



# Journal of Neurotherapy: Investigations in Neuromodulation, Neurofeedback and Applied Neuroscience

## News from Other Journals and Websites

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## NEWS FROM OTHER JOURNALS AND WEBSITES

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Martijn Arns, MSc, Senior Editor

In the following section, interesting new articles recently published are summarized. The articles are mainly from the broad area of Applied Neurosciences with a focus on neurofeedback, brain computer interface, quantitative EEG, and repetitive transcranial magnetic stimulation. These are the articles, which could be found between March 10, 2010, and September 6, 2010.

Miller, G. (2010). Is pharma running out of brainy ideas? *Science*, 329(5991), 502.

Article discussing the impact of GSK and AstraZeneca announcing they are ceasing drug discovery to CNS drugs such as depression, schizophrenia, and anxiety.

Gevensleben, H., Holl, B., Albrecht, B., Schlamp, D., Kratz, O., Studer, P., et al. (2010). Neurofeedback training in children with ADHD: 6-month follow-up of a randomized controlled trial. *European Child & Adolescent Psychiatry*, 19, 715–724.

The 6-month follow-up of the Gevensleben multicenter RCT demonstrating that the effects of neurofeedback were maintained at 6-month follow-up.

Debattista, C., Kinrys, G., Hoffman, D., Goldstein, C., Zajecka, J., Kocsis, J., et al. (2010). The use of referenced-EEG (rEEG) in assisting medication selection for the treatment of depression. *Journal*

*of Psychiatric Research*. Advance online publication. doi:10.1016/j.jpsychires.2010.05.009

The first prospective randomized controlled trial investigating the use of referenced EEG (rEEG) in selecting the appropriate medication in depression. This study demonstrates promise of the use of rEEG in selecting the appropriate medication in depression on primary endpoints and most secondary endpoints, except for remission.

Nelson, D. V., Bennett, R. M., Barkhuizen, A., Sexton, G. J., Jones, K. D., Esty, M. L., et al. (2010). Neurotherapy of fibromyalgia? *Pain Medicine (Malden, Mass.)*, 11, 912–919.

A randomized controlled trial investigating the effects of LENS in fibromyalgia demonstrating that both the sham group and the LENS group improved and no specific effects were found on primary and secondary outcome measures for LENS treatment. The authors concluded that LENS cannot be relied on as a single modality treatment for fibromyalgia.

Kayıran, S., Dursun, E., Dursun, N., Ermutlu, N., & Karamürsel, S. (2010). Neurofeedback intervention in fibromyalgia syndrome: A randomized, controlled, rater blind clinical trial. *Applied Psychophysiology and Biofeedback*. Advance online publication. doi:10.1007/s10484-010-9135-9

Randomized study comparing neurofeedback to escitalopram in the treatment of fibromyalgia. Both treatments were associated with clinical improvements, however neurofeedback was found to demonstrate greater statistically significant benefits.

Lansbergen, M., Arns, M., van Dongen-Boomsma, M., Spronk, D., & Buitelaar, J. K. (2010). The increase in theta/beta ratio on resting state EEG in boys with attention-deficit/hyperactivity disorder is mediated by slow alpha peak frequency. *Progress in Neuro-Psychopharmacology & Biological Psychiatry*. Advance online publication. doi:10.1016/j.pnpbp.2010.08.004

A study demonstrating that a deviating Theta/Beta ratio in ADHD is only found using fixed frequency bands. When frequency bands are adjusted for individual alpha peak frequency there is no significant difference in Theta/Beta ratio anymore, suggesting that this measure actually combines at least two functionally different subtypes of ADHD, namely, the frontal theta type and slowed alpha peak frequency type.

Logemann, H. N., Lansbergen, M. M., Os, T. W., Böcker, K. B., & Kenemans, J. L. (2010). The effectiveness of EEG-feedback on attention, impulsivity and EEG; a sham feedback controlled study. *Neuroscience Letters*. Advance online publication. doi:10.1016/j.neulet.2010.05.026

A pilot study investigating a sham-controlled double blind method in healthy volunteers. They found no effects and no trend between placebo and neurofeedback after 15 sessions. The two major drawbacks of this study are the use of "auto-thresholding" for neurofeedback and the use of QEEG based protocol selection based on the inspection of only one rater.

Owen, A. M., Hampshire, A., Grahn, J. A., Stenton, R., Dajani, S., Burns, A. S., et al. (2010). Putting brain training to the test. *Nature*. Advance online publication. doi:10.1038/nature09042

Study carried out by the BBC investigating if brain training also has a transfer effect in 11,430 participants. Only improvements were found on the test, which was used to train on, but no transfer effects were found to other tests measuring the same cognitive domain.

Khodayari-Rostamabad, A., Hasey, G. M., MacCrimmon, D. J., Reilly, J. P., & Bruin, H. (2010). A pilot study to determine whether machine learning methodologies using pre-treatment electroencephalography can predict the symptomatic response to clozapine therapy. *Clinical Neurophysiology*. Advance online publication. doi:10.1016/j.clinph.2010.05.009

Study investigating the use of pretreatment EEG to predict treatment outcome to Clozapine.

Gruzelier, J., Inoue, A., Smart, R., Steed, A., & Steffert, T. (2010). Acting performance and flow state enhanced with sensory-motor rhythm neurofeedback comparing ecologically valid immersive VR and training screen scenarios. *Neuroscience Letters*. Advance online publication. doi:10.1016/j.neulet.2010.06.019

Neurofeedback with feedback provided in a virtual reality environment for improving acting performance.

Mueller, A., Candrian, G., Kropotov, J. D., Ponomarev, V. A., & Baschera, G. M. (2010). Classification of ADHD patients on the basis of independent ERP components using a machine learning system. *Nonlinear Biomed Phys*, 4 *Suppl 1*, S1.

Study investigating independent components analysis in a Go/NoGo ERP paradigm in adults with ADHD and healthy controls.

Tereshchenko, E. P., Ponomarev, V. A., Müller, A., & Kropotov, Y. D. (2010). Normative EEG spectral characteristics in healthy subjects aged 7 to 89 years. *Human Physiology*, 36(1), 1–12.

Report of normative EEG parameters across age (7–89 years of age) for eyes open and eyes closed EEG, also reporting on independent components.

Dupuy, F. E., Clarke, A. R., Barry, R. J., McCarthy, R., & Selikowitz, M. (2010). EEG coherence in children with attention-deficit/hyperactivity disorder: Differences between good and poor responders to methylphenidate. *Psychiatry Research*. Advance online publication. doi:10.1016/j.psychres.2009.12.002

Retrospective study in ADHD which found that good methylphenidate responders had higher intrahemispheric coherences over short, medium, and long interelectrode distances in the theta band.

Barry, R. J., Clarke, A. R., Hajos, M., McCarthy, R., Selikowitz, M., & Dupuy, F. E. (2010). Resting-State EEG gamma activity in children with attention-deficit/hyperactivity disorder. *Clinical Neurophysiology*. Advance online publication. doi:10.1016/j.clinph.2010.04.022

This study demonstrated that in addition to increased delta and theta and decreased beta, both absolute and relative gamma are decreased in ADHD.

Sander, C., Arns, M., Olbrich, S., & Hegerl, U. (2010). EEG-Vigilance and response to stimulants in paediatric patients with attention deficit/hyperactivity disorder. *Clinical Neurophysiology*, *121*, 1511–1518.

Study demonstrating that children with ADHD demonstrate lower EEG Vigilance and more unstable EEG Vigilance regulation. Lower EEG Vigilance regulation was numerically associated with worst CPT performance and best response to stimulant medication, though not significantly.

vanLuijelaar, G., Verbraak, M., van den Bunt, M., Keijsers, G., & Arns, M. (2010). EEG findings in burnout patients. *The Journal of Neuropsychiatry and Clinical Neurosciences*, *22*, 208–217.

This study investigated the EEG of patients' diagnoses with Burnout syndrome and found that these patients did not deviate on frontal alpha asymmetry suggesting this disorder is different from depression. However, burnout patients demonstrated a P3A and P3B suggesting that they had an inability to automate information processing possibly also explaining part of the symptomatology such as mental fatigue.

George, M. S., & Aston-Jones, G. (2010). Noninvasive techniques for probing neurocircuitry and treating illness: Vagus nerve stimulation (VNS), transcranial magnetic stimulation (TMS) and transcranial direct current stimulation (tDCS). *Neuropsychopharmacology*, *35*, 301–316.

Interesting review on VNS, rTMS, and tDCS.

Valdés-Hernández, P. A., Ojeda-González, A., Martínez-Montes, E., Lage-Castellanos, A., Virués-Alba, T., Valdés-Urrutia, L., et al. (2010). White matter architecture rather than cortical surface area correlates with the EEG alpha rhythm. *Neuroimage*, *49*, 2328–2339.

This study tried to replicate the original findings of Nunez (1978) of a negative correlation between head size and the spectral position of the alpha peak, which was not replicated in this study. They found other relations and concluded that white matter architecture rather than neocortical area determines the dynamics of the alpha rhythm.

Lui, M., & Rosenfeld, J. P. (2009). The application of subliminal priming in lie detection: Scenario for identification of members of a terrorist ring. *Psychophysiology*, *46*, 889–903.

ERP-based lie detection method.

Hinds, O., Ghosh, S., Thompson, T. W., Yoo, J. J., Whitfield-Gabrieli, S., Triantafyllou, C., et al. (2010). Computing moment-to-moment BOLD activation for real-time neurofeedback. *Neuroimage*.

- Advance online publication. doi:10.1016/j.neuroimage.2010.07.060
- Methodological paper on real-time fMRI.
- Arani, F. D., Rostami, R., & Nostratabadi, M. (2010). Effectiveness of neurofeedback training as a treatment for opioid-dependent patients. *Clinical EEG and Neuroscience*, *41*, 170–177.
- Study investigating the effects of add-on neurofeedback in opioid dependent patients, demonstrating added efficacy of neurofeedback, with concomitant changes in the post-treatment QEEG.
- Sokhadze, E., Baruth, J., Tasman, A., Mansoor, M., Ramaswamy, R., Sears, L., et al. (2010). Low-frequency repetitive transcranial magnetic stimulation (rTMS) affects event-related potential measures of novelty processing in autism. *Applied Psychophysiology and Biofeedback*, *35*(2), 147–161.
- Low-frequency rTMS in autism and the effects on ERPs.
- Vansteensel, M. J., Hermes, D., Aarnoutse, E. J., Bleichner, M. G., Schalk, G., van Rijen, P. C., et al. (2010). Brain-computer interfacing based on cognitive control. *Annals of Neurology*, *67*, 809–816.
- This study employed a BCI approach based on the cognitive control network as opposed to often employed approaches using the sensori-motor network. In this study three patients with intractable epilepsy were implanted with subdural grid electrodes over the left dorsolateral prefrontal cortex. All subjects gained accurate BCI control by modulation of gamma-power of the left DLPFC.
- Blankertz, B., Sannelli, C., Halder, S., Hammer, E. M., Kübler, A., Müller, K. R., et al. (2010). Neurophysiological predictor of SMR-based BCI performance. *Neuroimage*, *51*, 1303–1309.
- A neurophysiological predictor is proposed which could differentiate which participants are able to learn to operate an SMR-based BCI based on 2-min eyes open EEG.
- Konrad, K., & Eickhoff, S. B. (2010). Is the ADHD brain wired differently? A review on structural and functional connectivity in attention deficit hyperactivity disorder. *Human Brain Mapping*, *31*, 904–916.
- Interesting review on structural and functional connectivity in ADHD.
- Pigott, H. E., Leventhal, A. M., Alter, G. S., & Boren, J. J. (2010). Efficacy and effectiveness of antidepressants: Current status of research. *Psychotherapy and Psychosomatics*, *79*, 267–279.
- Critical review of meta-analyses of antidepressants arguing for a reappraisal of the current recommended standard of care of depression.
- Ilmoniemi, R. J., & Kicić, D. (2010). Methodology for combined TMS and EEG. *Brain Topography*, *22*, 233–248.
- Methodological article on combining TMS and EEG and explaining the different artifact issues TMS pulses have on the EEG.
- Vedeniapin, A., Cheng, L., & George, M. S. (2010). Feasibility of simultaneous cognitive behavioral therapy and left prefrontal rTMS for treatment resistant depression. *Brain Stimulation*. Advance online publication. doi:10.1016/j.brs.2010.03.005
- Feasibility study investigating the possibilities of combined cognitive behavior therapy and rTMS in depression.
- Vandermeeren, Y., Jamart, J., & Ossemann, M. (2010). Effect of tDCS with an extracephalic reference electrode on cardiorespiratory and autonomic functions. *BMC Neuroscience*, *11*, 38. doi:10.1186/1471-2202-11-38
- Study demonstrating that using an extracephalic tDCS reference electrode does not

- affect autonomic functions and can hence be used safely.
- Kanai, R., Paulus, W., & Walsh, V. (2010). Transcranial alternating current stimulation (tACS) modulates cortical excitability as assessed by TMS-induced phosphene thresholds. *Clinical Neurophysiology*. Advance online publication. doi:10.1016/j.clinph.2010.03.022
- Validation of a new neuromodulation technique: transcranial Alternating Current Stimulation.
- Frank, E., Wilfurth, S., Landgrebe, M., Eichhammer, P., Hajak, G., & Langguth, B. (2010). Anodal skin lesions after treatment with transcranial direct current stimulation. *BRAIN STIMULATION: Basic, Translational, and Clinical Research in Neuromodulation*, 3(1), 58–59.
- Letter to the editor demonstrating potential side effects of tDCS, namely, skin lesions.
- Baeken, C., De Raedt, R., Vanderhasselt, M. A., Leyman, L., Schiettecatte, J., Poppe, K., et al. (2010). A “hypersensitive” hypothalamic-pituitary-adrenal system could be indicative for a negative clinical high-frequency repetitive transcranial magnetic stimulation outcome in melancholic depressed patients. *BRAIN STIMULATION: Basic, Translational, and Clinical Research in Neuromodulation*, 3(1), 54–57.
- Study suggesting a relationship between a hypersensitive HPA axis and treatment outcome after high frequency rTMS in melancholic depression.
- Filipović, S. R., Rothwell, J. C., & Bhatia, K. (2010). Slow (1 Hz) repetitive transcranial magnetic stimulation (rTMS) induces a sustained change in cortical excitability in patients with Parkinson’s disease. *Clinical Neurophysiology*. Advance online publication. doi:10.1016/j.clinph.2010.01.031
- Several sessions of slow rTMS (1 Hz) exerted neuroplastic changes in the motor cortex persisting for at least 1 day after stimulation.
- Fallahpour, K., Clarke, S. D., Goldberg, E., Hermens, D. F., Falconer, E. M., & Gordon, E. (2010). Alterations in theta activity associated with novelty and routinization processing in ADHD. *Clinical Neurophysiology*. Advance online publication. doi:10.1016/j.clinph.2010.02.152
- Study demonstrating that there are alterations in theta activity related to stimulus novelty and routinization during and auditory oddball task in ADHD.
- Ivanov, I., Bansal, R., Hao, X., Zhu, H., Kellendonk, C., Miller, L., et al. (2010). Morphological abnormalities of the thalamus in youths with attention deficit hyperactivity disorder. *The American Journal of Psychiatry*, 167, 397–408.
- Study demonstrating reduced pulvinar volumes in youths with ADHD and indicating this area is relatively enlarged in patients treated with stimulants compared to those untreated.
- Mantovani, A., Westin, G., Hirsch, J., & Lisanby, S. H. (2010). Functional magnetic resonance imaging guided transcranial magnetic stimulation in obsessive-compulsive disorder. *Biological Psychiatry*, 67(7), e39–40.
- fMRI guided rTMS in the treatment of OCD.
- Arns, M., Spronk, D., & Fitzgerald, P. B. (2010). Potential differential effects of 9 Hz rTMS and 10 Hz rTMS in the treatment of depression. *Brain Stimulation*, 3, 124–126.
- A study demonstrating that personalizing rTMS stimulation frequencies based on individual alpha peak frequency did not improve clinical outcomes in the treatment of depression. A tendency for a differential effect of 9 Hz TMS was found.
- Rizzolatti, G., & Fabbri-Destro, M. (2010). Mirror neurons: From discovery to autism. *Experimental Brain Research*.

- Experimentelle Hirnforschung. Expérimentation Cérébrale*, 200, 223–237.
- History of discovery of Mirror Neurons and their involvement in autism. suicidal ideation and mood symptoms during antidepressant treatment. *Acta Psychiatrica Scandinavica*. Advance online publication. doi:10.1111/j.1600-0447.2010.01560.x
- Hunter, A. M., Leuchter, A. F., Cook, I. A., & Abrams, M. (2010). Brain functional changes (QEEG cordance) and worsening Relation between EEG cordance and suicidal ideation and mood during antidepressant treatment.