XXV INTERNATIONAL EVOKED RESPONSE AUDIOMETRY STUDY GROUP BIENNIAL SYMPOSIUM, 21–25 MAY 2017, WARSAW

Hallowell Davis Lecture – John D. Durrant

Moderator: Suzanne Purdy

Unpublished Works and the Importance of Continuing to Turn Stones in Our Science

John D. Durrant

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In the perfect scientific world and following rigorously the scientific method, no research study would go unpublished. Yet, researchers prove that they too are human, extenuating circumstances arise, and publication is naturally not the only means to achieve (at some level) the same objective--that of exchange of ideas and information. The IERASG Biennial Symposia have provided a rich and inviting forum for such exchange in a rarefied, yet highly important area of hearing science and health care for over half a century, remaining true to its founder's intent. A variety of the presenter's findings, particularly those "aired out" at the Biennial Symposia over a period of four decades are cataloged, reflecting as well some of the shifting interests of the times. Some studies noted perhaps left a stone or few "unturned". Yet, the overall contention is that research begins by turning stone(s) at the curiosity of the researcher which would be fettered were one's motivation to be uniquely a 100% conversion rate to publication and/or other motives. The biennial "forum" provides healthy interactive opportunities by which the researcher may ultimately bring a given work to true maturity or simply weigh the merits of further pursuit, as well as potentially opening the door to collaboration(s). The unpublished works to be covered are exemplary of those begging further consideration. They are presented with the hope that others might derive motivation to take on bringing some to fruition. In any event, more than a summary of the presenter's contributions over the years, this presentation is a tribute to the collegial environment of the Biennial Symposia and the spirit of Hallowell Davis' visionary formation of the evoked response "club", which strongly motivated this presenter's efforts to faithfully participate.

Keynote Lecture I – John J. Rosowski

Moderator: M. Patrick Feeney

Wideband Acoustic Immittance and Sound Power Absorbance as a Measure of the Acoustic Reflex

John J. Rosowski

Eaton-Peabody Laboratory, Massachusetts Eye and Ear Infirmary, Boston, MA USA

Objectives: The history and physics of Wideband Acoustic Immittance and Sound Power Absorbance will be reviewed from the 1930s till present day.

Material and methods: The discussion will include the development of tympanometry and arguments for expanding the frequency range of immittance measurements to improve its sensitivity to changes introduced by varied disease states.

Results: The use of multiple frequencies makes wide-band immittance and power absorbance a sensitive measure of the acoustic reflex.

Conclusions: Sound-induced changes in acoustic immittance and power absorbance can be used as measures of the acoustic reflex.

Keynote Lecture II – Frank E. Musiek

Moderator: David McPherson

The Middle Latency Response (MLR) and Disorders of the Central Nervous System

Frank E. Musiek

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The development and application of the (auditory) Middle Latency Response (MLR) has had a long and somewhat challenging journey. Although its research and clinical use has waned in recent history, the evoked potential community may wish to revisit the potential of the MLR. One area of promise, often overlooked, is the MLR's utility as a measure of central auditory nervous system (CANS) integrity. Our experimental and clinical experience with the MLR, corroborated by published reports from other labs, confirms the MLRs sensitivity to compromise of the CANS. In this review of our work as well as others, the insights gained from the MLR for various disorders of the CANS will be highlighted. MLR results for brainstem and cortical

Monday, May 22nd

ABR I

Moderators: Guy Lightfoot, Martin Walger

The threshold ABR high-pass filter re-visited: An old chestnut served up in a new way

Guy Lightfoot

ERA Training and Consultancy Ltd.

Objectives: To measure the ABR SNR when 30, 50 and 100 Hz filters are used in quiet and restless patient conditions after 60s of averaging regardless of whether some of that time was wasted rejecting epochs- a real-life scenario that differentially penalises 30 Hz.

Material and methods: Using an artifact rejection level of ±10 μV and noise-weighted averaging, the raw data from 12 sleeping and 12 restless babies was re-averaged with the 3 high-pass filters and the SNR was measured.

Results: Response amplitude, residual noise and SNR declined with increasing filter frequency for both groups but whilst 30–100 Hz filter SNR difference was significant for the sleeping group (p=.004) it was not significant for the restless group (p=.2).

Conclusions: The high-pass filter of choice for threshold ABR testing is 30 Hz. The use of 100 Hz is disadvantageous in relaxed babies. There is no gain in raising the filter to 100 Hz, in restless patients.

Comprehensive recording of auditory evoked potentials by projecting over a base of functions

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Objectives: To develop a stimulus and a processing algorithm that allows the recording of all auditory evoked potentials from the cochlea to the auditory cortex, thus obtaining a single signal consisting of the ABR, MLR and CAEP components.

Material and methods: Stimulus consisted of 400 bursts of 7 clicks (ISI [10–40] ms) presented at an average rate of 1 Hz. Analysis consisted of averaging a time window of 500 ms, and projecting over a base of functions uniformly distributed in the logarithmic time scale.

Results: The signals resulting from projecting over the base of functions show replicable auditory evoked potentials with latencies compatible with ABR, MLR and CAEP components in all subjects and recording conditions.

Conclusions: Projecting over the defined base of vectors is a reliable method for latency-dependent filtering, which, together with the proposed stimulation paradigm, allows the simultaneous recording and visualization of ABR, MLR and CAEP components.

A group sequential test strategy for objective auditory brainstem response detection methods

Michael A. Chesnaye, Steven L. Bell, James M. Harte, David M. Simpson

Institute of Sound and Vibration Research, University of Southampton, United Kingdom
Interacoustics Research Unit, c/o Technical University of Denmark, Lyngby, Denmark

Objectives: A novel statistical approach for rapidly detecting auditory brainstem responses using a sequence of tests is proposed. Its performance is evaluated in terms of specificity, sensitivity and test time and is compared to a conventional single shot test.

Material and methods: Performance was evaluated using multiple simulations, along with real EEG background activity (recorded from 20 individuals) and ABR threshold data (recorded from 12 adults, using clicks presented at 33.3 Hz at various dB SL).

Results: No significant ($p<0.05$) deviations from the expected false positive rates (FPRs) were observed, which suggests that specificity was controlled as intended. Results furthermore show a trade-off between detection time and sensitivity.

Conclusions: The proposed method allows the repeated application of an objective ABR detection method, whilst maintaining the expected FPR. The method provides relatively large reductions in detection time (~40%), with potentially no loss in statistical power.

Comparative study of noise in auditory brainstem evoked potentials recorded asleep and in active state

Oleg Belov, Alla Yasinskaya, George Tavartkiladze

National Research Centre for Audiology and Hearing Rehabilitation, Moscow, Russia

Objectives: We studied the noise in the data stream while the ABR registration in adults during the relaxation both in supine and seated positions and in active state in seated position, where the person was having a conversation and was gesticulating.

Material and methods: The data were recorded using Tucker-Davis "System 3" station. A data from accelerometers,