EDITORIAL

THE JOURNAL OF NEUROBEHAVIORAL SCIENCES
NÖRODAVRANIŞ BİLİMLERİ DERGİSİ

Year : 2016
Volume : 3
Issue Number : 2
Doi Number : 10.5455/JNBS.1462261950

Article history:
Received 03 May 2016
Received in revised form 09 May 2016
Accepted 17 May 2016

WHAT DOES THE BRAIN MAPPING TELL THE PSYCHIATRIST IN DAILY PRACTISE?

Kemal Arıkan[*1], Bekir B. Artukoglu[2]

In order for the brain mapping to be useful for the psychiatrist in daily practice, it should reveal a Z Score Mapping which would allow the clinician to make a comparison with the normal age group. The brain mapping should also reveal a regional interconnectivity map. Production of the brain mapping is also a crucial point: it should imitate the reading of a standard EEG. Frequency analysis should be favored since other analysis methods may be out of a standard clinician's comfort zone.

One significant area where brain mapping is expected to bring revolutionary advances is the diagnosis of psychiatric disorders. 4 major patterns have been detected in 4 major psychiatric syndromes: Alpha wave increase in the frontal lobe is significant in depression. Generalized increase of beta waves in anxiety disorders may be informative for the clinician. An increase in delta and theta waves is seen in dementia. An intermixed increase of slow, very slow and fast waves is valuable as a diagnostic tool for schizophrenia.

Brain mapping may be an improvement on DSM diagnosis since it has the potential to enable the psychiatrist to identify the pathological electrophysiological activities in a psychiatric disorder. (McLoughlin et al., 2014; Miller, 2010). Studies of the biomarker trait of brain mapping in various psychiatric disorders has been promising so far. Significant progress have been made in disorders such as depression (Eyre et al., 2015; Leaver et al., 2015) , autism (Jann et al., 2015) and schizophrenia. (Taylor & Macdonald, 2012; Gur et al., 2002; Turetsky et al., 2007)

Regional connectivity put forward by statistical methods may reveal patterns that have genetic correlations. These potential endophenotypes will allow the psychiatrist to devise personalized treatment plans. (Moseley et al., 2015; Gardner et al., 2014; Di Martino et al., 2014) For instance, whole brain functional connectivity changes in children with Autism Spectrum Disorders and their healthy siblings point to the fact that brain mapping is one promising approach to detect endophenotypes of psychiatric disorders. (Moseley et al., 2015)

Using a test dose and observing the effect of a drug via brain mapping may predict the success of a treatment modality. (Arns & Olbrich, 2014; Mucci et al., 2006; Saletu et al., 2006) Bioavailability of a drug is made up of components such as crossing the blood brain barrier, binding its receptor and causing the desired effect. Brain mapping and test dose studies together can give the clinician an accurate idea of the bioavailability of a drug. Previous studies indicate that changes in EEG waves and brain morphometry may be used as predictors of clinical response to interventions against ADHD (Arns & Olbrich, 2014) , depression (Wade et al., 2015; Arns & Olbrich, 2014).

Finally, brain mapping may evolve into an objective method for the monitoring of psychiatric patients. The psychiatrist could observe the prognosis of a disorder in an evidence based fashion by using brain mapping at regular intervals.

In conclusion, brain mapping has implications for the diagnosis of psychiatric disorders, the detection of endophenotypes, predicting clinical response to therapeutic interventions and the monitoring of psychiatric patients. Further research is necessary to better determine the potentials of brain mapping and make full use of brain mapping in the aforementioned areas of daily practice.

References

Arns M, Olbrich S. Personalized Medicine in ADHD and Depression: Use of Pharmaco-EEG. Curr Top Behav Neurosci. 2014;21:345-70. doi: 10.1007/7854_2014_295. PubMed PMID: 24615541.

Di Martino A, Yan CG, Li Q, Denio E, Castellanos FX, Alaerts

[*1]Corresponding author: Akademik Psikiyatri ve Psikoterapi Merkezi Halaskargazi Cad. No: 103, Gün Apt. Daire:4B 34371 Osmanbey- Istanbul.
E-mail: mkarikan46@gmail.com

K, Anderson JS, Assaf M, Bookheimer SY, Dapretto M, Deen B, Delmonte S, Dinstein I, Ertl-Wagner B, Fair DA, Gallagher L, Kennedy DP, Keown CL, Keysers C, Lainhart JE, Lord C, Luna B, Menon V, Minshew NJ, Monk CS, Mueller S, Müller RA, Nebel MB, Nigg JT, O'Hearn K, Pelphrey KA, Peltier SJ, Rudie JD, Sunaert S, Thioux M, Tyszka JM, Uddin LQ, Verhoeven JS, Wenderoth N, Wiggins JL, Mostofsky SH, Milham MP. The autism brain imaging data exchange: towards a large-scale evaluation of the intrinsic brain architecture in autism. Mol Psychiatry. 2014 Jun;19(6):659-67. doi: 10.1038/mp.2013.78. Epub 2013 Jun 18. PubMed PMID: 23774715; PubMed Central PMCID: PMC4162310.

Eyre HA, Yang H, Leaver AM, Van Dyk K, Siddarth P, Cyr NS, Narr K, Ercoli L, Baune BT, Lavretsky H. Altered resting-state functional connectivity in late-life depression: A cross-sectional study. J Affect Disord. 2015 Sep 28;189:126-133. doi: 10.1016/j.jad.2015.09.011. [Epub ahead of print] PubMed PMID: 26433760.

Gardner A, Åstrand D, Öberg J, Jacobsson H, Jonsson C, Larsson S, Pagani M. Towards mapping the brain connectome in depression: functional connectivity by perfusion SPECT. Psychiatry Res. 2014 Aug 30;223(2):171-7. doi: 10.1016/j.pscychresns.2014.05.008. Epub 2014 May 23. PubMed PMID: 24931481.

Gur RE, McGrath C, Chan RM, Schroeder L, Turner T, Turetsky BI, Kohler C, Alsop D, Maldjian J, Ragland JD, Gur RC. An fMRI study of facial emotion processing in patients with schizophrenia. Am J Psychiatry. 2002 Dec;159(12):1992-9. PubMed PMID: 12450947.

Insel T, Cuthbert B, Garvey M, Heinssen R, Pine DS, Quinn K, et al. 2010. Research domain criteria (RDoC): Toward a new classification framework for research on mental disorders. Am J Psychiatry 167(7):748–751

Jann K, Hernandez LM, Beck-Pancer D, McCarron R, Smith RX, Dapretto M, Wang DJ. Altered resting perfusion and functional connectivity of default mode network in youth with autism spectrum disorder. Brain Behav. 2015 Sep;5(9):e00358. doi: 10.1002/brb3.358. Epub 2015 Jun 25. PubMed PMID: 26445698; PubMed Central PMCID: PMC4589806.

Leaver AM, Espinoza R, Joshi SH, Vasavada M, Njau S, Woods RP, Narr KL. Desynchronization and Plasticity of Striato-frontal Connectivity in Major Depressive Disorder. Cereb Cortex. 2015 Sep 22. pii: bhv207. [Epub ahead of print] PubMed PMID: 26400916.

McLoughlin G, Makeig S, Tsuang MT. In search of biomarkers in psychiatry: EEG-based measures of brain function. Am J Med Genet B Neuropsychiatr Genet. 2014 Mar;165B(2):111-21. doi: 10.1002/ajmg.b.32208. Epub 2013 Nov 25. Review. PubMed PMID: 24273134.

Miller G. 2010. Psychiatry. Beyond DSM: Seeking a brain-based classification of mental illness. Science 327(5972):1437.

Moseley RL, Ypma RJ, Holt RJ, Floris D, Chura LR, Spencer MD, Baron-Cohen S, Suckling J, Bullmore E, Rubinov M. Whole-brain functional hypoconnectivity as an endophenotype of autism in adolescents. Neuroimage Clin. 2015 Aug 7;9:140-52. doi: 10.1016/j.nicl.2015.07.015. eCollection 2015. PubMed PMID: 26413477; PubMed Central PMCID: PMC4556734.

Mucci A, Volpe U, Merlotti E, Bucci P, Galderisi S. Pharmaco-EEG in psychiatry. Clin EEG Neurosci. 2006 Apr;37(2):81-98. Review. PubMed PMID: 16733940..

Saletu B, Anderer P, Saletu-Zyhlarz GM. EEG topography and tomography (LORETA) in the classification and evaluation of the pharmacodynamics of psychotropic drugs. Clin EEG Neurosci. 2006 Apr;37(2):66-80. Review. PubMed PMID: 16733939.

Swatzyna RJ, Kozlowski GP, Tarnow JD. Pharmaco-EEG: A Study of Individualized Medicine in Clinical Practice. Clin EEG Neurosci. 2015 Jul;46(3):192-6. doi: 10.1177/1550059414556120. Epub 2014 Nov 23. PubMed PMID: 25420624..

Taylor SF, MacDonald AW 3rd; Cognitive Neuroscience Treatment Research to Improve Cognition in Schizophrenia. Brain mapping biomarkers of socio-emotional processing in schizophrenia. Schizophr Bull. 2012 Jan;38(1):73-80. doi: 10.1093/schbul/sbr105. Epub 2011 Sep 30. PubMed PMID: 21965468; PubMed Central PMCID: PMC3245598.

Turetsky BI, Kohler CG, Indersmitten T, Bhati MT, Charbonnier D, Gur RC. Facial emotion recognition in schizophrenia: when and why does it go awry? Schizophr Res. 2007 Aug;94(1-3):253-63. Epub 2007 Jun 20. PubMed PMID: 17583481; PubMed Central PMCID: PMC2571079.

Wade BS, Joshi SH, Pirnia T, Leaver AM, Woods RP, Thompson PM, Espinoza R, Narr KL. Random Forest Classification of Depression Status Based On Subcortical Brain Morphometry Following Electroconvulsive Therapy. Proc IEEE Int Symp Biomed Imaging. 2015 Apr;2015:92-96. PubMed PMID: 26413200; PubMed Central PMCID: PMC4578162.

JNBS 2016 Published by Üsküdar University www.jnbs.org