ADULT IMMITTANCE AUDIOMETRY

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**Test Preparation**

1. Perform a cavity calibration of the immittance meter to determine whether it is in calibration for tympanometry

**Tympanometry - Adult**

Note: It is standard clinical practice to use “compensated” tympanometry where the ear:canal volume, which is measured at +200daPa, is automatically subtracted from the total volume measured at maximum admittance.

2. set the sweep rate to 50
3. instruct client on nature of test before placing probe in ear
   - what the test is measuring
   - that there will be a change in pressure in their ear
   - that they may hear a low pitched humming sound
   - that they just need to sit still and do nothing.
4. choose correct-size probe tip and obtain an airtight seal
5. obtain tympanogram, draw tympanogram on results form or print out
6. record ear canal volume, tympanogram type, peak pressure, width & static admittance correctly
7. recognise any discomfort due to probe tip or test procedure
8. if you obtain a Type B tympanogram verify by noting the tympanometric width and admittance values and compare against the norms (ASHA 1990), additionally you may attempt acoustic reflex testing (unless for example there is a patent grommet or a known perforation), e.g. test at 1000 Hz ipsilaterally at 110 dB HL

**Contraindications for performing immittance audiometry**

1. Recent stapedectomy/stapedotomy or other middle ear surgery (generally within previous 3 months is considered recent but this policy should be discussed with individual otolaryngologists)
2. Discharging ear
3. Discomfort (e.g., severe otitis externa, herpes zoster oticus)
**ADULT IMMITTANCE Audiometry**

**ADULT TYPMANOMETRY NORMS**

**ADMITTANCE $Y_{TM}$**

<table>
<thead>
<tr>
<th>Type</th>
<th>Description</th>
<th>ASHA (1990):</th>
<th>Adults</th>
<th>$0.3 \text{ ml} \leq Y_{tm} \leq 1.4 \text{ mmho}$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type A</td>
<td>Peak in tympanogram between $\pm 100$ daPa</td>
<td>adults</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Type A-s</td>
<td>Peak between $\pm 100$ daPa</td>
<td>adults</td>
<td></td>
<td>$Y_{tm} &lt; 0.3 \text{ mmho}$</td>
</tr>
<tr>
<td>Type A-d</td>
<td>Peak between $\pm 100$ daPa</td>
<td>adults</td>
<td></td>
<td>$Y_{tm} &gt; 1.4 \text{ mmho}$</td>
</tr>
</tbody>
</table>

Type B  
- **Type B-low**  
  Equivalent ear-canal volume ($Vec @ +200$ daPa) within normal limits**

- **Type B-high**  
  Equivalent ear-canal volume exceeds normal limits

Type C  
- Peak in tympanogram @ < - 100 daPa

Note that Type C tympanograms can be classified as shallow or deep if the admittance falls outside the normal range.

**Ear Canal Volume $Vec$ (cm$^3$)**

<table>
<thead>
<tr>
<th>Vec @ +200 daPa:</th>
<th>Mean (cm$^3$)</th>
<th>90% Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adults</td>
<td>1.1</td>
<td>0.6 - 1.5</td>
</tr>
</tbody>
</table>

**TYMPANIC WIDTH TW (DApa)**

<table>
<thead>
<tr>
<th>TW (daPa)</th>
<th>Mean (daPa)</th>
<th>90% Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adults</td>
<td>80</td>
<td>50 – 110</td>
</tr>
</tbody>
</table>

**Note:**

You should generally indicate whether a Type B tympanogram is a low or high volume B unless there is a history of chronic middle ear disease in which case the volume may be ambiguous. Equivalent ear canal volumes may not be informative when trying to ascertain the presence of a perforation if there is a history of chronic middle ear disease - thus Type B tympanograms should always be interpreted in the light of the person's history of middle ear disease.
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Acoustic Reflex Thresholds

1. instruct client on the nature of the test (warn about potentially loud sounds) and to inform you if sounds become uncomfortably loud.

2. if there is an A-deep tympanogram and the baseline admittance is very variable it may be necessary to take the ear canal pressure off peak slightly in order to measure acoustic reflex thresholds

3. choose starting and stopping levels appropriately

4. use efficient threshold seeking strategies (check growth of response & repeatability)

5. if contralateral reflexes are unexpectedly elevated (especially at 500 Hz) check contralateral probe fit

6. classify acoustic reflex thresholds as normal (refer to Gelfand, Schwander & Silman 1990 norms), elevated, absent, or abnormal (i.e., abnormal morphology such as negative on/off, biphasic, reversed) and record this on summary sheet

7. using appropriate symbols record reflex thresholds on two-audiogram summary sheet (contralateral reflex thresholds are recorded by sound ear, not by probe ear)

8. note that if you run out of memory on the GSI 33 immittance meter and erase all traces this erases the tympanometric peak pressure and the system repressurises to 0 daPa when you press START again after erasing memories - if the individual's peak pressure was significantly different from 0 daPa, reflex thresholds may be elevated when testing at 0 daPa ear canal pressure as middle ear admittance will not be maximal. In this instance, the pressure should be manually reset to reflect the peak pressure.

Suggested acoustic reflex threshold test protocol for testing normal hearing adults:

Measure: (i) contralateral 500, 1000 and 2000 Hz, and (ii) ipsilateral 1000 Hz reflex thresholds

If there is a hearing loss in either ear, or any suggestion of pathology from the history, obtain a full set of acoustic reflexes in both ears.

Use 'steady' rather than pulsed tones for contralateral reflex testing since norms are based on the use of continuous tones. According to Mellott (1992) GSI-33 reflex thresholds will be 2-5 dB higher on average for pulsed than for continuous tones.

As a general rule do not test for acoustic reflexes at levels above 110 dB HL. You may be able to safely test at higher levels if there is a conductive or mixed hearing loss at the test frequency. Always check for loudness discomfort before presenting high levels.