

QEEG and symptom guided NeuroRehabilitation programs

Victoria L. Ibric, MD, PhD, BCIAC, FACFEI

President of the NNRI, Inc. Pasadena, CA,

www.nnrionline.com

Abstract

- In order to achieve a successful outcome, in a NeuroRehabilitation program, a detailed planning process is essential.
- The clinician must learn about the client's biological markers, such as hormones, neurotransmitters as well as the composition of his/her body chemistry (trace elements in hair or urine) in addition to their symptoms and brain electrical activity (EEG).
- EEG activity has been found to be correlated to certain clinical conditions. Furthermore, the Quantitative EEG (QEEG) findings will add to the clinician's decision making process; most importantly to be considered in TBI, in very complex pain syndromes, in emotional dysfunctions and in the Autistic Spectrum.
- A number of case studies and their progress will be presented and discussed.

Biological markers evaluation

- Trace mineral analysis (see Watts book)
- Neurotransmitters evaluation in urine and saliva
- Diet and detoxification programs to aid the Neurofeedback training (see 2002 JNT paper)
- Longitudinal studies

Neurotransmitters

- **1-2-3 Approach**
- **Baseline Assessment:**
 - **Measure biomarkers to determine appropriate intervention**
 - **NeuroModulation:**
- **Develop a therapeutic regimen based on biomarker measurements**
 - **Reassess:**
- **Monitor clinical and laboratory response; adjust regimen as needed to improve outcome**

“The need for biomarker analysis to treat psychiatric disorders is rampant”

British Journal of Pharmacology (2008) 153, S133–S136
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www.bjppharmacol.org



LifeSciences2007

REVIEW

The utility of biomarker discovery approaches for the detection of disease mechanisms in psychiatric disorders

F. Schwarz and S. Bahn

Institute of Biotechnology, University of Cambridge, Cambridge, UK

Schizophrenia remains an elusive multifaceted disorder with all evidence of its onset and aetiology pointing to a complex interplay of genetic, nutritional, environmental and developmental factors. Although several molecular and structural abnormalities have been reported for schizophrenia, no diagnostic test or other application of clinical use has yet emerged from this research. The heterogeneity of schizophrenia symptoms and its similarity to other psychiatric disorders, the accessibility of appropriate samples and the complexity of molecular alterations have greatly slowed down research. Biomarker discovery approaches should ultimately facilitate objective diagnosis, allow the identification of at-risk individuals, predict treatment success and revolutionize drug-discovery approaches. For psychiatric disorders, large sample numbers are necessary if disease-intrinsic alterations are to be detected in an environment of high biological variability. Only recent technological advances facilitate the profiling of proteins and metabolites of large sample numbers. These approaches promise to provide interesting insights into disease mechanisms, as they enable capturing the dynamic nature of disease-related alterations. By means of parallel profiling using a multi-omics approach, we aim to disentangle the complex nature of schizophrenia's aetiology. Here, we will outline how this system-based analysis approach can contribute to the discovery of disease mechanisms in schizophrenia and in turn other psychiatric disorders.

British Journal of Pharmacology (2008) **153**, S133–S136; doi:10.1038/sj.bjp.0707658; published online 14 January 2008

Keywords: biomarker discovery; schizophrenia; psychiatric disorders; profiling

Abbreviations: MALDI, matrix-assisted laser desorption/ionisation; SELDI, surface-enhanced laser desorption/ionisation; DIGE, differential in-gel electrophoresis; ICAT, isotope-coded affinity tags; iTRAQ, isobaric tags for relative and absolute quantitation

Urinary NT studies

Clinical applications explored in published studies include:

- **War related PTSD**
- **Child abuse related PTSD**
- **Depression**
- **ADD/ADHD**
- **Breast cancer**
- **Carcinoid tumor**
- **Physical trauma**
- **Elite athletes**
- **AIDS patients**

Different patterns of Insomnia

| | Pt1 | Pt2 | Pt3 | Pt4 | Pt5 | Pt6 | Pt7 | Optimal range |
|-----------|-------------|------------|------------|------------|------------|------------|-------------|---------------|
| Epi | 15.6 | 6.5 | 5.9 | 3.6 | 7 | 14 | 5.2 | 8-12 |
| NorEpi | 42.9 | 117 | 37 | 39 | 52 | 96 | 33.8 | 35-60 |
| Dopamine | 168 | 205 | 478 | 150 | 171 | 146 | 113 | 110-175 |
| 5HT | 95 | 124 | 136 | 153 | 82 | 60 | 63 | 150-200 |
| GABA | 3.5 | 5.3 | 8.2 | 7.4 | 2.1 | 3.6 | 4.4 | 1.5-4.0 |
| PEA | 298 | 174 | 150 | 956 | 302 | 214 | 33.2 | 175-450 |
| Glutamate | 11 | 21 | 33 | 15 | 58 | 20 | 49.7 | 10-35 |

BR case

- 38 y/ o man with ADHD and
 - Anxiety
 - Hypertension
 - Arrhythmia
- Meds: Verapamil
- NF training designed following the symptoms and TMA tests.
- TMA's identified Ca/ Mg imbalances and Hg intoxication was done over 3 years (first year every 3 months, then yearly) and
- Diet/ supplements plus detoxification program were adjusted accordingly to TMA
- BP and arrhythmia stabilized even after Verapamil was excluded, and ADHD completely corrected.
- See ref.#13

CM case

- 11 y/ o boy, ADD and tics disorder
- Evaluated first, in 2003 for NF and first QEEG, second QEEG in 2009
- First TMA in 2006, at the age of 14; 20 NF sessions
- Second and third evaluations in 2007, at the age of 15; last in 2008.
- TMA evaluations and diet/ supplements prescribed over the years

CM, Minerals ratios

- Ca/Mg (glycemia)

- $117/12.8=9\uparrow$
- $110/10.3=10$
- $159/12.4=12$
- $91/8.7=10$

- Ca/K (thyroid function)

- $117/1=117\uparrow\uparrow$
- $110/2=55$
- $159/1=159\uparrow\uparrow\uparrow$
- $91/1=91$

- Ca/P (oxidation)

- $117/10=11.7\uparrow$
- $110/12=9$
- $159/13=12$
- $91/13=7$

- Zn/Cu (mental function)

- $40/5.1=7.2\downarrow$
- $30/1.4=15$
- $30/1.7=14$
- $48/1.6=25$

MC Case

- An 8 year old boy, after a febrile seizure at the age of two and a half, developed:
 - Recurrent headaches and abdominal aches
 - Insomnia - enuresis
 - Speech deterioration until age 4, left him speech impaired, followed by diminution of “eye contact”
 - Multiple allergies
 - Anger and Aggressive behavior
 - Uncontrollable hands movements, and facial squinting, and vocalizations

He was diagnosed “autistic” as a consequence of a toxic encephalopathy.

MC, Allergies

- Food hypersensitivity to specific proteins from:
 - Milk
 - » IgG 3657 (N, 400-2000)
 - Corn
 - » IgG 4040 (N, 400-2000)
 - Soy
 - » IgM 3470 (N, 400-2000)
 - Wheat
 - » IgG 2789 (N, 400-2000)
 - » IgM 3826 (N, 400-2000)
- Pancreatic enzymes:
 - Secretin*
 - » IgG 14 (N, 0-10)
 - » IgM 11 (N, 0-10)

*Secretin, a GI hormone, regulates pancreatic enzymes, trypsin and amylase. Also has been shown to reduce

MC, Neurotransmitters

- Neurotransmitters and other important proteins antibodies to:
 - Serotonin*
 - » IgG, 22 (N, 0-10)
 - » IgM, 11 (N, 0-10)
 - Glial Fibrillary Acidic Protein (GFAP**)
 - » IgM 60 (N, 0-50)
 - » IgA 21 (N, 0-20)
 - Somatostatin***
 - » IgG 34 (N, 0-10),
 - » IgM 18 (N, 0-10)
 - Robeola IgG 94 (N, 0-20)

*Serotonin is found in platelets and Ab against serotonin are found in patients with primary fibromyalgia and neuroimmune disorders

** GFAP expression in glial cells is associated to development, aging and CNS injury

***Somatostatin, like secretin, is present in GI tract, has an endocrine function in neurons

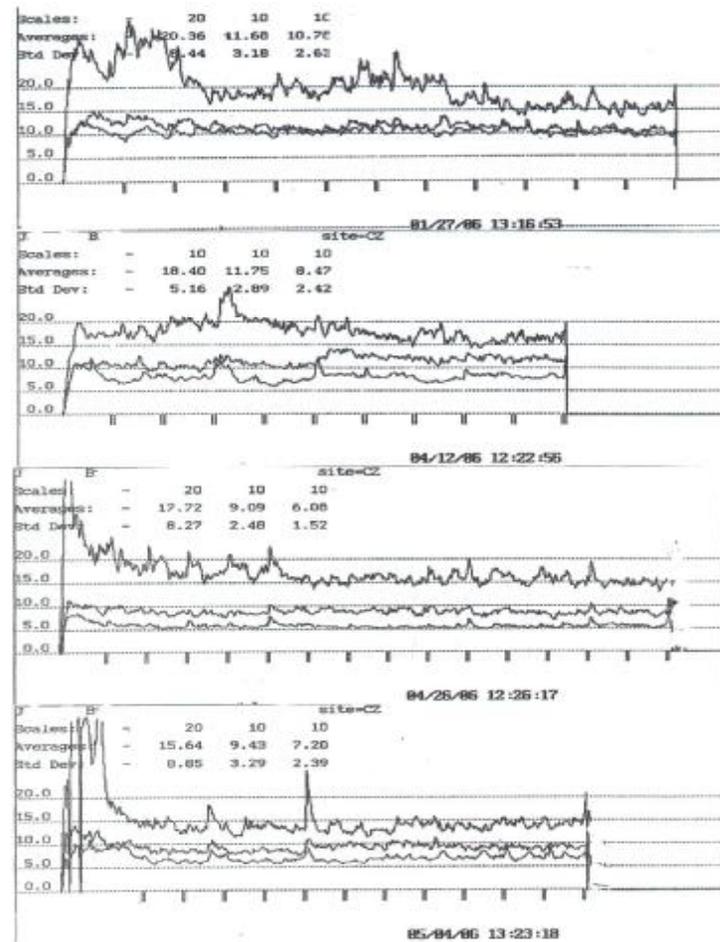
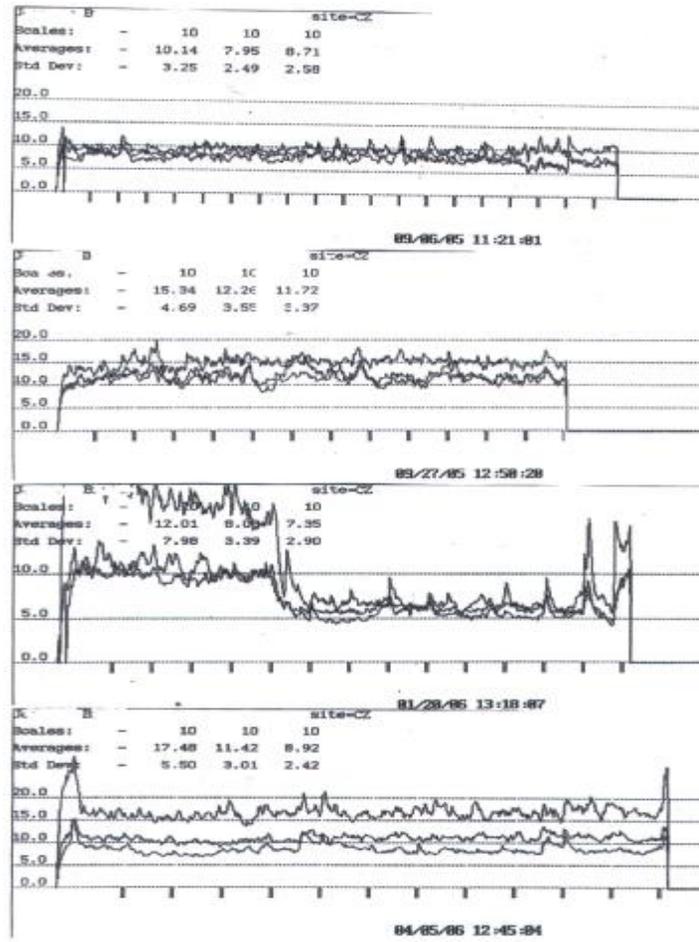
MC, RESULTS

- The consequences of this QEEG guided NF training with this autistic child were as follows:
 - A complete resolution of his sleep disturbance/enuresis,
 - Aggressive behavior lessened to almost none as the training continued,
 - His academic performance and verbal expression improved and continues to improve,
 - His obsessive behavior almost completely controlled
 - He is happier and it is easier for him to communicate (e.g., better eye contact); forming friendships!

DJ Case

- Female, 68 y/ o with GvH post leukemia transplant:
- Symptoms at the intake: PTSD, depression, anxiety, chronic pain, sleep and memory problems!
- 60 NF sessions, on NC plus Neurodynamic activator, followed by daily home training with same
- Rx: Prednison, Metotraxate, vitamins + minerals
- Chiropractic treatments done before NF and continued during NF.
- Results: all the symptoms resolved or significantly diminished in 1 year, and the stability achieved, and kept till present. Productive life continues.

DJ, EEG changes overtime of NF training enhanced by the Neurodynamic activator

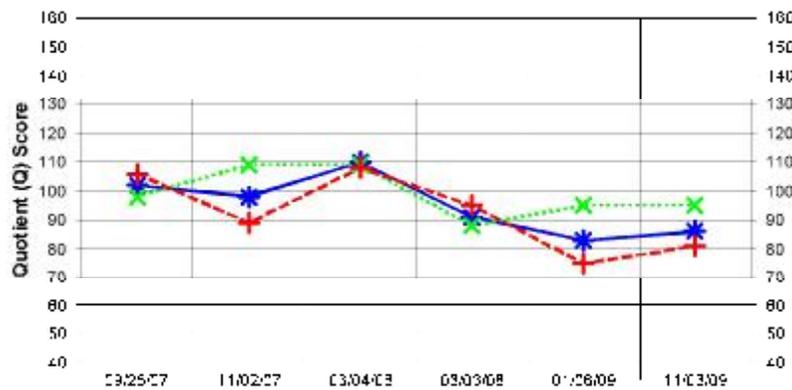


AO Case

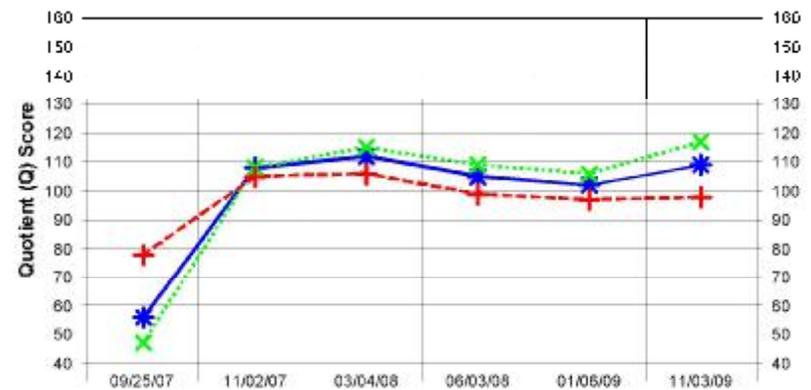
- Symptoms
 - Physical pain (lumbar, neck)
 - Anxiety, Depression
 - Suicidal tendencies
 - Unable to read, concentrate (dropped from studying in college)
 - Low self esteem
- TBI in the past
- Medications prescribed did not help
- Some nutritional advice prior to NF and during NF
- Thyroid supplementation after hormonal evaluation, in very small amount
- #NF sessions of 1 hour each plus brain exercises over 2 year interval guided by repeated QEEGs 7/07; 9/08/; 6/09
- Positive results described bellow

AO, Cognitive test IVA progress

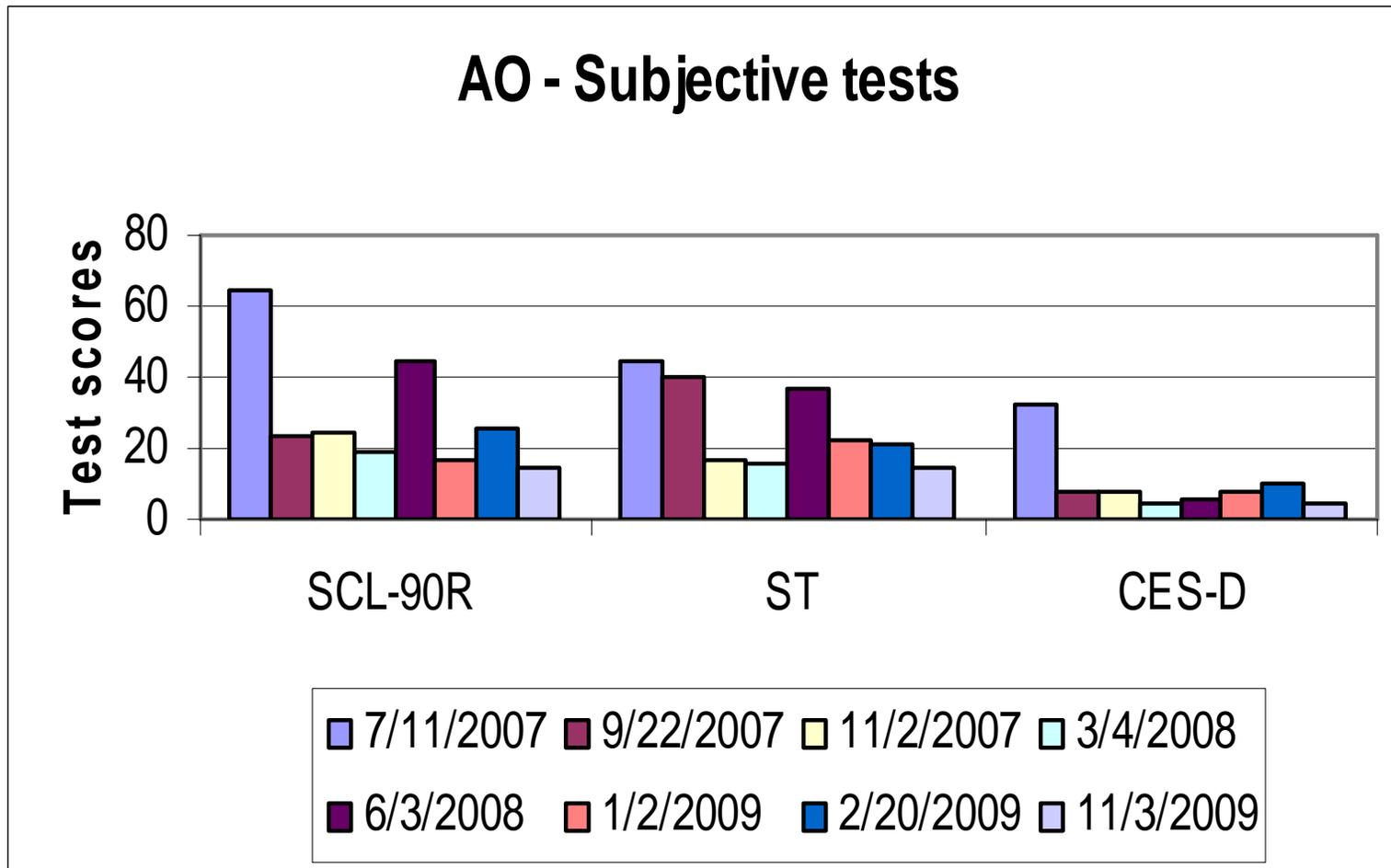
Global Response Control Scales



Global Attention Scales



AO, Subjective TESTS over time



MM Case

- 67 y/ o woman with:
 - Extreme anxiety disorder
 - Depression (Crying uncontrollable)
 - Sleep disorder
 - Dizziness
 - Headaches
 - Lethargic
- QEEG
- 28 NF session plus Stress Eraser (home training)
- 2 NT tests
- Rx: Xanax, Ativan, Remeron, Aspirin

**MM, case of insomnia
and anxiety disorder**

Urine

| | | |
|----------------|---------------|---------------|
| Epinephrine | 13.5 | 9.7 |
| Norepinephrine | 85.9 | 38.5 |
| Serotonin | 110.2 | 284.8 |
| Glycine | 5807.7 | 2414.2 |
| GABA | 15.1 | 8.3 |
| Glutamate | 68.2 | 37.6 |
| Aspartic Acid | 51.5 | |
| PEA | 76.8 | 96.4 |
| Creatinine | 27.7 | 212.5 |
| Dopamine | | 140 |
| DOPAC | | 787.2 |
| 5HIAA | | 4957 |

Consequences of NT adjustments and NFT

Supplements:

- Calm-PRT, Endo-plus, Kavinase, Travacor
- Valerian, Melatonin
- Slight improvement of sleep and lowering of the anxiety (from 8-10 to 3-5), but
- Impatient patient Stopped NT adjustments as well as NFT, after 28 sessions, to return to the medical Rx.
- Incomplete, in compliant and unsuccessful case.

Conclusion

- QEEG analyses are helping us in:
 1. Planning a more specific and directed NF training
 2. In the evaluation of the efficacy of some adjunct training devices
 3. In measuring the progress obtained through the NF training

Final integration of our data

- **Collecting all the pertinent data at the evaluation and re-evaluation times were very important measures of the progress**
- **QEEGs were instrumental in guiding the NF training and the corrections, of either the coherence or the amplitudes of the certain frequencies over the areas indicated by the QEEGs, were followed by changes in behavior, mental status, and well being of our clients.**
- **Neurodynamic activation was instrumental in enhancing the NF training experience.**
- **The evaluation of the chemical and biochemical composition of the urine, saliva and hair added important information for designing the proper diet, specific supplementation and detoxification programs for each client.**

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