Hybrid Cochlear Implants in Adolescents

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In accordance with requirements for Transparency and Disclosure: Drs. Gantz and Dunn are consultants for Cochlear Americas and Dr. Gantz is a consultant for Advanced Bionics.
Hybrid Cochlear Implant

- The Nucleus Hybrid Cochlear Implant was FDA approved in March, 2014
  - adults 18 years of age and older
  - mild to moderate hearing loss through 500 Hz
Hybrids with Severe LF HL

- Gap in candidacy for implantation
  - Mild to Moderate HL in the LF
  - Severe to profound HL in all frequencies
- Purpose: Determine the benefit of residual hearing in severe LF range

<table>
<thead>
<tr>
<th>Frequency (Hz)</th>
<th>125</th>
<th>250</th>
<th>500</th>
<th>750</th>
<th>1000</th>
<th>1500</th>
<th>2000</th>
<th>3000</th>
<th>4000</th>
<th>6000</th>
<th>8000</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hearing Threshold (dB HL) (ANSI - 1989)</td>
<td>-10</td>
<td>0</td>
<td>10</td>
<td>20</td>
<td>30</td>
<td>40</td>
<td>50</td>
<td>60</td>
<td>70</td>
<td>80</td>
<td>90</td>
</tr>
</tbody>
</table>

- Hybrid
- Standard Implant

GAP
Hybrids with Severe LF HL

- FDA IDE to see if acoustic hearing in the severe range is beneficial
  - 15 Adults (12 implanted)
    - L24
  - 30 Children (5 implanted)
    - L24 or S12
Candidacy in Children

- Five to fifteen years of age
- PTA between 60-90 dB HL between 125-1500 Hz in the ear to be implanted
  - Profound loss at higher frequencies
- PBK word recognition score between 0% and 50% in the ear to be implanted
  - Contra PBK word recognition score equal to, or better than, the ear to be implanted but not more than 60%
L24 or S12 in Children

• S12 vs L24
  – Hearing threshold $\leq 90$ dB HL at 1500 Hz will be implanted with the Hybrid S12
  – Hearing threshold $>90$ dB HL at 1500 Hz will be implanted with the Hybrid L24
    • N=5
Adolescent change in PTA
Adolescent CNC Words
Ipsi HA vs Hybrid

Percent Correct

P-01
P-02
P-03
P-04
P-05
Hybrid Avg

Pre-implant Ipsi HA
4 months
8 months
12 months
24 months
Localization: Hybrid Combined vs CI+HA

RMS Error in Degrees (lower is better)

Hybrid Combined

CI+HA (N=11)
Summary

• The hybrid can provide significant speech perception benefit to adolescents with moderately severe to severe low-frequency residual hearing.

• While localization scores might be poorer for some hybrid users, scores are much better than those who do not have preserved low-frequency residual hearing in the implanted ear.