

# Hearing Screening Technology for Ontario Infant Hearing

## Program

Ontario Ministry of  
Health  
&  
Long-term Care

Bill Campbell, TBDHU

Kathy Murphy, MA, CCC-A  
Bio-logic Systems Corp.



# Screening Procedure - Auditory Brainstem Response

- The ABR is electrical activity of the auditory nervous system produced by introducing an auditory stimulus (a click) in the ear.
- The ABR is recorded by electrodes placed on the scalp. Infant screening with ABR requires placement of 3 electrodes.
- The system is designed to record the ABR over and over again until it emerges from the background of normal EEG activity.

# Screening Procedures

- **Issues important to achieving optimal ABR screening & program results are:**
  - **System setup and operation**
  - **Infant handling & preparation skills**
  - **Environmental controls**
  - **Troubleshooting**

# Screening Procedures

- **System setup and operation**
  - **Hands-On practice**

# Screening Procedures

- **Infant handling & preparation skills**
  - **Follow hospital protocol re: infection control procedures (disposables)**
  - **A sleeping, comfortable, swaddled baby is optimal for screening**
  - **A baby that is too alert or uncomfortable will create high test artifact and compromise the result or prolong test time**

# ABaer Information Screen

- Enter the ID number

Hearing Screening [ver 3.0.16]

Patients Setup Hardware Setup Help Exit

ABaer™ AOAE

Patient Information

ID Number \* Last Name \* First Name

Birth Date Sex: Male Female Patient Search

Edt Mother's Last Name Mother's First Name Technician

Asterisk (\*) shows required fields

Accept

Choose Test Ear

Both Ears - Select First Ear

RIGHT BOTH EARS LEFT

Choose Test Type after Preparing Patient

Begin ABaer Impedance: Begin AOAE

High Intensity Check Fit: 0

HATS Access Setup Help Exit

Hardware supports ABaer tests. Ready: C:\P&T\data\ No ear selected Search mode

# ABaer Information Screen

- Enter the ID number
- Enter the infant's last name

Enter Patient Information

ID Number \* Last Name \* First Name

Bath Date Sex: Male Female Patient Search

Edt Mother's Last Name Mother's First Name Technician

Asterisk (\*) shows required fields

Accept

Choose Test Ear

Both Ears - Select First Ear

RIGHT BOTH EARS LEFT

Choose Test Type after Preparing Patient

Begin ABaer Impedance: Begin AOAE

High Intensity Check Fit: 0

HATS Access Setup Help Exit

Hardware supports ABaer tests. Ready. C:\P&T\data\ No ear selected Search mode

# ABaer Information Screen

- Enter the ID number
- Enter the infant's last name
- Enter the infant's first name (if known)

Hearing Screening [ver 3.0.16]

File Edit Hardware Setup Help Exit

ABaer™ AOAE

Enter Patient Information

1 ID Number \* Last Name \* First Name

Bath Date 9/11/2002 Sex Male Female Patient Search

2 Mother's Last Name Mother's First Name Technician

Accept

Choose Test Ear

3 RIGHT BOTH LEFT

Choose Test Type after Preparing Patient

Begin ABaer Impedance Check Fit 0 Begin AOAE High Intensity

HATS Access Setup Help Exit

Hardware supports ABaer tests. Ready. C:\P&T\data\ No ear selected Search mode

# ABaer Information Screen

- Enter the ID number
- Enter the infant's last name
- Enter the infant's first name (if known)
- Enter the DOB

Hearing Screening [ver 3.0.16]

Patients Setup Hardware Setup Help Exit

ABaer™ AOAЕ

Enter Patient Information:

ID Number \*  Last Name \*  First Name

Birth Date  9/11/2002 Sex  Male  Female

Mother's First Name  Technician

Accept

Choose Test Ears:

Choose Test Type after Preparing Patient:

Impedance

Check Fit  High Intensity

HAIS Access  Setup  Help  Exit

Hardware supports ABaer tests: Ready. C:\P&T\data\ No ear selected Search mode

# ABaer Information Screen

- Enter the ID number
- Enter the infant's last name
- Enter the infant's first name (if known)
- Enter the DOB
- Enter M or F

1

2

3

Accept

RIGHT BOTH EARS LEFT

Begin ABaer Impedance Check Fit 0 Begin AOAE High Intensity

HATS Access Setup Help Exit

Hardware supports ABaer tests. Ready. C:\P&T\data\ No ear selected Search mode

# ABaer Information Screen

- Enter the ID number
- Enter the infant's last name
- Enter the infant's first name (if known)
- Enter the DOB
- Enter M or F
- Enter Mothers info

Hearing Screening [ver 3.0.16]

File Edit Hardware Setup Help Exit

ABaer™ AAOAE

Enter Patient Information

1 ID Number \* Last Name \* First Name

Birth Date 9/11/2002 Sex Male Female Patient Search

Edit Mother's Last Name Mother's First Name Technician

Asterisk (\*) shows required fields

Accept

Choose Test Ear

2 RIGHT BOTH LEFT

Both Ears - Select First Ear

Choose Test Type Preparing Patient

3 Begin ABaer Impedance Check Fit 0 Begin AOAE

High Intensity

HATS Access Setup Help Exit

Hardware supports ABaer tests. Ready. C:\P&T\data\ No ear selected Search mode

# ABaer Information Screen

- Enter the ID number
- Enter the infant's last name
- Enter the infant's first name (if known)
- Enter the DOB
- Enter M or F
- Enter Mothers info
- Enter Screener info

The screenshot shows the 'ABaer Information Screen' software interface. The window title is 'Hearing Screening [ver 3.0.16]'. The interface is divided into several sections:

- Enter Patient Information:** This section contains several input fields: 'ID Number \*', 'Last Name \*', 'First Name', 'Birth Date' (with a calendar icon), 'Sex' (radio buttons for Male and Female), 'Mother's Last Name', 'Mother's First Name', and 'Technician'. There is an 'Edit' button and a 'Patient Search' button.
- Accept:** A button located below the patient information fields.
- Choose Test Ear:** This section has a large number '2' and three buttons: 'RIGHT', 'BOTH EARS', and 'LEFT'. A note above the buttons says 'Both Ears - Select First Ear'.
- Choose Test Type after Preparing Patient:** This section has a large number '3' and two main buttons: 'Begin ABaer' and 'Begin AOAE'. There are also input fields for 'Impedance' and 'Check Fit' (with a value of '0'). A 'High Intensity' button is located below the 'Begin ABaer' button.
- Navigation Buttons:** At the bottom of the main area are buttons for 'HATS Access', 'Setup', 'Help', and 'Exit'.
- Status Bar:** At the very bottom, it shows 'Hardware supports ABaer tests. Ready.', 'C:\P&T\data\', 'No ear selected', and 'Search mode'.

A red arrow points from the 'Technician' dropdown menu in the 'Enter Patient Information' section towards the 'Begin ABaer' button in the 'Choose Test Type' section.

# ABaer Information Screen

- Enter the ID number
- Enter the infant's last name
- Enter the infant's first name (if known)
- Enter the DOB
- Enter M or F
- Enter Mothers info
- Enter Screener info
- Select 'Accept'

The screenshot shows the 'ABaer Information Screen' software interface. The window title is 'Hearing Screening [ver 3.0.16]'. The interface is divided into several sections:

- Enter Patient Information:** This section contains input fields for ID Number, Last Name, First Name, Birth Date (with a calendar icon), Sex (Male/Female), Mother's Last Name, Mother's First Name, and Technician. A 'Patient Search' button is also present. A large orange number '1' is overlaid on the ID Number field.
- Accept:** A button labeled 'Accept' is located below the patient information fields. A red arrow points from the 'Accept' button in the list to this button.
- Choose Test Ear:** This section has a 'Choose Test Ear' label and three buttons: 'RIGHT' (with an ear icon), 'BOTH EARS' (with a baby face icon), and 'LEFT' (with an ear icon). A large orange number '2' is overlaid on the 'RIGHT' button.
- Choose Test Type after Preparing Patient:** This section has a 'Choose Test Type after Preparing Patient' label and three buttons: 'Begin ABaer', 'Begin AOAE', and 'High Intensity'. A large orange number '3' is overlaid on the 'Begin ABaer' button.
- Buttons:** At the bottom of the main interface area, there are buttons for 'HATS Access', 'Setup', 'Help', and 'Exit'.
- Status Bar:** The bottom of the window shows a status bar with the text 'Hardware supports ABaer tests. Ready.', 'C:\P&T\data\', 'No ear selected', and 'Search mode'.

# Screening Procedures

- **Infant preparation**
  - **Skin preparation with alcohol pad at electrode sites:**



# Screening Procedures

- Attach clips to electrodes while still on backing card
- Avoid hair
- Press gel pad firmly to skin
- Cables directed away from body



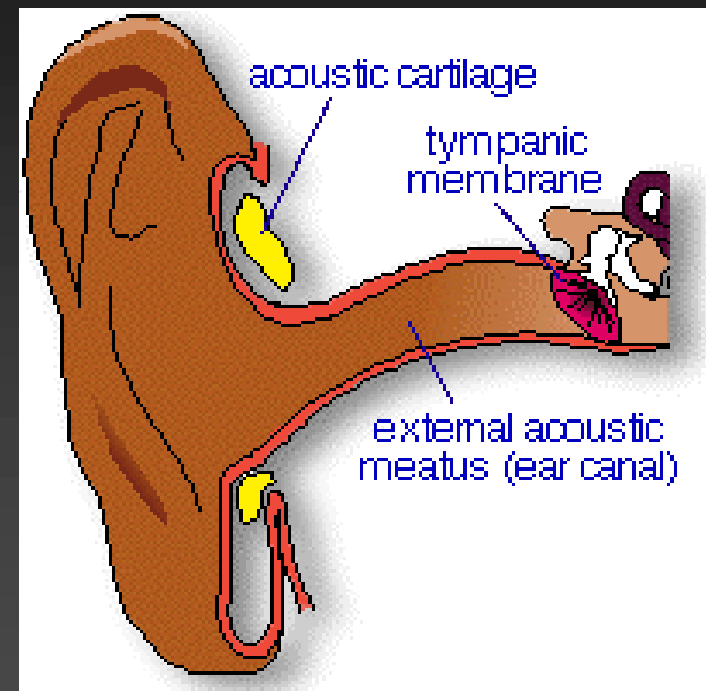
# Screening Procedures

**Ensuring electrode attachment in difficult situations**



# Screening Procedures

- **Infant preparation - ear probe placement**
  - Slightly “s” shaped
  - Vernix
  - Collapsing ear canals
  - Reposition baby so that gravity assists with probe retention



# Screening Procedures

- **Infant preparation -probe placement technique**
  - **choose disposable tip of appropriate size for canal**
  - **apply tip completely onto probe body**
  - **open the canal**
  - **gentle but firm pressure with slight twisting motion to achieve deep, secure fit**



# ABaer Screening

- Select R or L ear

The screenshot displays the 'ABaer™ AOAE' software interface. The window title is 'Hearing Screening [ver 3.0.16]'. The menu bar includes 'Patients', 'Setup', 'Hardware Setup', 'Help', and 'Exit'. The main interface is divided into several sections:

- Enter Patient Information:** This section contains fields for ID Number (12345), Last Name (Baby), First Name (NBM), Birth Date (9/11/2002), Sex (Male), Mother's Last Name, Mother's First Name, and Technician (Bill Campbell). There is an 'Edit' button and a 'Patient Search' button.
- Buttons:** An 'Accept' button is located below the patient information fields.
- Choose Test Ear:** This section has a heading 'Choose Test Ear' and 'Choose First Ear'. It features three buttons: 'RIGHT' (with an ear icon), 'BOTH EARS' (with a smiley face icon), and 'LEFT' (with an ear icon). Red arrows from the bullet point point to the 'RIGHT' and 'LEFT' buttons.
- Choose Test Type after Preparing Patient:** This section includes 'Begin ABaer', 'Begin AOAE', and 'High Intensity' buttons. It also has input fields for 'Impedance' and 'Check Fit'.
- Footer:** At the bottom, there are buttons for 'HATS Access', 'Setup', 'Help', and 'Exit'. The status bar shows 'Hardware supports ABaer tests: Ready.', 'C:\P&T\data\', 'No ear selected', and 'Search/Edit mode'.

# ABaer Screening

- Select R or L ear
- Select 'Begin ABaer' to start test

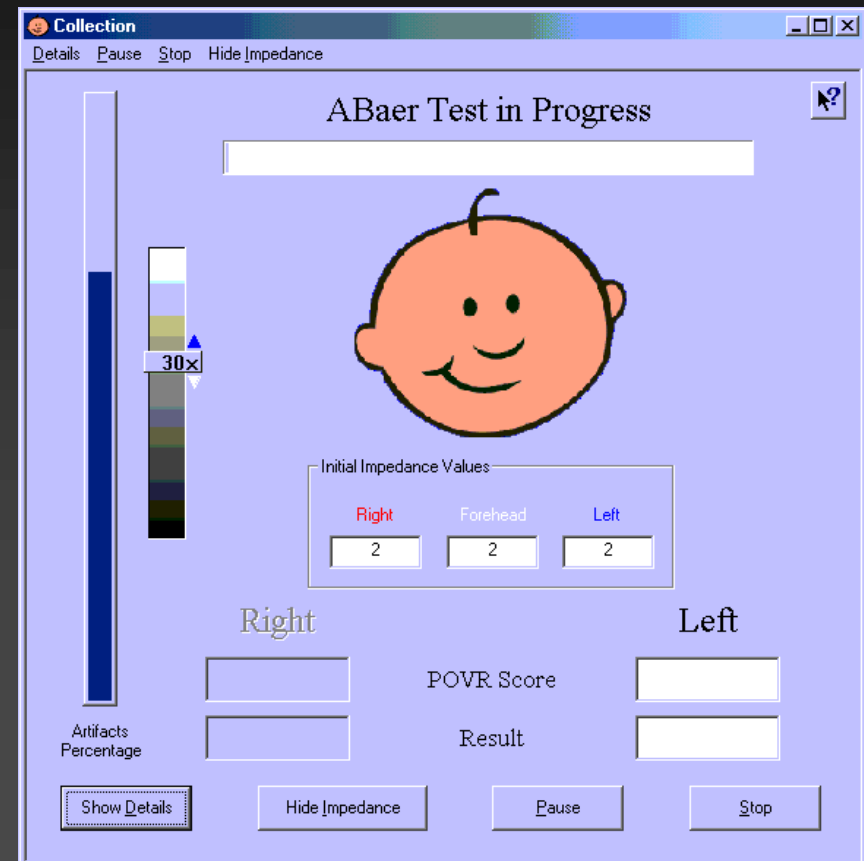
The screenshot shows the 'Hearing Screening [ver 3.0.16]' software window. The interface is divided into several sections:

- Enter Patient Information:** This section contains fields for ID Number (12345), Last Name (Baby), First Name (NBM), Birth Date (9/11/2002), Sex (Male), Mother's Last Name (Baby), Mother's First Name, and Technician (Bill Campbell). There is an 'Edit' button and a 'Patient Search' button.
- Accept:** A button to confirm the patient information.
- Choose Test Ear:** This section has three buttons: 'RIGHT' (orange), 'BOTH' (white with a baby face), and 'LEFT' (blue). A red arrow points from the 'Begin ABaer' button in the next section to the 'RIGHT' button.
- Choose Test Type after Preparing Patient:** This section contains buttons for 'Begin ABaer' (highlighted with a red arrow), 'Begin AOAe', and 'High Intensity'. There are also input fields for 'Impedance' and 'Check Fit'.
- Navigation:** Buttons for 'HATS Access', 'Setup', 'Help', and 'Exit' are located at the bottom.

The status bar at the bottom of the window displays: 'Hardware supports ABaer tests: Ready.', 'C:\P&T\data\', 'No ear selected', and 'Search/Edit mode'.

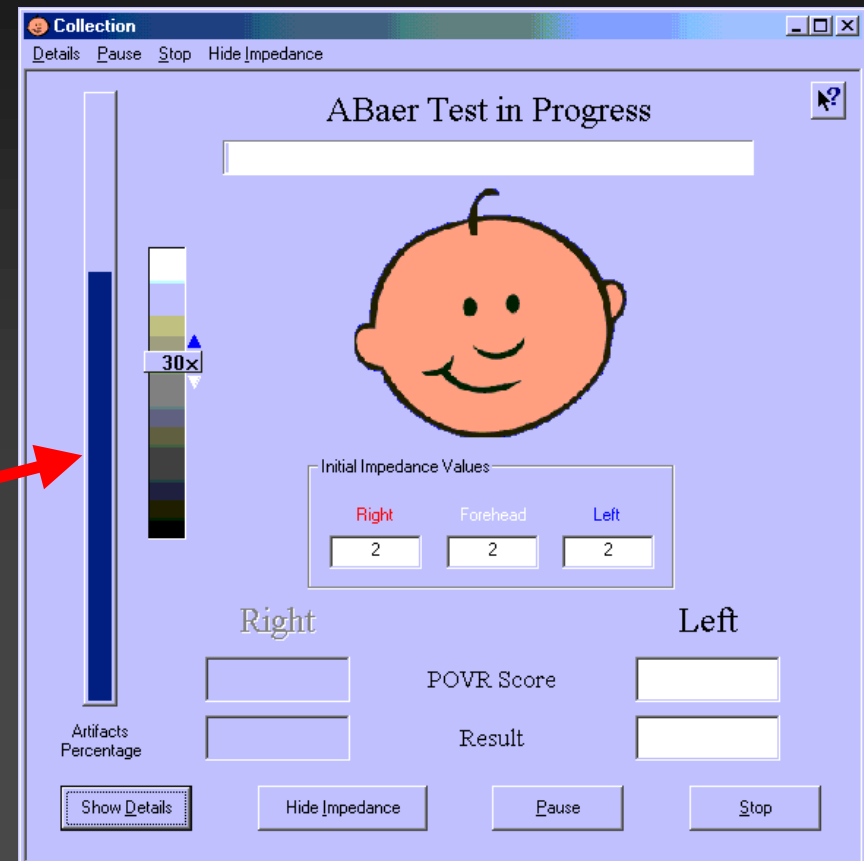
# ABaer Screening

- If setup is OK, this screen will appear and the test will start



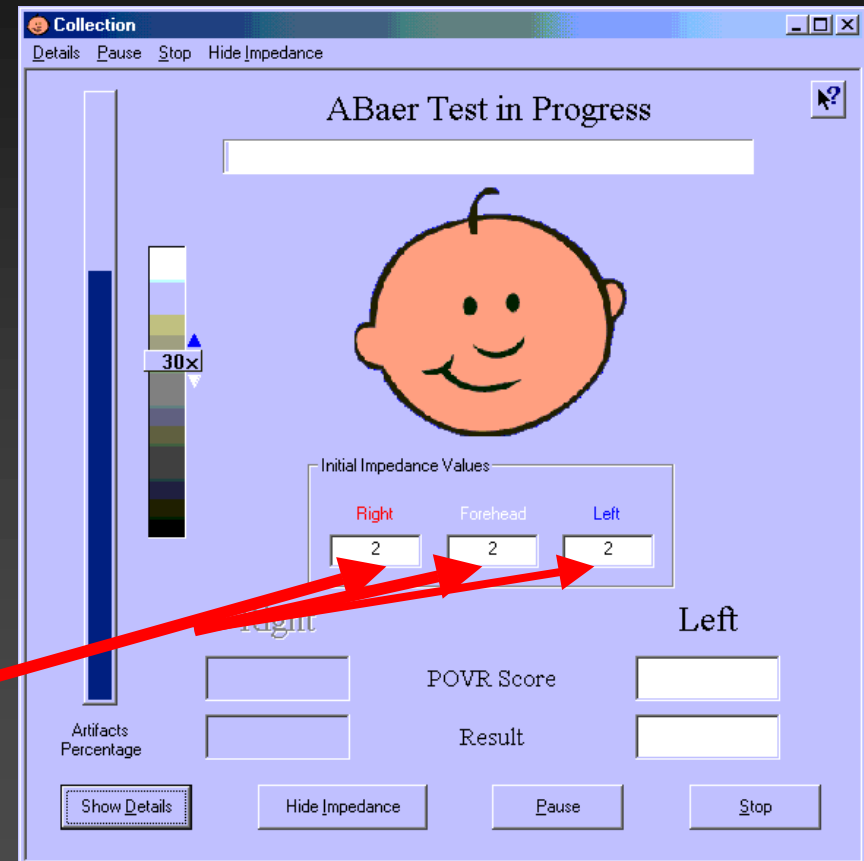
# ABaer Screening

- If setup is OK, this screen will appear and the test will start
- This bar indicates the activity or 'noise' in the test (a sign of infant activity)



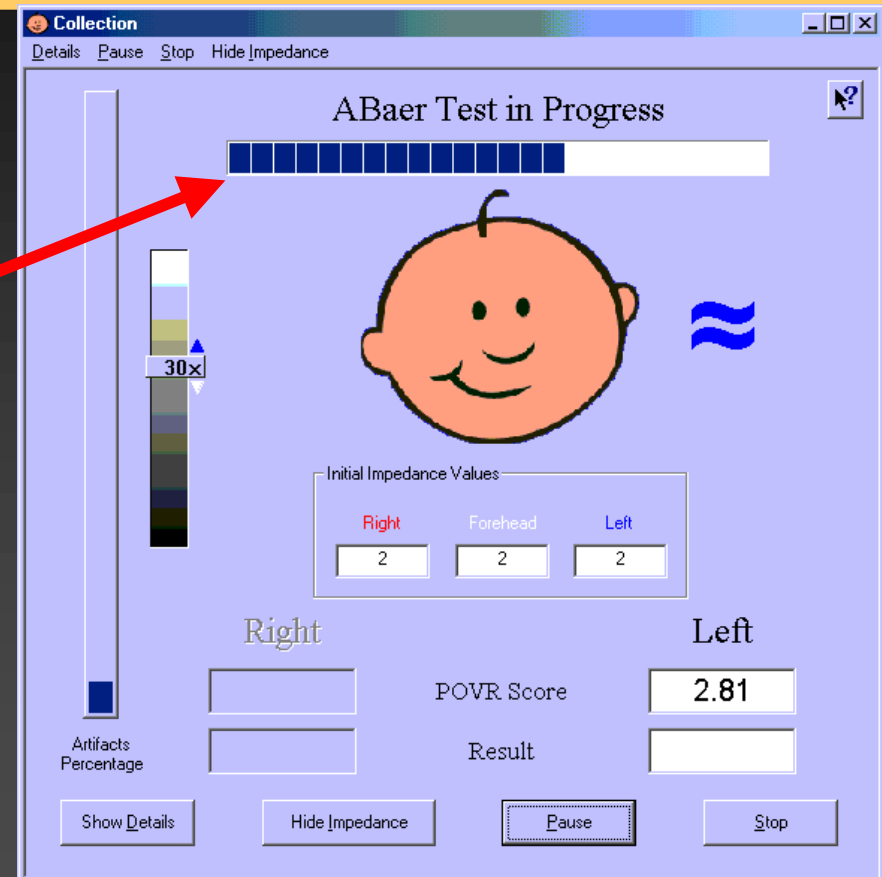
# ABaer Screening

- If setup is OK, this screen will appear and the test will start
- This bar indicates the activity or 'noise' in the test (a sign of infant activity)
- This indicates that all 3 electrodes are fit correctly



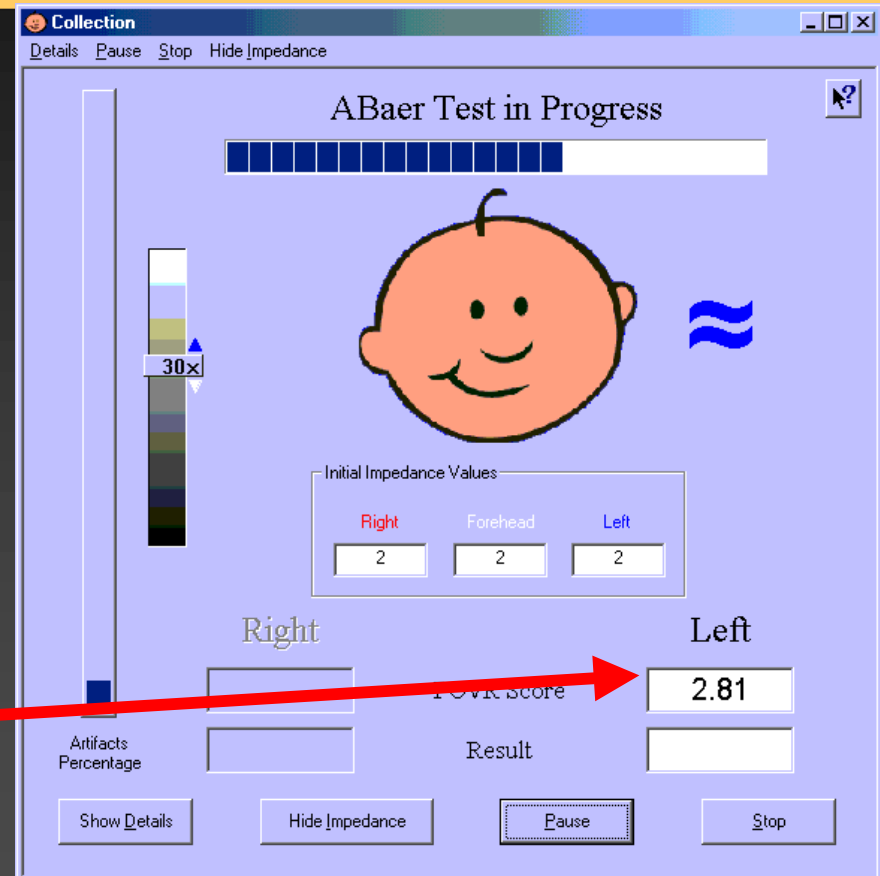
# ABaer Screening

- This bar indicates the number of presentations in the test, or the length of time tested



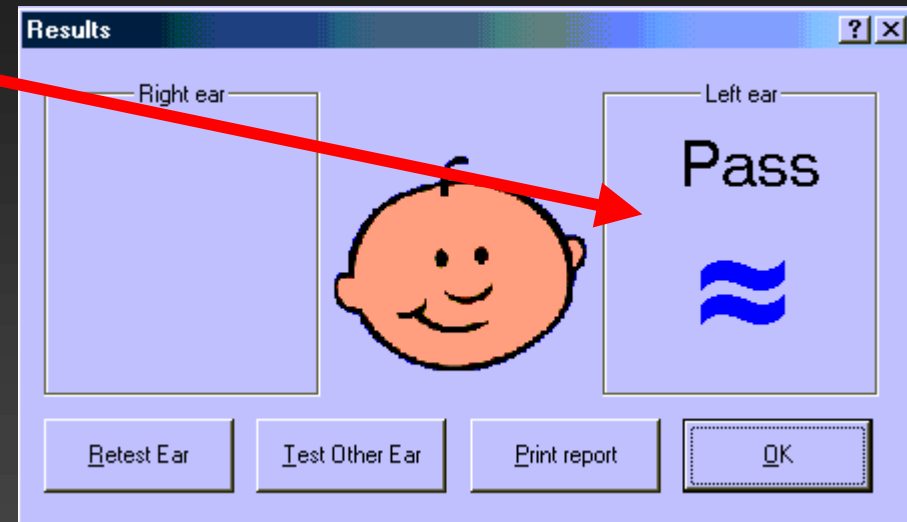
# ABaer Screening

- This bar indicates the number of presentations in the test, or the length of time tested
- This box gives the POVR score, or pass/refer criteria. A pass is  $>3.5$



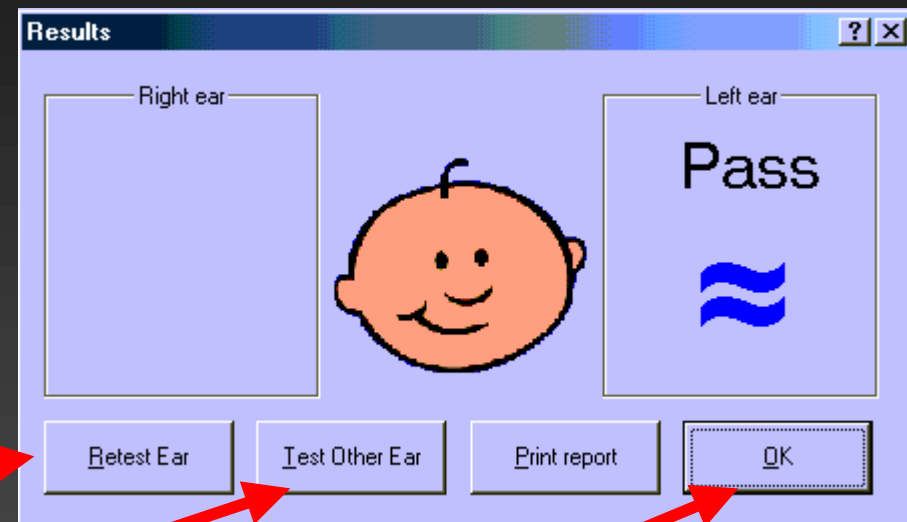
# ABaer Screening

- Once the infant has passed the screening, this window will open



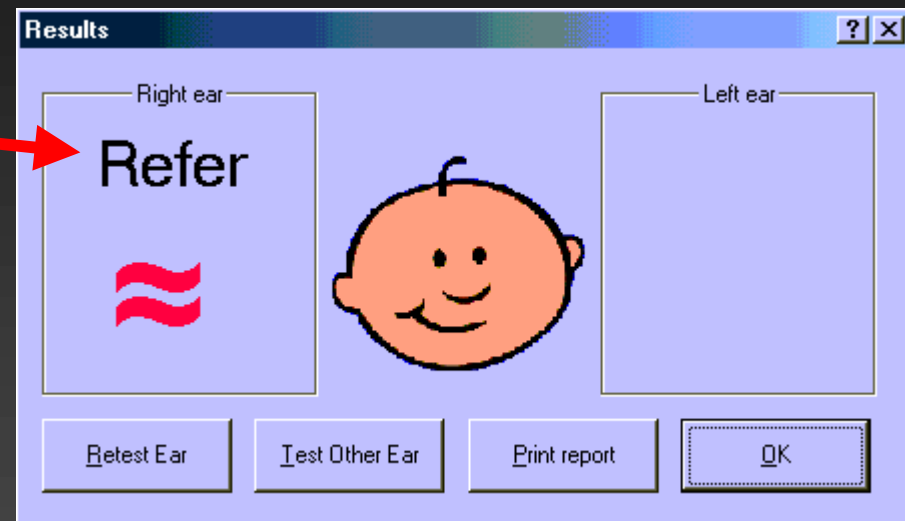
# ABaer Screening

- Once the infant has passed the screening, this window will open
- You will have the choice to:
  - retest
  - test the other ear
  - or close the window and return to the main screen



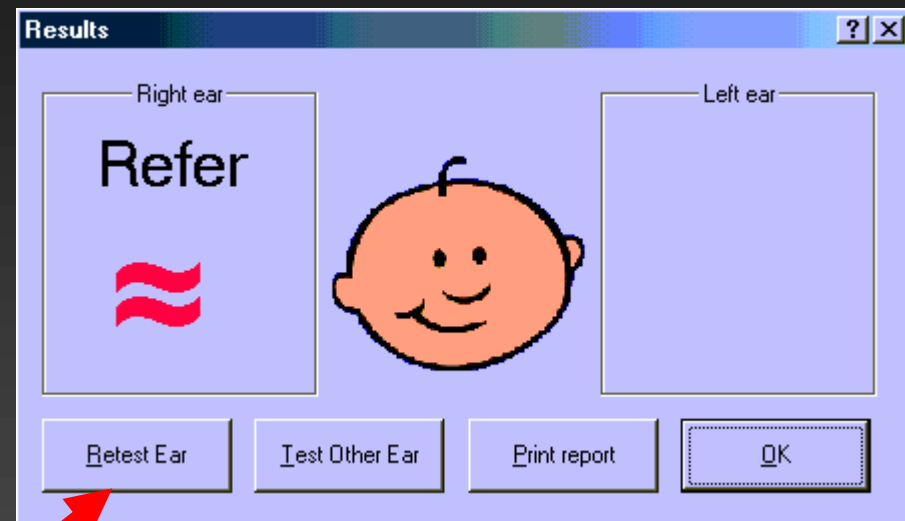
# ABaer Screening

- If a refer result is indicated, this window is displayed



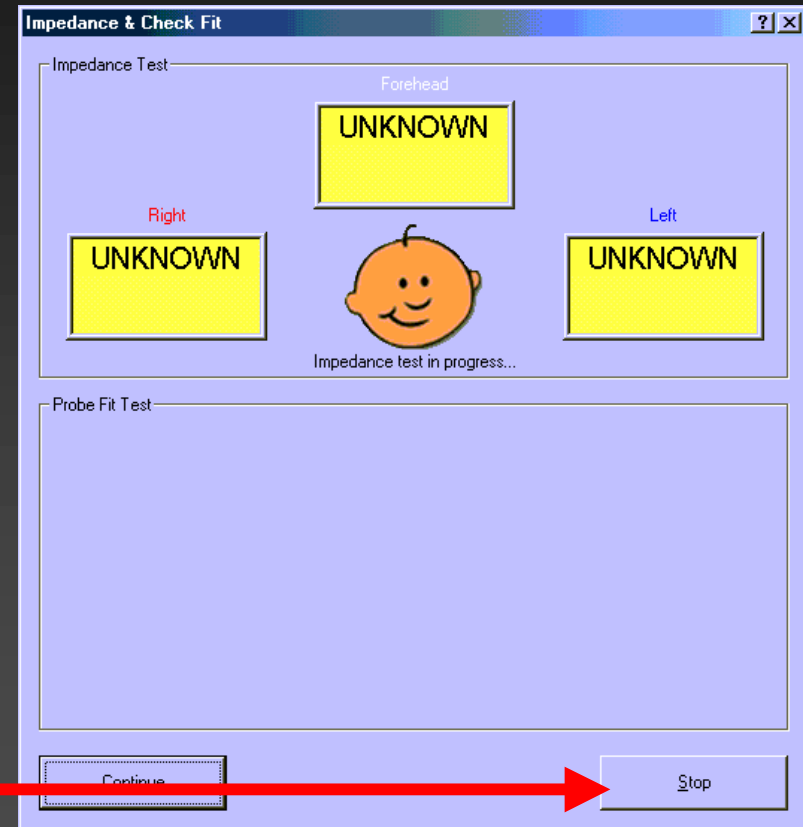
# ABaer Screening

- If a refer result is indicated, this window is displayed
- A retest of the same ear is suggested once the probe and electrode fit have been checked and the infant is sleeping or quiet



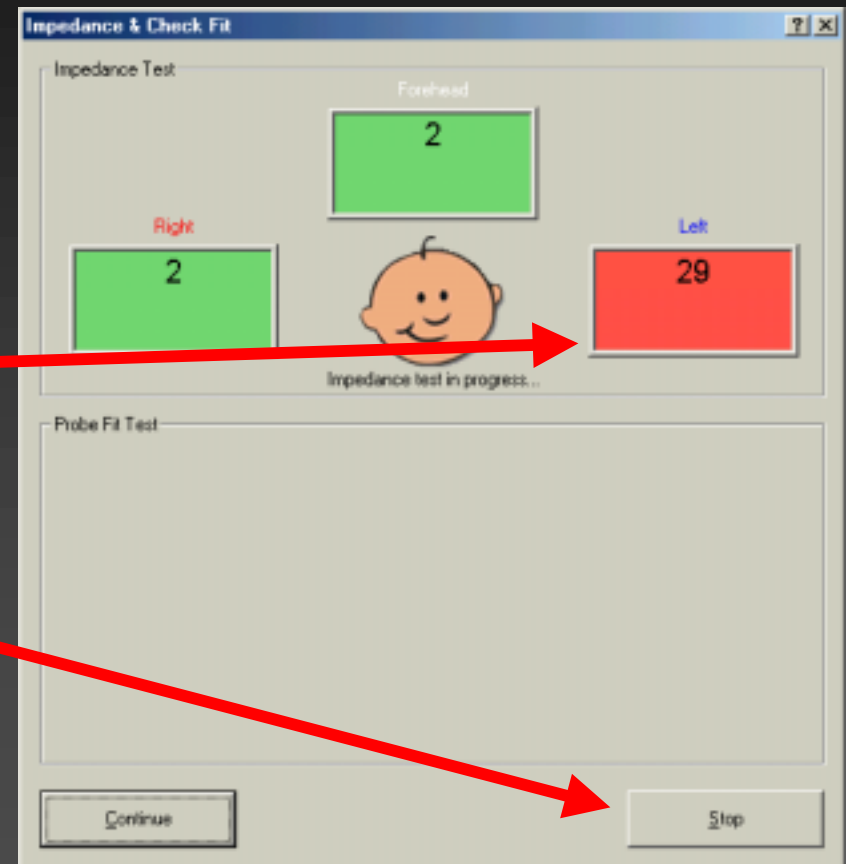
# What can go wrong?

- If this screen is displayed, it indicates that the electrode (s) are not attached or that the blue patient cable is not hooked to the computer
- Stop the test and find the problem



# What can go wrong?

- This screen indicates that the patient cable is OK, but that one electrode (left) is not properly fit
- Stop the test and find the problem
- You may have to re-scrub the site and fit a new electrode



# Screening Procedures

- **Environmental controls - external noise that can affect the ABR screening are:**
  - **Acoustical**
    - **minimize as much as possible**
    - **sources: fans, monitors, radios, loud talking**

# Screening Procedures

- **Environmental controls - external noise that can affect the ABR screening are:**
  - **Electrical - minimize as much as possible by:**
    - **observing system setup issues**
    - **verifying grounded electrical outlets**
    - **keep electrode cables away from other cables**

# Troubleshooting

- **High Artifact Level - check baby, electrodes, other sources of electrical noise**
- **Poor test results or prolonged test - check artifact, check probe placement, check probe for occlusion with vernix and clean as needed, check for excessive acoustical noise**



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