Benefit after Partial Deafness Treatment (PDT)
CHANGES

OLD ERA

NEW ERA
CHALLENGES

CHANGES

Technology

New concepts

- PDT (EAS/HYBRID)
- bilateral
- bimodal
- vibroplasty
- early implantation
- SSD
NEW / OLD DIFFERENCES

PRODUCTS
Auditory Implants

SERVICE
Patients’ visits

TRANSFORMATION

Q U A N T I T Y

Old
New

Old
New
CHALLENGES

PRODUCTS
Auditory Implants

SERVICE
Patients’ visits

QUALITY
QUANTITY
DIVERSITY
SERVICE DIVERSITY

- Cochlear
- Med-El
- AB

- Toddlers
- Children
- Teens
- Adults
- The elderly

- CI
- ABI
- MEI

- Prelingually deaf
- Postlingually deaf

- Children with partial deafness
- Adults with partial deafness
HEARING PROSTHESIS

HEARING AIDS

COCHLEAR IMPLANTS

BRAINSTEM IMPLANTS

MIDDLE EAR IMPLANTS

BAHA

RETRO-X
TYPES OF HEARING IMPAIRMENT

- SEVERE OR PROFOUND SENSONEURAL HEARING LOSS
  - cochlear origin
  - retrocochlear origin
- SIGNIFICANT RESIDUAL HEARING
- PARTIAL DEAFNESS
- MIXED HEARING LOSS
- CONDUCTIVE HEARING LOSS
- AUDITORY NEUROPATHY
- SINGLE SIDE DEAFNESS
TYPES OF STIMULATION UTILIZED BY PATIENTS

- UNILATERAL ELECTRICAL STIMULATION BY COCHLEAR IMPLANT
TYPES OF STIMULATION UTILIZED BY PATIENTS

- UNILATERAL ELECTRICAL STIMULATION BY COCHLEAR IMPLANT
- BILATERAL STIMULATION WITH COCHLEAR IMPLANTS
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• UNILATERAL ELECTRICAL STIMULATION BY COCHLEAR IMPLANT

• BILATERAL STIMULATION WITH COCHLEAR IMPLANTS

• BIMODAL STIMULATION WITH COCHLEAR IMPLANT AND HEARING AID IN CONTRALATERAL EAR
TYPES OF STIMULATION UTILIZED BY PATIENTS

• UNILATERAL ELECTRICAL STIMULATION BY COCHLEAR IMPLANT

• BILATERAL STIMULATION WITH COCHLEAR IMPLANTS

• BIMODAL STIMULATION WITH COCHLEAR IMPLANT AND HEARING AID IN CONTRALATERAL EAR

• ELECTRIC-ACOUSTIC STIMULATION WITH COCHLEAR IMPLANT AND HEARING AID IN THE SAME EAR OR Duet System
TYPES OF STIMULATION UTILIZED BY PATIENTS

• UNILATERAL ELECTRICAL STIMULATION BY COCHLEAR IMPLANT

• BILATERAL STIMULATION WITH COCHLEAR IMPLANTS

• BIMODAL STIMULATION WITH COCHLEAR IMPLANT AND HEARING AID IN CONTRALATERAL EAR

• ELECTRIC-ACOUSTIC STIMULATION WITH COCHLEAR IMPLANT AND HEARING AID IN THE SAME EAR

• ELECTRIC-ACOUSTIC STIMULATION WITH COCHLEAR IMPLANT AND NORMAL HEARING IN LOW FREQUENCY REGION IN BOTH EARS (PDT-EC)
**MATERIAL**

- Patients with hearing implants 1992-2010: 3124
- Patients with cochlear implants 1992-2009: 2960
- \( N = 663 \)

Age > 5 years, measurable THRs for 3 freq

- Retrospective analysis of hearing threshold in the ear selected for implantation
RESULTS

PTA (125, 250, 500 Hz)
RESULTS

% of patients with residual hearing

[Graph showing the percentage of patients with residual hearing from 1994 to 2009.]
PDT - EAS
ELECTRIC ACOUSTIC STIMULATION
BEST AIDED CONDITION

CI + HA

HA
SYNERGY

STIMULATION

ELECTRIC UNILATERAL

+ 20% SPEECH DISCRIMINATION

ACOUSTIC BILATERAL

20% SPEECH DISCRIMINATION

ELECTRIC-ACOUSTIC

100% SPEECH DISCRIMINATION
A new method of partial deafness treatment

Henryk Skarżyński, Artur Lorens, Anna Piotrowska
ORIGINAL ARTICLE

Partial deafness cochlear implantation provides benefit to a new population of individuals with hearing loss

HENRYK SKARZYNSKI¹, ARTUR LORENS¹, ANNA PIOTROWSKA¹ & ILONA ANDERSON²
Preservation of low frequency hearing in partial deafness cochlear implantation (PDCI) using the round window surgical approach

HENRYK SKARZYNSKI¹, ARTUR LORENS¹, ANNA PIOTROWSKA¹ & ILONA ANDERSON²
Outcomes of Treatment of Partial Deafness With Cochlear Implantation: A DUET Study

Artur Lorens, PhD; Marek Polak, PhD; Anna Piotrowska, MD; Henryk Skarzynski, MD

BINAURAL EFFECT

CI + HA

HA
Outcomes of Treatment of Partial Deafness With Cochlear Implantation: A DUET Study

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Percent Correct [%]

<table>
<thead>
<tr>
<th>Condition</th>
<th>CI + HA</th>
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<tbody>
<tr>
<td>Quiet</td>
<td>89.5</td>
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<tr>
<td>W 10dB</td>
<td>83.6</td>
</tr>
<tr>
<td>W Quiet</td>
<td>91.4</td>
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<tr>
<td>W 10dB</td>
<td>72.4</td>
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</table>
Electric Acoustic Stimulation in Children

Henryk Skarzynski · Artur Lorens

Institute of Physiology and Pathology of Hearing, Warsaw, Poland
PARTIAL DEAFNESS TREATMENT (PDT)

Commercial SRA – CI422

Hybrid-L

16mm stopper / marker

Wing for fixing

CI422 / SRA

Handle / orientation guide

20mm white marker

25mm white marker

Approx. 25mm
MATERIAL & METHOD

- 23 adults with Partial Deafness
- Round window approach
- Nucleus CI422 straight array
- CT scans
- Audiometric evaluation
- Monosyllabic word discrimination test
CT SCAN 400°
CT SCAN 355°

Reference zero degrees
21 patients with 3 month post-op data

- **Group I (EC)** N=7,
  \[ \leq 50\text{dBHL} @ 500\text{Hz} \]

- **Group II (EAS)** N=7,
  \[ > 50\text{dBHL}, < 80\text{dBHL} @ 500\text{Hz} \]

- **Group III (CI)** N=7,
  \[ \geq 80\text{dBHL} @ 500\text{Hz} \]
3M MEAN THRESHOLDS AND MEDIAN CHANGES

<table>
<thead>
<tr>
<th>Frequency Hertz</th>
<th>Group I</th>
<th>Group II</th>
<th>Group III</th>
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<tbody>
<tr>
<td>125</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>250</td>
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<td>8000</td>
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</tbody>
</table>

Pure Tone Threshold dBHL

-10 -0 0 10 20 30 40 50 60 70 80 90 100 110 120 130
IMPROVEMENT IN QUIET - 12 MONTHS

Change in score % points

EC  EAS  ES
IMPROVEMENT IN NOISE - 12 MONTHS

Change in score % points

EC      EAS      ES

-30  -20  -10   0   10   20   30   40   50   60   70   80   90  100
EAS – BINAURAL EFFECT benefit for complex listening environments

René Gifford, PhD
Michael F. Dorman, PhD
Artur Lorens, PhD
Henryk Skarzynski, MD, PhD

MAYO CLINIC

INTERNATIONAL CENTER HEARING AND SPEECH
n = 30

- 17 Med El EAS - Polish
- 2 Hybrid S8 - English
- 3 Hybrid-L24 - English
- 8 Nucleus 24 series or later [CI24RCA, CI24RE(CA), CI512] - English
BILATERAL PDT/EAS – CASE 1

2002

2010
BILATERAL PDT/EAS – CASE 2

2003

2010
BILATERAL PDT/EAS

Case 1
3 months experience

![Bar chart showing dB SNR for Adaptive speech test „Matrix” with categories 2xDuet, L Duet, and R Duet.]
BILATERAL PDT/EAS

Case 2
3 months experience

Adaptive speech test „Matrix”
FUTURE DIRECTIONS

MINIMAL INVASIVE BILATERAL COCHLEAR IMPLANTATION WITH FULL PRESERVATION OF RESIDUAL HEARING
REMEDIATION OF HEARING LOSS (HearTreat)

Project financed by the European Commission

Scientist in Charge: Artur Lorens

Start Date: [02 October 2006]  Duration of the project: [48] Months

Partners

Blake Wilson, RTI, USA
Marek Polak, Med-El company, Austria
Frans Coninx, University of Cologne, Germany
Thomas Wollner, University of Innsbruck, Austria
Jose-Luis Padilla, University of Granada, Spain
Sophia Kramer, VU University of Amsterdam, Netherlands
INSTITUTE OF PHYSIOLOGY AND PATHOLOGY OF HEARING
INVITES TO

2nd International Congress
of Young Scientists and Students

Poland, Warsaw, June 22, 2011

TOPICS
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PHYSIOLOGY AND PATHOLOGY
OF THE AUDITORY SYSTEM,
OTOLOGY, PSYCHOLOGY,
sPEECH THERAPY, EDUCATION,
PHONIATRICS, ACOUSTICS,
PSYCHO-ACOUSTICS,
BIOPHISICS, RADIOLOGY
AND TECHNOLOGY

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