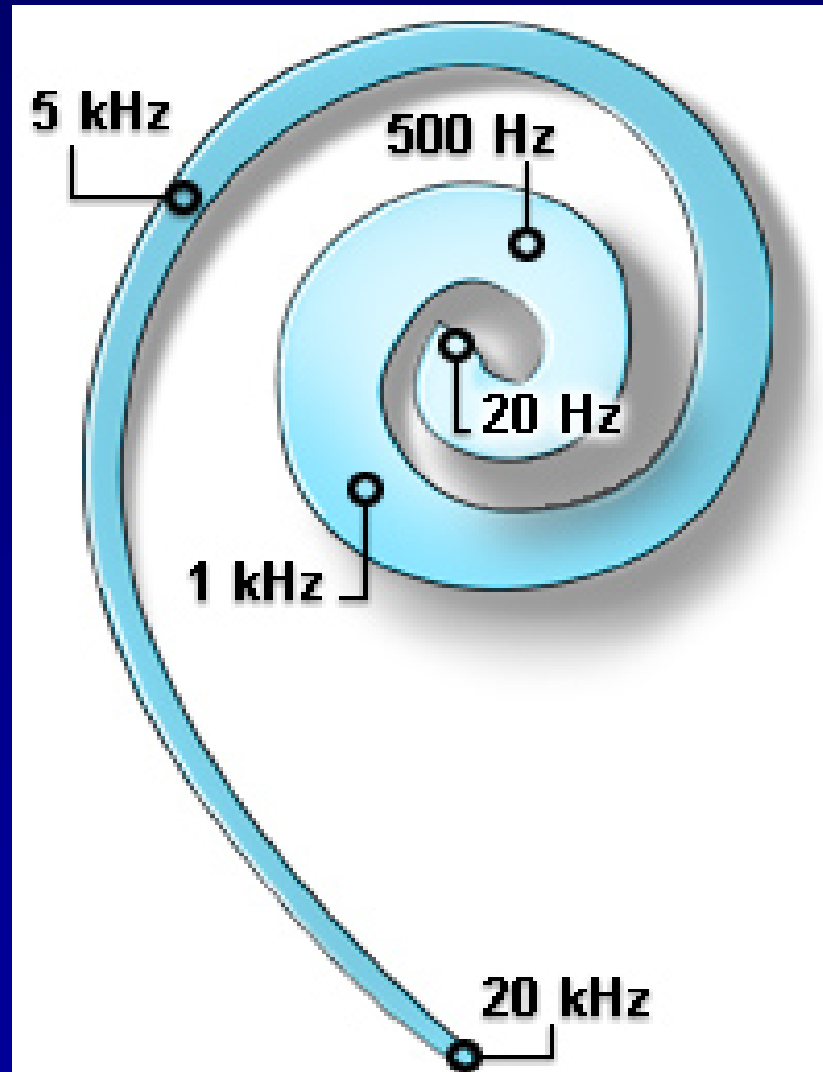
DISCUSSION

“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.”

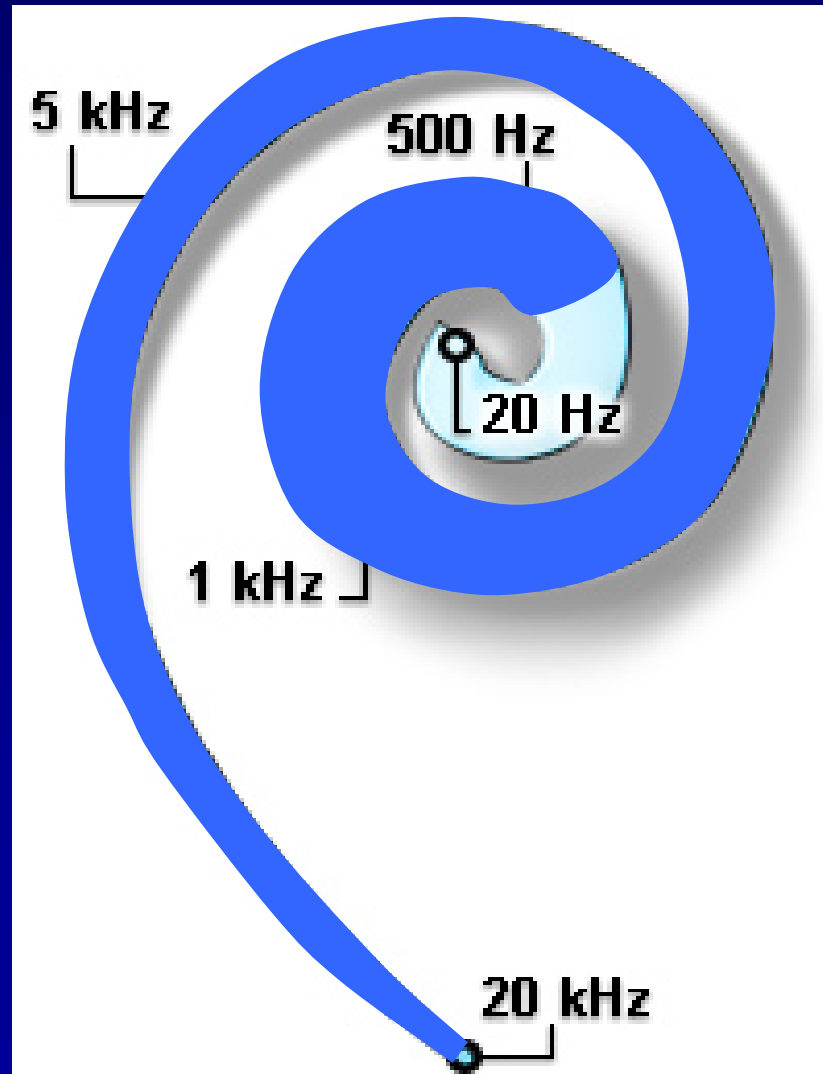
Source: Andrew J. Oxenham et.al. 2003

DISCUSSION



Basilar membrane

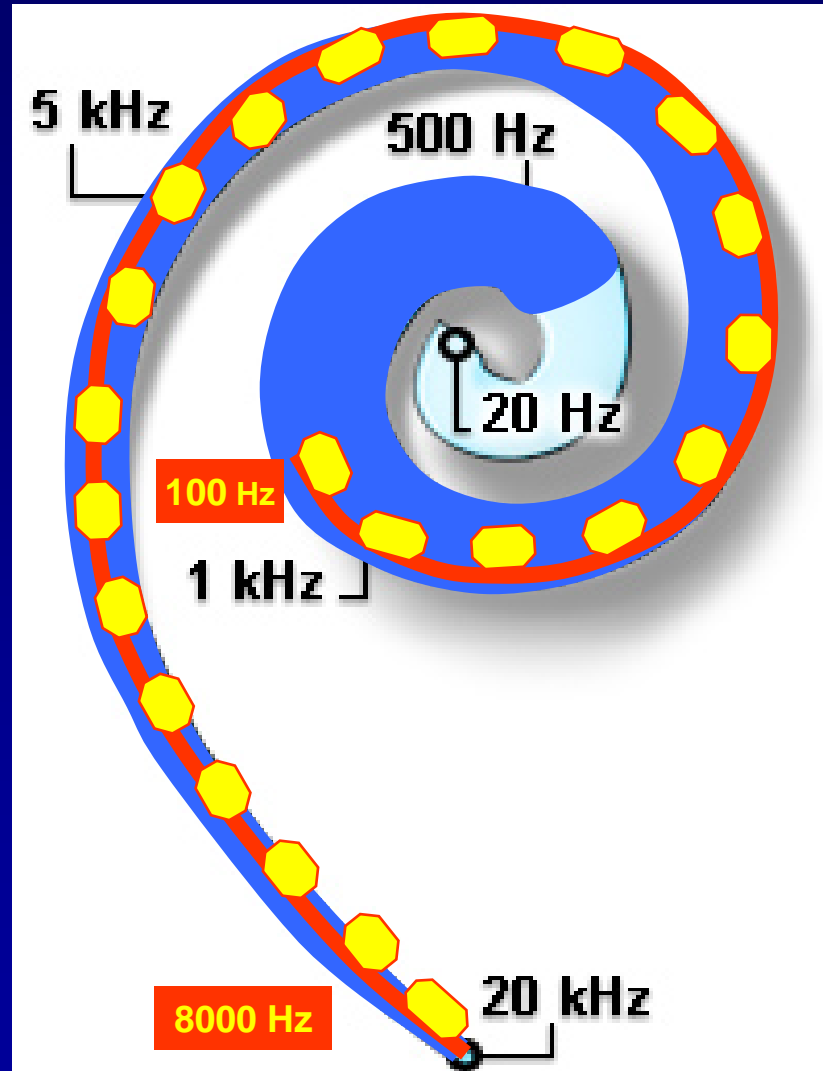
DISCUSSION



Basilar membrane

Spiral Ganglion Cells

DISCUSSION

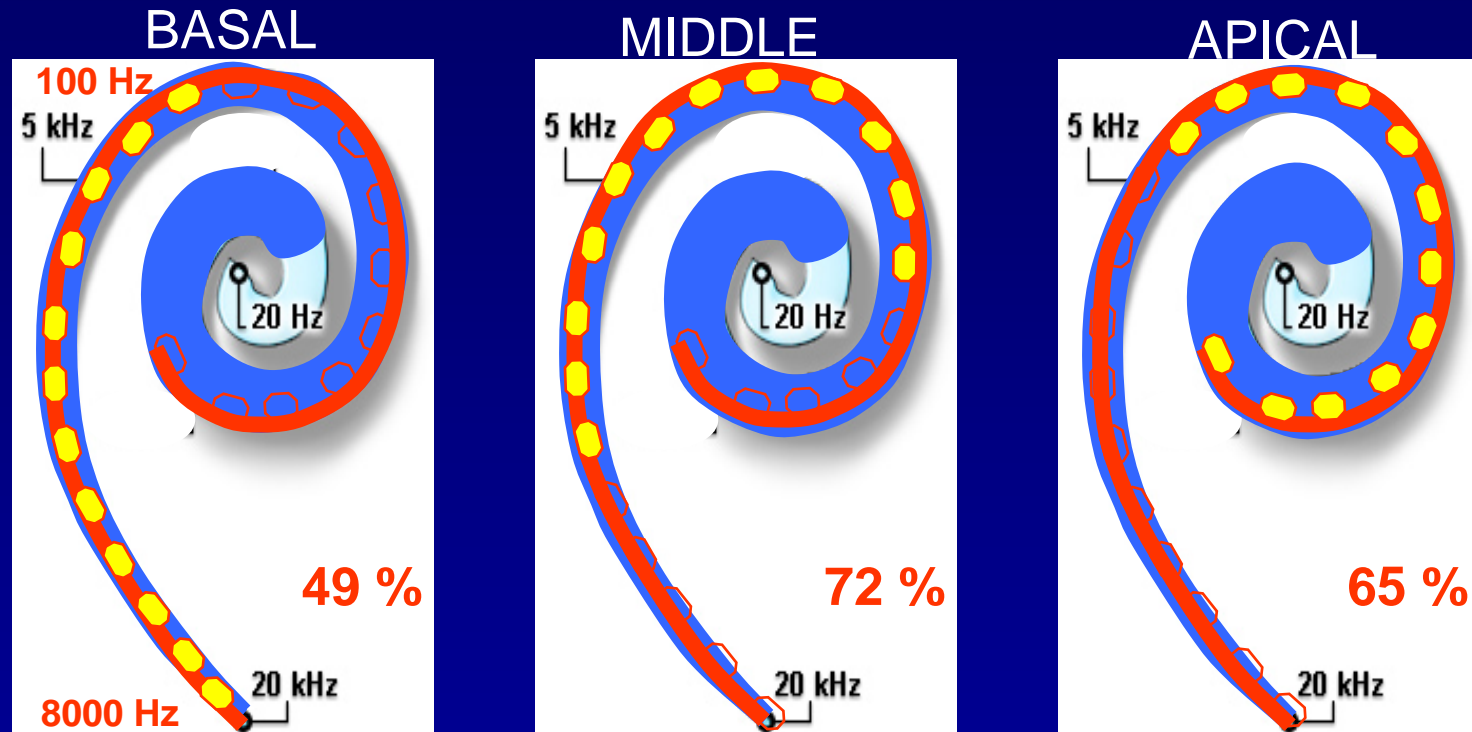


Basilar membrane

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.