Diagnostic protocols for paediatric populations

Infants younger than 6 months of age:
- child and family history
- electrophysiologic measure of threshold such as ABR and/or ASSR using frequency specific stimuli,
- diagnostic OAEs,
- assessment of middle-ear functioning,
- acoustic reflex thresholds,
- observation of the infant’s behavioural response to sound,
- parental report of emerging communication and auditory behaviours

Infants and toddlers between 6 through 36 months of age:
- child and family history
- diagnostic OAEs,
- assessment of middle-ear functioning,
- acoustic reflex thresholds,
- behavioural response audiometry according to the child’s developmental age (visual reinforcement or conditioned play audiometry),
- speech detection and recognition measures,
- parental report of auditory and visual behaviours,
- screening of communication and language milestones

Children 36 months and older:
- child and family history
- behavioural response audiometry according to the child’s developmental age (visual reinforcement or conditioned play audiometry),
- speech detection and recognition measures,
- parental report of auditory and visual behaviours,
- screening of communication and language milestones

Diagnostic protocols for electro-acoustic and electro-physiologic test-procedures for the paediatric population

Immittance measurements:

Tympanometry
Appropriate measures of middle-ear functioning include tympanometry with high frequency probe tones of 660 or 1000 Hz, but preferably 1000 Hz, for children younger than 8 months of age corrected for prematurity. For children 9 months and older conventional 226 Hz probe tone tympanometry can be used. Pressure sweep should be positive to negative from +200 to -400 daPa.

Acoustic Reflexes
Acoustic reflexes in children younger than 8 months (corrected for prematurity) must be determined using a 1000Hz probe tone. A conventional probe tone of 226 Hz can be used in children 8 months and older. The stimuli to be used can vary from broadband noise as a general screening stimulus to frequency specific tones from 500, 1000, 2000 and 4000 Hz. Measurements should be made contralaterally and/or ipsilaterally as time permits.

**Diagnostic Oto-acoustic emission:**
Transient Evoked (TE) or Distortion Product (DP) oto-acoustic emissions (OAE) may be used for diagnostic testing. Click stimuli can be used for the TEOAE measurements and DPOAE measurements should be conducted from 750 – 8000 Hz.

**Auditory evoked potentials:**

*Auditory brainstem response*
Auditory brainstem response (ABR) measurements are the most widely used auditory evoked potential test for estimating hearing loss. The following minimum protocol is recommended for ABR testing for infants and young children:

- Frequency-specific measurements using toneburst (TB) ABR must be conducted to provide threshold information across the frequency spectrum (At least between 500 – 4000 Hz)
- A click stimulus may be used for assessing neurological integrity, cross-checking results, and for monitoring the cochlear microphonic response
- A cochlear microphonic response must be evaluated by changing stimulus polarity at high intensities for children with absent or abnormal ABR waves. If supra-aural earphones are used the stimulus artifact may obscure the cochlear microphonic response and therefore insert earphones are recommended.
- If conductive hearing loss is suspected bone conduction ABR measurements are recommended to provide frequency-specific bone-conduction thresholds.

*Auditory steady-state response*
The auditory steady-state response (ASSR) is a useful measure for frequency-specific threshold estimations in infants and children. The following minimum protocol is recommended for ASSR testing in infants:

- Frequency specific tones modulated between 70 – 110 Hz should be used for assessing young infants preferably between 500 – 4000 Hz.
- If extended periods of averaging is not utilized at low intensities the technique cannot differentiate between mild hearing loss and normal hearing thresholds in infants and children.
- Since it does not provide information regarding neural integrity it should be used in combination with at least one ABR measurement (a click or high-frequency toneburst). This will ensure an indication of neural integrity as determined by the ABR waves or lack thereof in addition to a test for a cochlear microphonic response when waves are absent or abnormal.
- Bone conduction ASSR measurements often result in artifactual responses and is not recommended as a clinical technique at this stage.