



Clinical practice highlights from CLINPH

Clinical practice highlights in *Clinical Neurophysiology* in 2015 (January–March)



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A focus of *Clinical Neurophysiology* is on fundamental research findings that shed light on disease mechanisms in human subjects, but some papers examine clinical practices or have implications for practice, rather than insights into pathophysiology. Here we mention selected papers published in *Clinical Neurophysiology* in the January–March issues last year, grouping them by broad topic, with Editorial comments on why this study has clinical practice implications and with links to the original papers in the reference list.

The selection is admittedly personal, and I apologise to those authors whose works may have practice relevance but whose abstracts are not included. The Editors would welcome feedback from readers on the value of this compilation, and particularly feedback about papers that should have been included. The present compilation covers the first 3 issues of 2015, and during the year we will cover the remaining issues, 3 at a time.

David Burke

Cerebral function

1. Comparing the effect of hypercapnia and hypoxia on the electroencephalogram during wakefulness

Editorial comments on clinical importance. Neurocognitive impairment in awake but drowsy patients with sleep-disordered breathing is commonly attributed to hypoxia. This study demonstrates in healthy volunteers subjected to controlled hypoxia or hypercapnia that hypercapnia is the critical factor in EEG slowing, a finding with management implications.

Wang D, Yee BJ, Wong KK, Kim JW, Dijk D-J, Duffin J, et al. Comparing the effect of hypercapnia and hypoxia on the electroencephalogram during wakefulness. *Clin Neurophysiol* 2015; 126: 103–109; doi: <http://dx.doi.org/10.1016/j.clinph.2014.04.012>.

2. Comparison of high gamma electrocorticography and fMRI with electrocortical stimulation for localization of somatosensory and language cortex

Editorial comments on clinical importance. In patients with medically intractable epilepsy undergoing surgical implantation of subdural grid electrodes, functional localisation of somatosensory cortex and language areas using fMRI and/or high gamma ECoG was compared to that using focal cortical stimulation

through the grid electrodes. Cortical stimulation localised somatosensory-related and language-related sites in only 75% and 58% of the patients, respectively, while hgECoG and fMRI localised somatosensory-related sites in 94% and 100% and language-related sites in 83% and 87%. It was concluded that “hgECoG and fMRI are reliable tools to support pre-surgical mapping of cortical functions such as language or somatosensory aspects.”

Genetti M, Tyrand R, Grouiller F, Lascano AM, Vulliemoz S, Spinelli L, et al. Comparison of high gamma electrocorticography and fMRI with electrocortical stimulation for localization of somatosensory and language cortex. *Clin Neurophysiol* 2015; 126: 121–130; doi: <http://dx.doi.org/10.1016/j.clinph.2014.04.007>.

3. Prognostic value of intracranial seizure onset patterns for surgical outcome of the treatment of epilepsy

Editorial comments on clinical importance. The onset patterns of overt and subclinical seizure discharges recorded using subdural grid and depth electrodes were correlated with clinical outcome following surgery. Focal fast activity was associated with a good outcome, but a diffuse electrodecremental response was not. Preceding epileptiform activity, whether focal, widespread or bilateral, was not correlated with outcome.

Jiménez-Jiménez D, Nekkare R, Flores L, Chatzidimou K, Bodi I, Honavar M, et al. Prognostic value of intracranial seizure onset patterns for surgical outcome of the treatment of epilepsy. *Clin Neurophysiol* 2015; 126: 257–267; doi: <http://dx.doi.org/10.1016/j.clinph.2014.06.005>.

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<http://dx.doi.org/10.1016/j.cnp.2016.03.001>

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4. The probability of seizures during EEG monitoring in critically ill adults

Editorial comments on clinical importance. In acutely ill patients (due to, e.g., altered mental state, subarachnoid or intracerebral haemorrhage, traumatic brain injury, stroke, etc.), continuous EEG monitoring for at least 18 h was used to identify the risk of seizures occurring during the next 3 days. In patients with epileptiform abnormalities the risk of seizures decayed to <5% over 16 h, and in patients with no epileptiform abnormalities the risk of seizures decayed to <5% over 2 h. If there are no epileptiform abnormalities few patients suffered a seizure within 3 days. These findings have implications for whether and how long continuous EEG monitoring should be undertaken.

Westover MB, Shafi MM, Bianchi MT, Moura LMVR, O'Rourke D, Rosenthal ES, et al. The probability of seizures during EEG monitoring in critically ill adults. *Clin Neurophysiol* 2015; 126: 463–471; doi: <http://dx.doi.org/10.1016/j.clinph.2014.05.037>.

5. Electroencephalographic features of moyamoya in adults

Editorial comments on clinical importance. Transient neurological events occur frequently in patients with Moyamoya Disease, a progressive, occlusive disease of the cerebral vasculature. In this study, epileptiform activity was identified in 24% patients and overt seizures in 12%, underlying the value of EEG in assessing episodes that may or may not reflect a fresh vascular episode.

Frechette ES, Bell-Stephens TE, Steinberg GK, Fisher RS. Electroencephalographic features of moyamoya in adults. *Clin Neurophysiol* 2015; 126: 481–485; doi: <http://dx.doi.org/10.1016/j.clinph.2014.06.033>.

6. Quantitative EEG markers relate to Alzheimer's disease severity in the Prospective Dementia Registry Austria (PRODEM)

Editorial comments on clinical importance. In a large cohort of patients with possible and probable Alzheimer's disease, the severity of the deficit as assessed using the MMSE was correlated with selected quantitative EEG abnormalities. The MMSE could explain 51% of the variations in relative theta power in the EEG of "probable" cases. This may not yet be sufficient to be a conclusive diagnostic test, but the described changes will undoubtedly be useful in uncertain cases.

Garn H, Waser M, Deistler M, Benke T, Dal-Bianco P, Ransmayr G, et al. Quantitative EEG markers relate to Alzheimer's disease severity in the Prospective Dementia Registry Austria (PRODEM). *Clin Neurophysiol* 2015; 126: 505–513; doi: <http://dx.doi.org/10.1016/j.clinph.2014.07.005>.

7. The utility of quantitative electroencephalography and Integrated Visual and Auditory Continuous Performance Test as auxiliary tools for the Attention Deficit Hyperactivity Disorder diagnosis

Editorial comments on clinical importance. Increased theta power or increased theta/beta ratio has been used to complement structured interviews in the diagnosis of ADHD. A further approach has been tests of cognitive performance. This paper reports on the enhanced value of combining the results of visual and auditory performance testing (requiring attention to visual and auditory stimuli at the same time) with those of QEEG to assist accurate diagnosis of ADHD.

Kim JW, Lee YS, Han DH, Min kJ, Kim DH, Lee CW. The utility of quantitative electroencephalography and Integrated Visual and Auditory Continuous Performance Test as auxiliary tools for the Attention Deficit Hyperactivity Disorder diagnosis. *Clin Neuro-*

physiol 2015; 126: 532–540; doi: <http://dx.doi.org/10.1016/j.clinph.2014.06.034>.

8. Significance of multiple neurophysiological measures in patients with chronic disorders of consciousness

Editorial comments on clinical importance. Combining multimodal EPs and sleep EEG proved the most valuable measures in determining the depth of the impaired consciousness and residual function in patients with severe brain injury. The tested EPs included brainstem auditory evoked potentials, somatosensory evoked potentials from the upper limbs, flash visual evoked potentials, slow vertex potentials and auditory ERPs. EEG power was not correlated with severity but was correlated with aetiology (anoxic, traumatic or vascular).

Rossi Sebastiano D, Panzica F, Visani E, Rotondi F, Scaioli V, Leonardi M, et al. Significance of multiple neurophysiological measures in patients with chronic disorders of consciousness. *Clin Neurophysiol* 2015; 126: 558–564; doi: <http://dx.doi.org/10.1016/j.clinph.2014.07.004>.

Lower motor neurone, peripheral nerve and muscle

9. Stimulated skin wrinkling as an indicator of limb sympathetic function

Editorial comments on clinical importance. When a limb is immersed in water, the skin wrinkles due to the activation of sympathetic drives. This results in digital vasoconstriction and the wrinkling represents a simple measure of sympathetic function. This Review summarises the evidence for this manoeuvre as a test for autonomic neuropathy.

Wilder-Smith EPV. Stimulated skin wrinkling as an indicator of limb sympathetic function. *Clin Neurophysiol* 2015; 126: 10–16; doi: <http://dx.doi.org/10.1016/j.clinph.2014.08.007>.

10. Optimizing electrical impedance myography measurements by using a multifrequency ratio: A study in Duchenne muscular dystrophy

Editorial comments on clinical importance. This paper reports on measures to improve the diagnostic value of electrical impedance myography in neuromuscular conditions when subcutaneous fat can complicate the recording (even though fat has much higher resistivity to the passage of current). In this technique "high-frequency, very low-intensity electrical current is passed through a localized area of muscle and the consequent surface voltages analyzed". In patients with Duchenne dystrophy, the authors found that studies based on the phase ratio of two frequencies, 50 kHz and 200 kHz, effectively eliminated the influence of subcutaneous fat.

Schwartz S, Geisbush TR, Mijailovic A, Pasternak A, Darras BT, Rutkove SB. Optimizing electrical impedance myography measurements by using a multifrequency ratio: A study in Duchenne muscular dystrophy. *Clin Neurophysiol* 2015; 126: 202–208; doi: <http://dx.doi.org/10.1016/j.clinph.2014.05.007>.

11. A comparison of ultrasonographic and electrophysiologic 'inching' in ulnar neuropathy at the elbow

Editorial comments on clinical importance. The value of ultrasound in peripheral nerve disorders is now well established, complementing but not replacing nerve conduction studies. In this paper, ultrasound measurements and nerve conduction were assessed at 2.5 cm intervals above and below the elbow. An important outcome is that the site of ultrasound abnormality need not

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