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**Nottingham  
University Hospitals**  
NHS Trust

# **Improving ABR strategy - How to get the most out of a ticking time bomb**

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## **Recommended Procedure**

### **Auditory Brainstem Response (ABR) Testing in Babies**

Date: February 2019

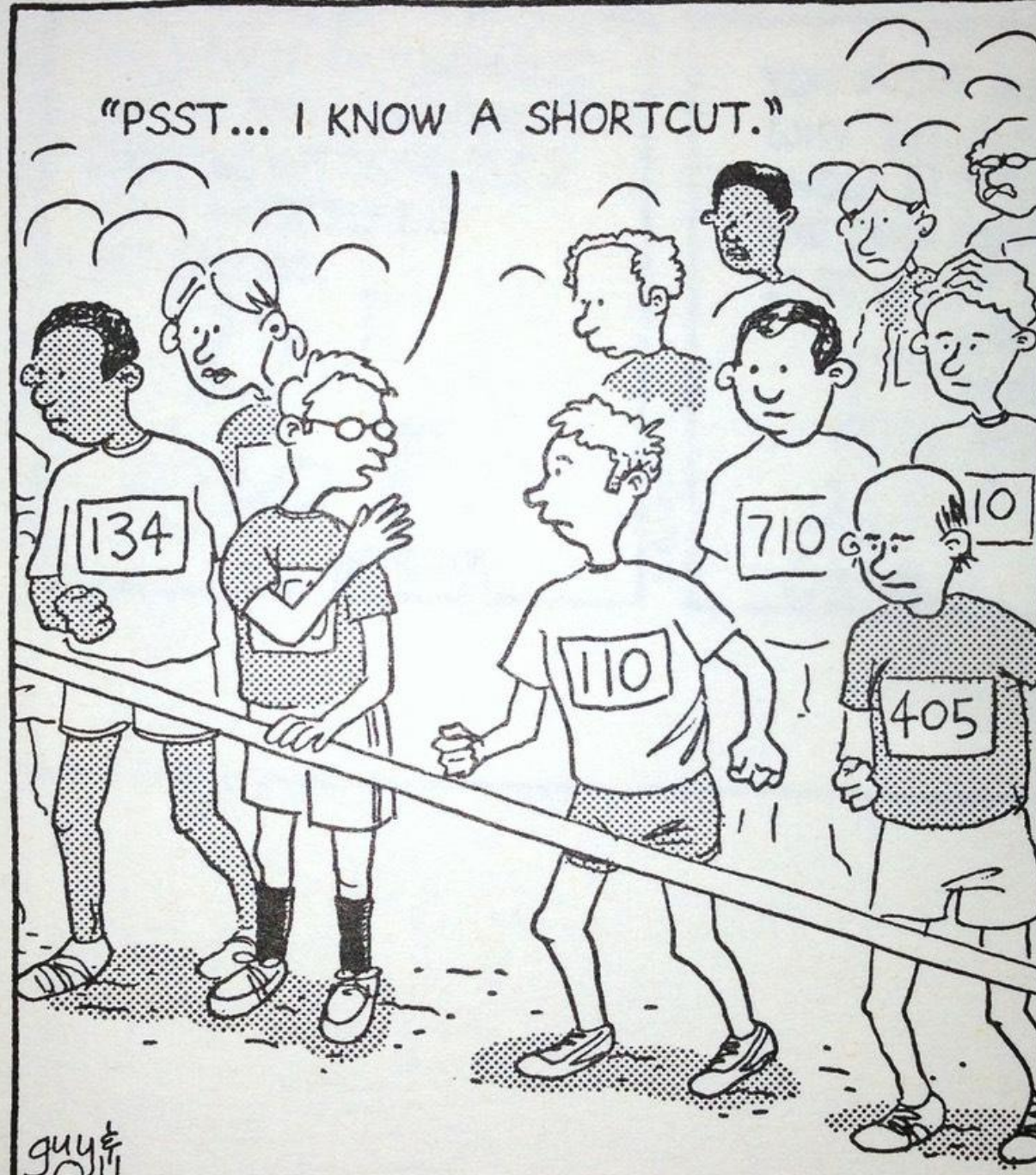
Due for review: February 2024

OD-104-81 (01/02/2019) v2

- Great document to start with, has dramatically improved practice in the UK – BUT because its designed as a ‘pick up and go’ has also got us into a mind-set of ‘I’ve got to do this, in this order to get this result which is not always practical, or the best way!



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- Time to move beyond the standard and start critically thinking
- The key question you should always be asking yourself with any objective assessment is 'what's the best test, so I can do the **absolute minimum** to answer the question?'
- Don't get too caught up in 'I've got to do it in this order'. That might not be the best for **this** baby.
- Think outside the box – the best test, right now, might not be ABR!

# First things first....

- Good strategy for your appointments starts before the patient even arrives in the clinic



## NHS Newborn Hearing Screening Programme

Your baby's visit to the audiology clinic:  
information for parents



Public Health England leads the NHS Screening Programmes



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## A parent's guide to Auditory Evoked Potentials

Evoked Potentials Clinic

This document can be provided in different languages and formats.  
For more information please contact:

Evoked Potentials Clinic  
Queen's Medical Centre Campus  
Derby Road, Nottingham  
Tel: 0115 9709266





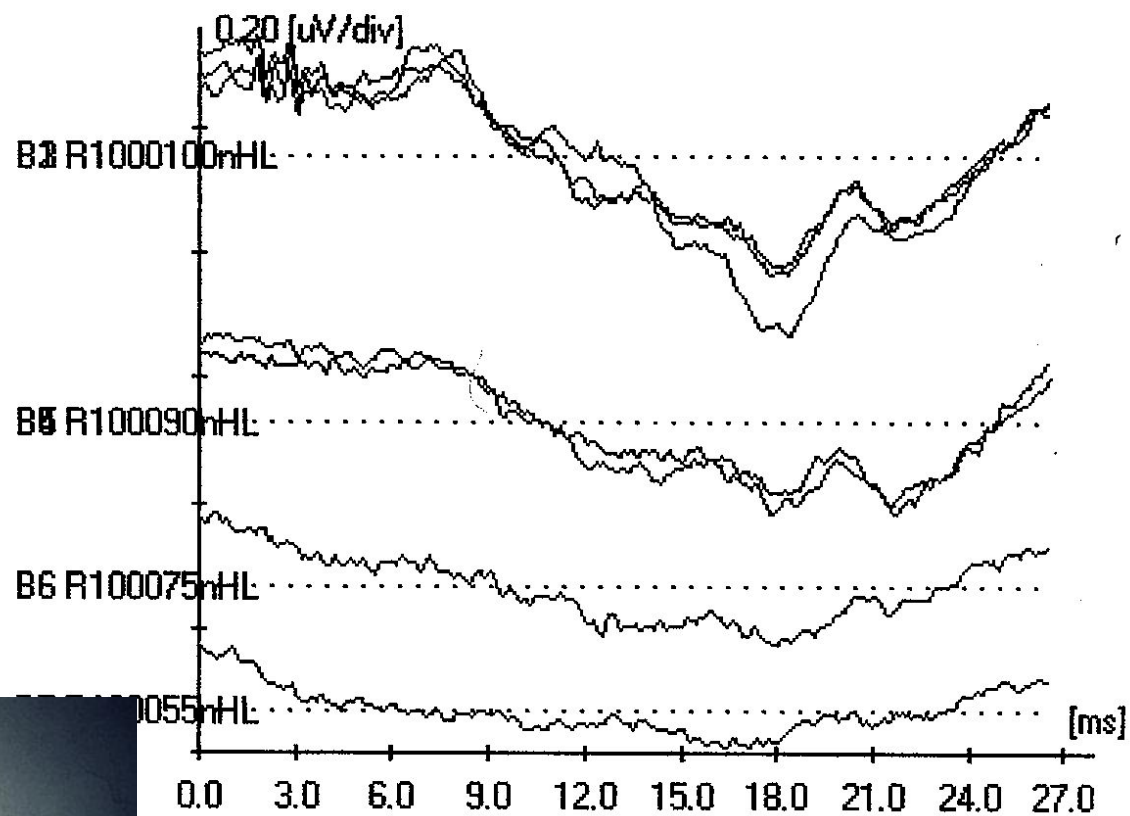
# Human factors – Mind Set

- Don't think in terms of individual tests – think in terms of 'What's the clinical question?'
- We don't take referrals for specific tests for this reason, we ask for clinical questions – in a lot of cases (especially NHSP) that's simply 'what is this child hearing?' or for adults 'is this loss non-organic' but it gets you into a way of thinking about the bigger picture rather than 'I've got to do this test'.

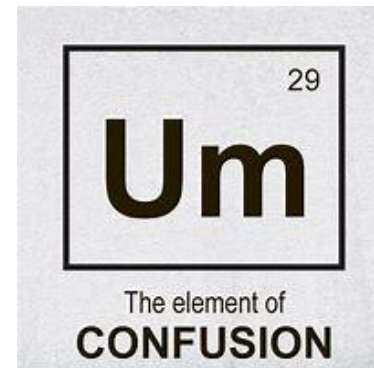


# Human Factors - Stress!

- If you're stressed, especially when things don't go your way, this will rub off on the parents and then the baby
- Take time to think things through, there's often breaks in testing for the baby getting unsettled or waking, if your not sure what your looking at response wise, take the laptop out with you / print the traces out and get a fresh pair of eyes.







- If you're still not sure what you're looking at, check your connections, have you wired it wrong? Is the ABR upside down? Are you measuring across the head by accident?
- Still unsure, but confident everything is correct? Try something else, it may mean you don't need to resolve it - still weird? Consider ANSD
- If your still not sure – consult a higher power!



# Human Factors – Blind Panic

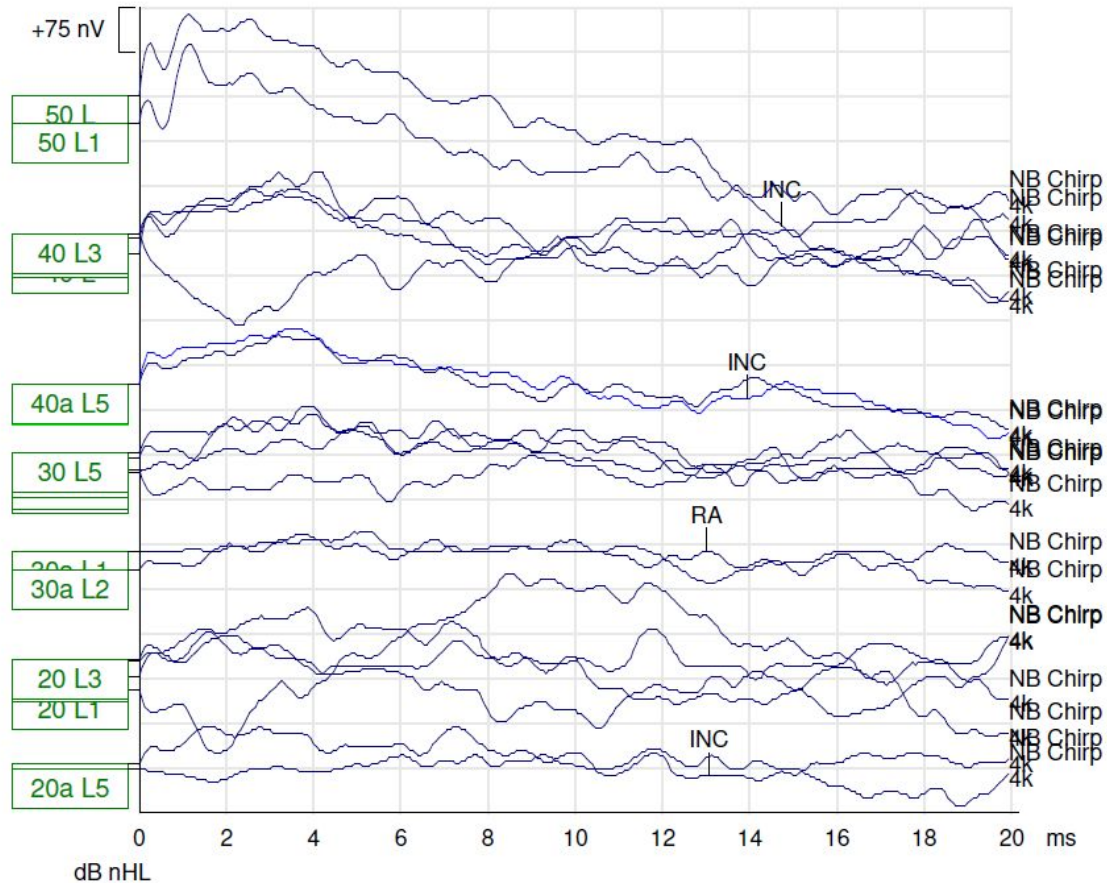
- The only things that need repeating are the stuff around threshold, anything else and you're wasting time
- We all want a response to be there, so you're eyes can deceive you. **If you're not 100% sure its there, go up first to get something you're happy with, you can always come back down**
- If its RA at max stim, remember you only need 2 runs, its only if its CR threshold is at max stim you need 3.





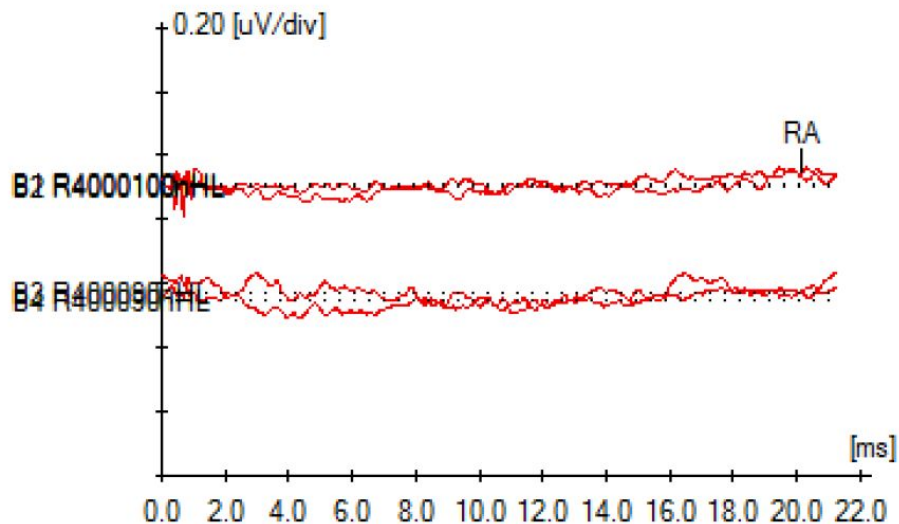
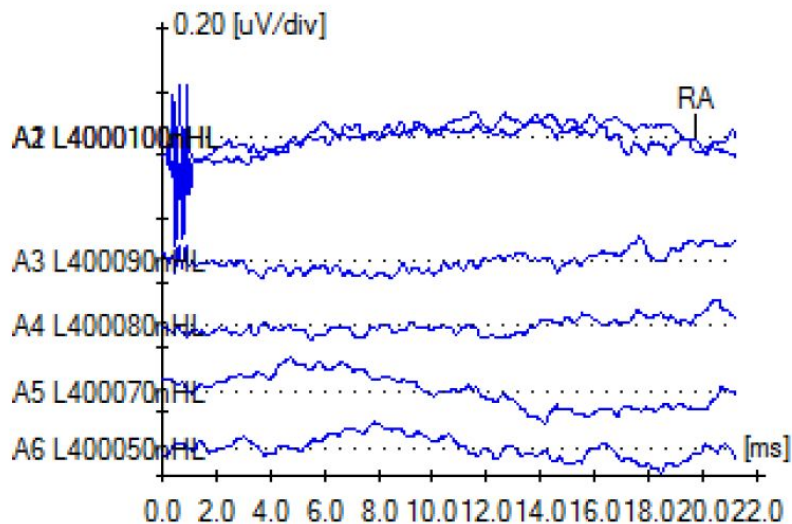
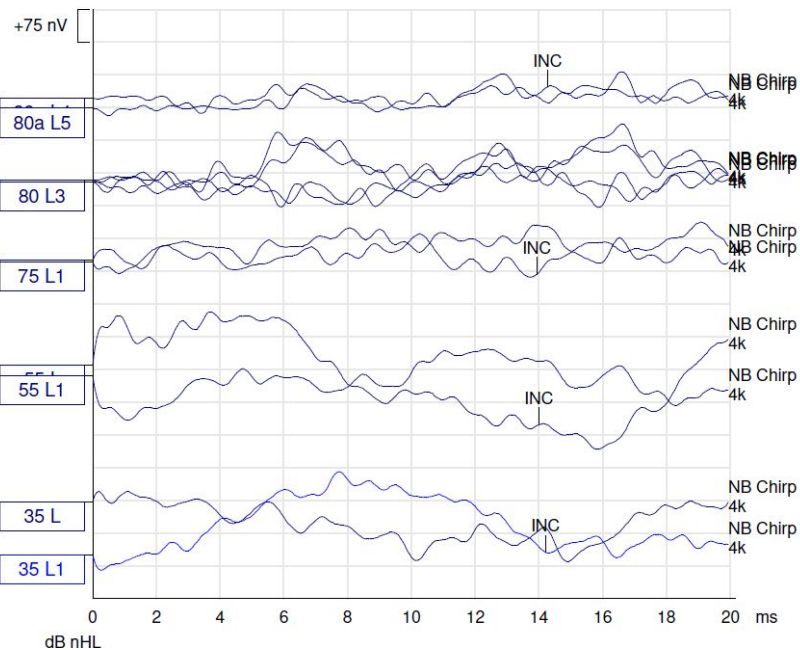
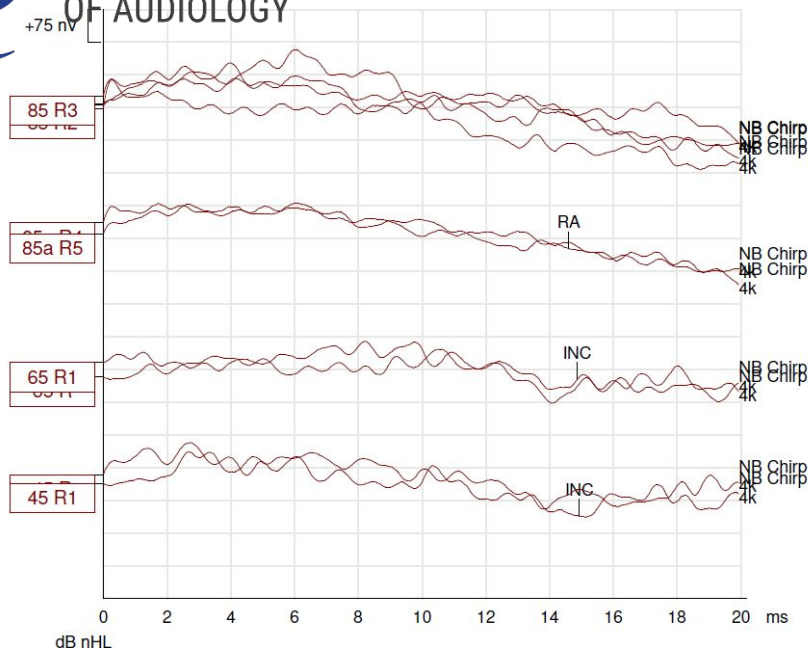
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# Un-necessary replication



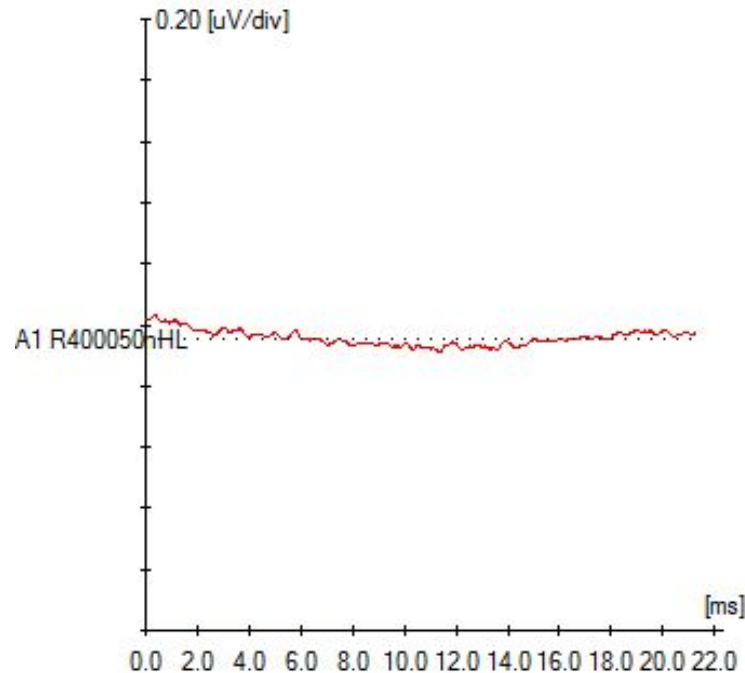


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# Turning up quickly...

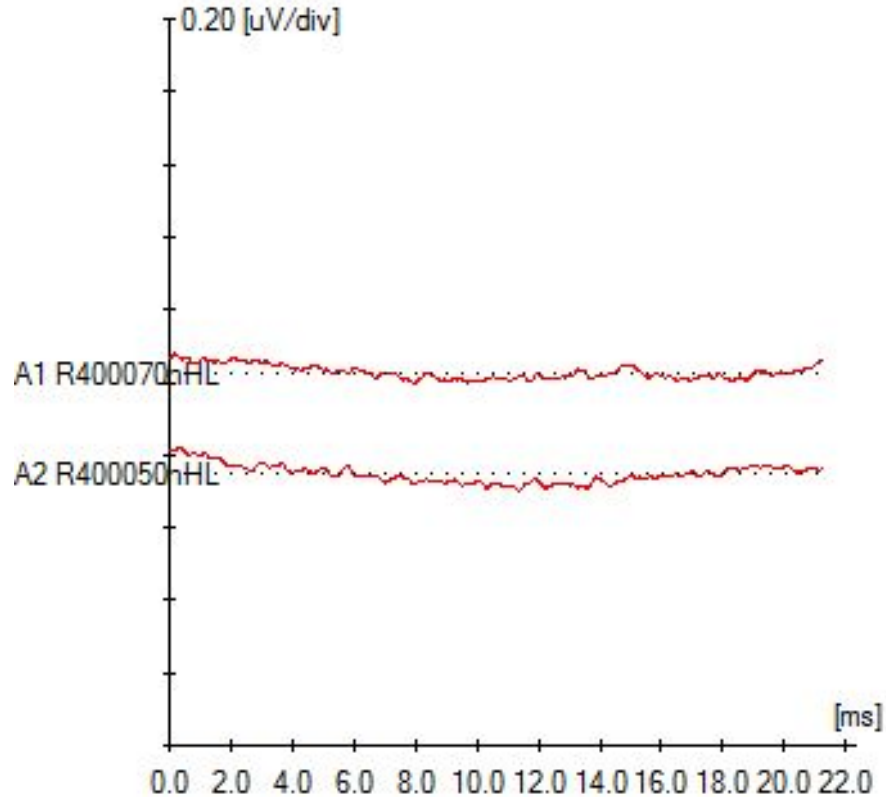
- If you get:



- Don't be afraid to jump it up 20dB



- If you then get:



- Check your wiring – does this fit with the screen / history?



- If it does, start to consider ‘what do I want from this appointment?’
- Think about the parents reaction, you could go all the way up to 105dBnHL 4kHz with headphones, but if it’s a well baby and parents have no concerns, usually they start to cotton on and get very upset, especially if they are holding the headphone! You’ve then got to hold the b/c afterwards
- If the one ear is significantly raised, and the referral is bilateral – don’t start low on the other side, go for it!

# Doing too much

- Don't try to do too much in one session – getting everything in one go is awesome, but happens rarely.
- If your working to 90 min appointments, break it into chunks – e.g. for first appointment which turns into a PCHI, 1 frequency (4kHz) AC + BC both sides with confirmed levels and a long chat to parents is better than 2 frequencies AC + BC with loads of inconclusive with little time to debrief.



# Change mind-set when Peer Reviewing

- Peer review has taught us to be picky, and rightly so!

BUT

- Lets cut some slack! If the person has got  $>85$  at 4kHz AC,  $> 45$  4kHz BC and no microphonic, of course 1kHz would be helpful, but was it needed at the first visit? I would argue the first visit for any PCHI should just be about coming up with a management plan and breaking the news



# Owt's better than nowt?

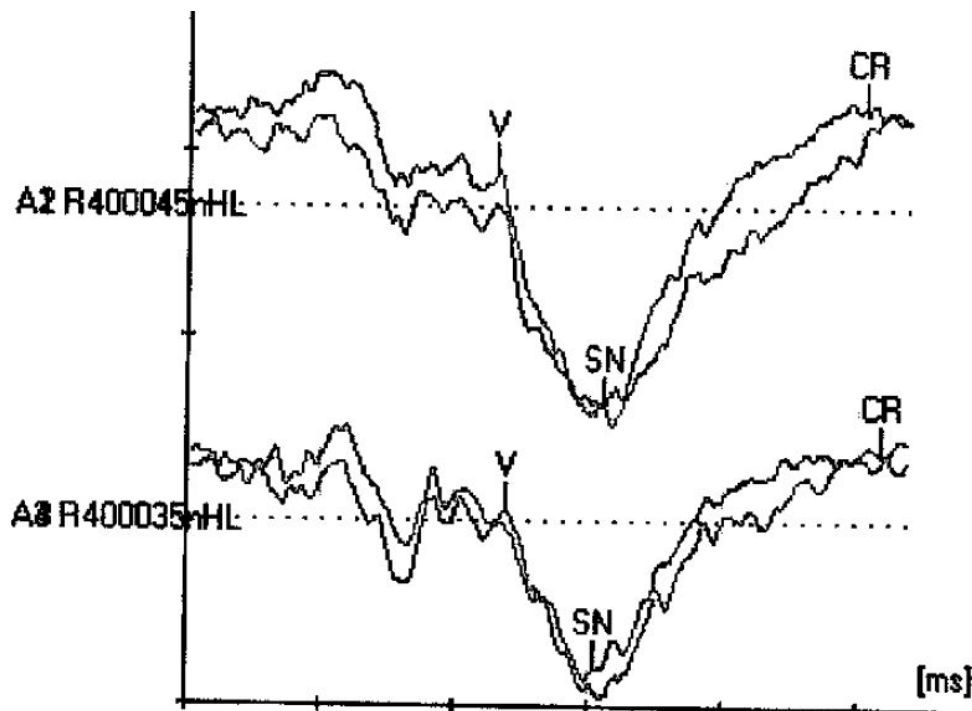
- Despite what any manufacturer will tell you, you won't get good quality ABRs anywhere near threshold on awake babies
- If the baby is really settled, but the baselines awful (and you've done all the sensible stuff) consider if its muscle noise and have a pillow handy!
- Still too noisy? – consider opening the rejection but can be a big price to pay (spec if the threshold is raised)

- Could you use something else to give you your answer? e.g. Well baby and OAE
- A massive pain, but consider bringing the baby back especially if not settled at all rather than slogging it out.
- In situations where you need to get something, open the AR – still too awful? Consider changing the filter sets (high pass / low filter) but again, comes with problems!



# BIG responses

- If you see a huge ABR response, stop it at the minimum number of sweeps (1000 for click and 1500 for tone pip)



Those numbers of sweeps are more for the FSP / FMP calculations than anything else as <1000 can give some odd readings

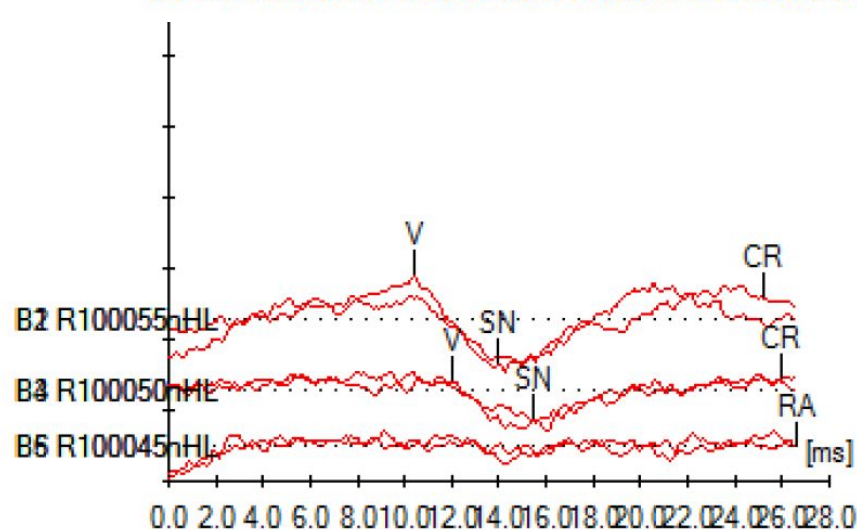
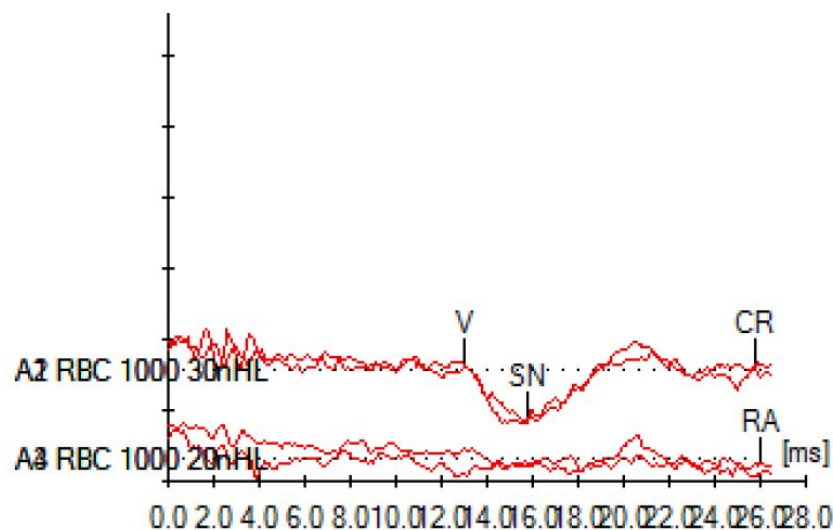
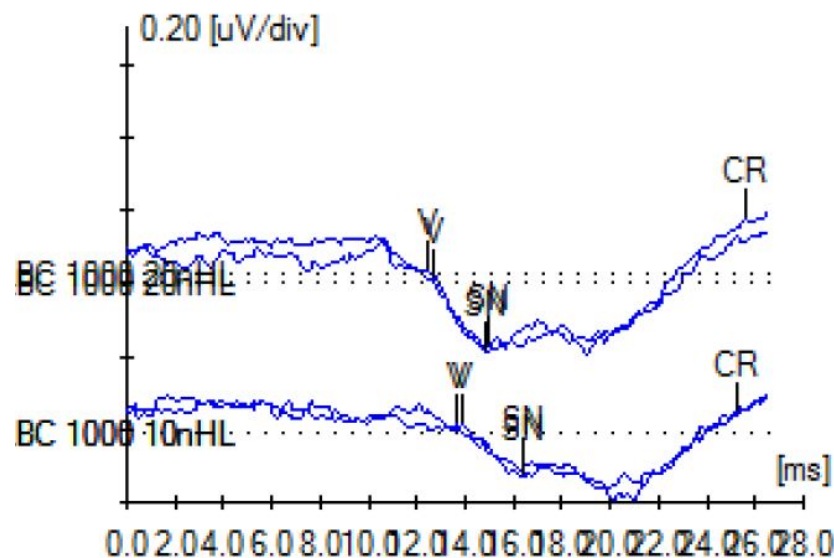
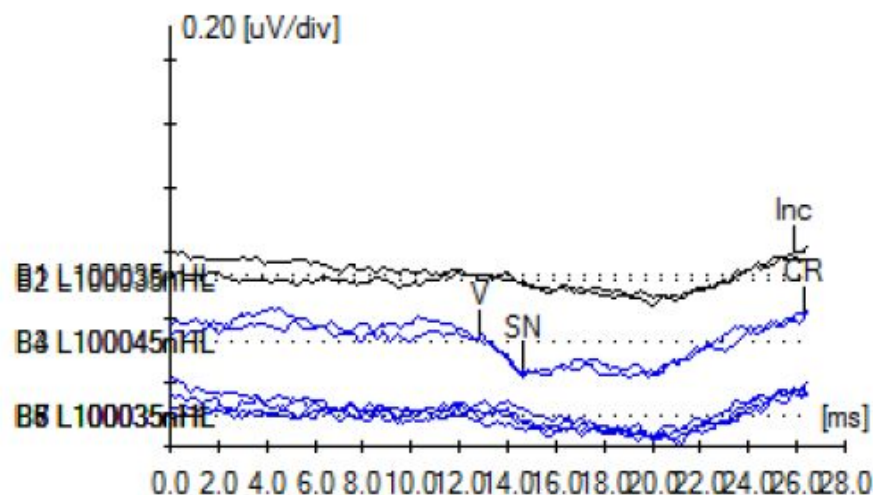


## Masking (Using one to confirm the other)

- Not how to do it or why, BUT do I actually **need** to mask even if the calculator tells me to?
- e.g. If the AC is raised, but below the level of cross-over and the BC is consistent with it, but above the level, IMO you don't need to mask the BC, it can't go anywhere



- 4kHz AC on right = 50eHL, BC > 45
- 4kHz AC on left ≤ 20eHL



# Unilateral's

- For unilateral referrals from screen, try to start with the 'passed ear' but don't get too bothered if you can't!
- Consider taking it down to 20eHL at 4kHz straight off the bat – e.g. 30 and 20eHL rather than 40 and 30
- It might save you time later and isn't going to do any harm

# Resolving Inconclusive

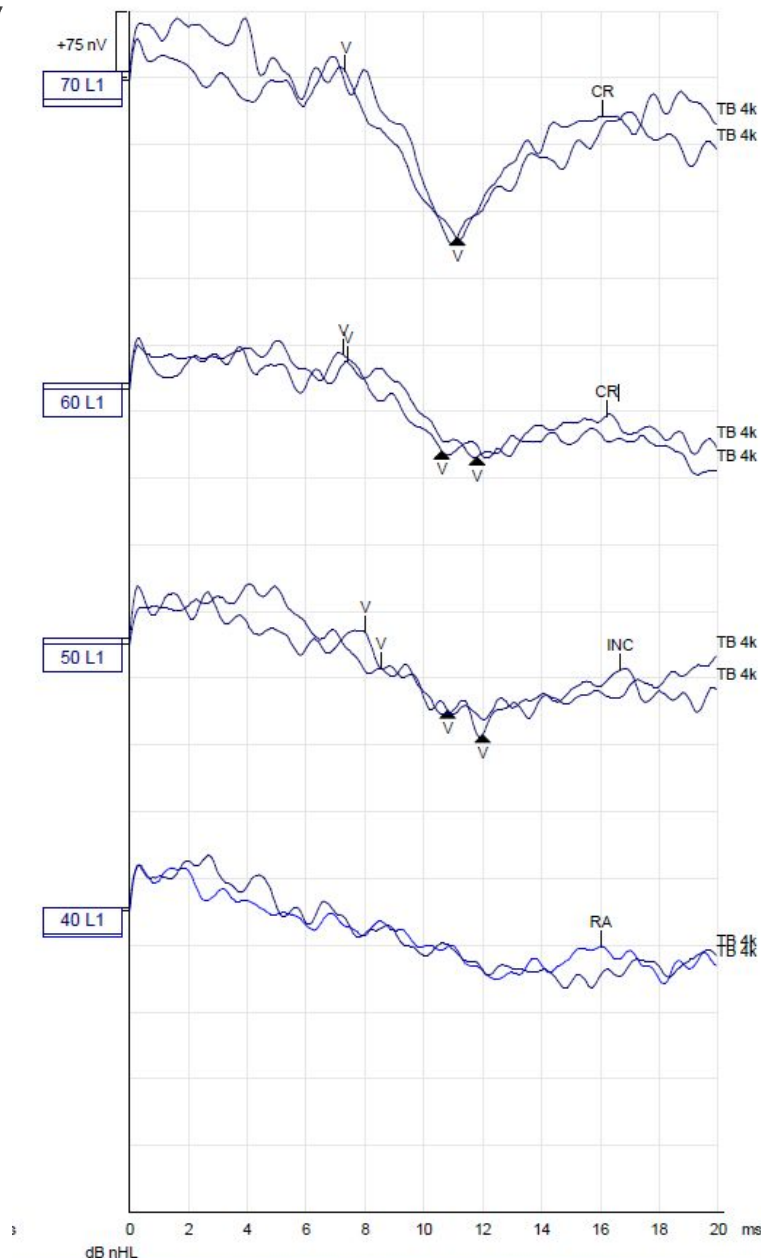


- First think to yourself, what about this response is inconclusive?
- Is there too much noise?
- Do the responses not match at all?
- Is the response just really small?
- If I do more work on it, will I actually resolve it?

Finally : Is this inconclusive going to change my management? Do I even need to do it?



• E.g.



40 is prob inc rather  
than RA - so options  
are:

Do more at 50 and 40?

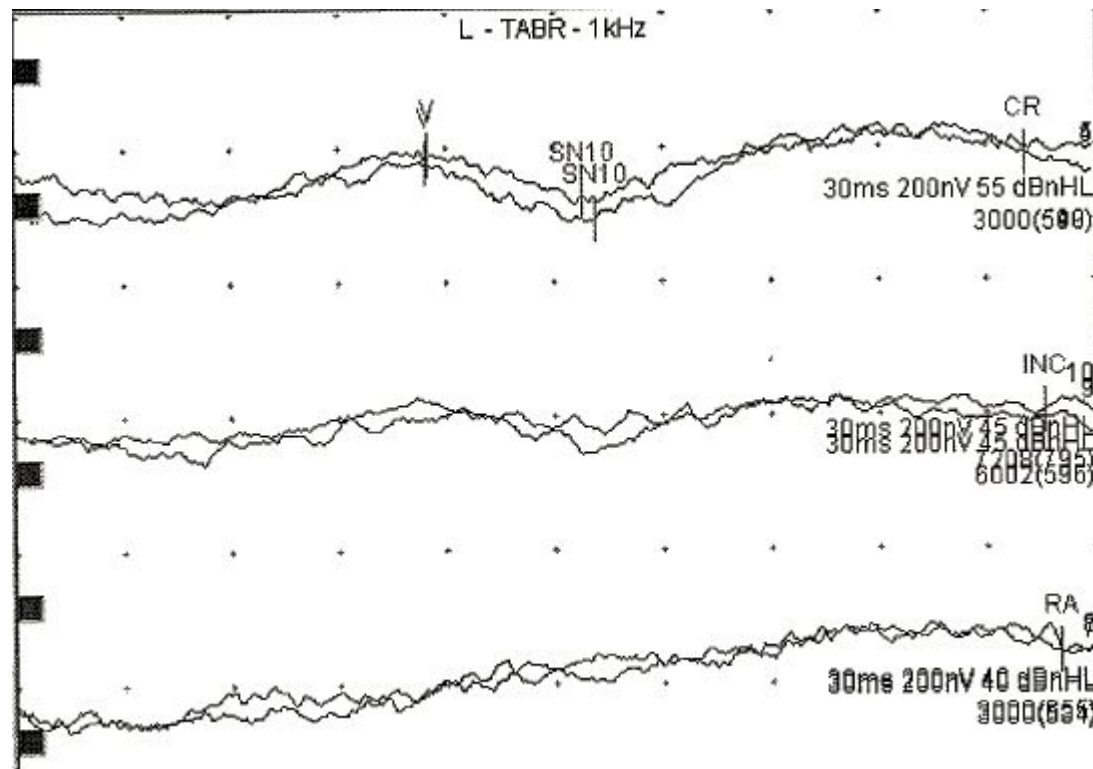
Do a 30 run?

Do a no stim run at 40?

Or

Just switch to BC?





With this case, you're unlikely to be able to resolve the 45 even with 2 more runs

The repeats are very tight, but the response, if there is very small (prob below 0.04) so rather than 2 more runs, if it was really important, could do 50

# When they come back....

- Especially when you bring back, have a flow chart in your mind – I'm going to start here, if I get this, I'm going here, if I don't get this, I'm doing that...
- It doesn't have to be the whole session, just what you're initially starting with



- Once the babies arrived and asleep, its then all about constantly being one step ahead
- Always assume that at the end of the current run / test, the baby is going to wake and you won't get any more testing.

**Don't see this as a bad thing!**

Use it to make sure you've got the absolute maximum results you can have to tell the parents with the minimum of testing

# Some Scenarios...

- You have the full range of Audiology tests available for their age (not just ABR, think outside the box!)
- Come up with a brief plan for testing each scenario
- e.g. start with 1kHz Air conduction, if raised do 4kHz bone conduction
- There are no right or wrong answers, they are just designed to make you think

# Scenario 1

- NHSP Referral - NICU
- Born 28 weeks GA, lots of health issues
- Screened at 36 weeks GA, screener reports baby was 'very snuffly'
- OAE – Response Absent Bilaterally
- AABR – Response Absent Bilaterally
- They are now 4 weeks corrected age and fast asleep

# Scenario 2

- NHSP Referral - NICU
- Born 39 weeks GA, has Pierre Robin Syndrome (also cleft lip / palate)
- Bi-passed screen as got to 12 weeks CA and was still too unwell
- They are now 21 weeks corrected age and only nap for a very short time



# Scenario 3

- NHSP Referral
- Born 38 weeks GA – well baby
- No risk factors
- OAE: Refer Right, Pass Left
- AABR: Refer Right, Pass Left
- They are now 2 weeks corrected age



# Scenario 4

- Cochlear implant assessment referral
- Your centre did not do the initial ABR and has never assessed the child
- Was a NICU baby, born 34 weeks, no major issues, just in NICU due to prematurity
- Investigations have not picked up any cause for the hearing loss, genetic or TORCH screen
- Original ABR shows >80eHL at 1 and 4k AC, >40eHL at 1 and 4kHz BC – CM was absent bilaterally. 1kHz tympanometry was attempted but baby was too wriggly
- Has been unable to condition for behavioural testing
- Now 7 months corrected age – sedation has been arranged
- Clinical question: Is this child's hearing within CI range?

# Scenario 5

- Well baby born 39 weeks
- Strong family history (Paternal Uncle and Sibling from birth)
- Consanguineous parents
- Passed newborn hearing screening (OAE fail x2, AABR pass bilaterally)
- Parents concerned about reactions to sound
- Appears to be highly autistic, untestable behaviourally although consistent turns to Pepper Pig theme-tune at 50dB(a)
- Is now 14 months CA

**Take home messages:**

**OAE is your friend!**

**It can rule out both a  
sensorineural and  
conductive hearing loss**

**Why not start with it?**



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**Treat the baby / child in  
front of you**

**Don't get too wound up  
in 'I must do this'**