**FETAL MEG/MCG, REFERENCES & NOTES**

**Early Articles**


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**NOTE 1**

Fetal MEG or combined fetal MEG/MCG methods have not yet received any remarkable reputation in perinatal medicine and it is obvious about 30 years after the first recorded AEF’s, that these difficult and expensive magnetic recording methods will not become familiar in the department of obstetrics. If the overpriced MEG equipment once could be replaced by a new generation of actively shielded multichannel systems, then perhaps one might expect that fetal MEG/MCG because of its noninvasiveness and its high resolution in time will be integrated in experimental designs of “developmental neuroscience” (see PDF
3) where these methods will allow a frequent recording from every member of an experimental group during a longer period such as the third trimester of pregnancy. In these periods the impact of certain interventions like sessions on haptonomy, bonding analysis or “sound yoga” (see Project BabyQ) can be followed up weekly or monthly and documented with the help of spectrum and latency-analysis of stable MEG components and other advanced methods of signal-analysis.

**NOTE 2**

In fetal MEG-recording, visual and auditory evoked cortical field components are standard, like the family of MMN components. All these components have longer latencies and are affected by the fetal and maternal heart activity. Here we propose searching for stable short latency components with larger amplitudes, eg. neuromuscular components, which are closely related to cochlear hearing. Our question is:

**IS THERE A FETAL MAGNETICAL STAPEDYUS REFLEX?**

Similarly to click-evoked eyeblink reflexes, a click evoked muscular stapedius reflex can be recorded magnetically from neonates. One of its function is to be seen in the dynamical adaption of cochlear hearing to loudness. It is very probable that the stapedius reflex exists prenatally. Because this reflex cannot be seen via ultrasound like the eyeblink reflex, here magnetical recordings seems to be the only method to study the stapedius reflex together with its interdependence with AEF’s at different tone-intensities and – frequencies. Further from asimple technical point of view, the fetal stapedius field with its short latency, sharp peak and distinct polarity inversion can serve as a suitable marker for the fetal ear canal.

In the attached PDF 5 (paper 1993) one can see in figure 7 on page 126 one of our recordings with the former 7-channel BTI system, which shows the stapedius signal of a 3-days-old neonate: here channel 1 had been positioned just above the right ear canal and one can identify a beautiful click evoked signal with its sharp peak at a latency of 24 msec and the polarity inversion in channels 2 and 5. The source of this signal is localized in the depth of the middle ear muscles and it may be the stapes alone or the ensemble of all three muscles in the middle ear. For these neonatal recordings we needed less than 50 sweeps for averaging in a 100 msec window with a bandwith of 1 – 150 Hz and a notch filter at 50 Hz.

Fetal magnetic studies of the stapedius reflex should be carried out by scientists with some experience in auditory stimulation. Critical is the stimulus intensity and for clicks or tone-burst one should try stimulus intensities between 80 and 90 db. The fetus in the third trimester is familiar with higher sound intensities from external noise, but we always recommend 10 minutes of “adaption to loudness” before every stapedius trial: play some lullaby or soothing vedic sounds while you increase slowly the volume up to 80 db.