

Deputy Head of Center for Social Psychiatry, University Zurich; President of the Pharmacology EEG Society IPEG

ORCID: 0000-0001-5557-4878, Academic Age: 11 *, H-index: 18 *

Education & Qualification

Habilitation, Department for Psychiatry, Psychotherapy and Psychosomatics, University Leipzig, Leipzig, Germany

09-2014 - 09-2014 ; 1 m.

Fähigkeitsausweis Interventional Psychiatry, Swiss Society for Interventional Psychiatry, PUK Zurich, Zurich, Switzerland

12-2019 - 12-2019 ; 1 m.

Employment

Deputy Chief of Center for Social Psychiatry, Department for Psychiatry, Psychotherapy and Psychosomatics, University Zurich, Zurich, Switzerland

01-2017 ; Still ongoing

Deputy Chief of Center for Depression and Anxiety Disorders, Department for Psychiatry, Psychotherapy and Psychosomatics, University Zurich, Zurich, Switzerland

01-2016 - 12-2016 ; 12 month(s)

Senior Psychiatrist, Centre for Acute Psychiatric Disorders, Department for Psychiatry, Psychotherapy and Psychosomatics, University Zurich, Zurich, Switzerland

02-2015 - 12-2015 ; 11 month(s)

Resident , Department for Psychiatry, Psychotherapy and Psychosomatics, University Leipzig, Leipzig, Germany

02-2007 - 01-2015 ; 7 year(s) 12 month(s)

Funding

Funding(1) | EEG/fMRI in the prediction of antidepressant treatment, Junior Grant Medical Faculty University Leipzig, Leipzig, Germany.

Lead; 01-2014 - 12-2014 ; 12 month(s)

Total funded amount: € 50000

Amount allocated to me or my group: 50000

Funding(2) | EEG vigilance regulation: A comparison of the multiple Sleep Latency Test and VIGALL, Metarot Program at the Integrated Research and Treatment Centre, Leipzig, Germany.

PI of subproject; 01-2011 - 12-2013 ; 2 year(s) 12 month(s)

Total funded amount: € approx. 50000

Amount allocated to me or my group: 50000

Funding(3) | Evaluation of Attempted Suicide Short Intervention Program - EASI, Stiftung Hans und Marianne Schwyn, Zurich, Switzerland.

Lead ; 01-2019 ; Still ongoing

Total funded amount: CHF 300000

Amount allocated to me or my group: 300000

Funding(4) | Multicentre Evaluation of Attempted Suicide Short Intervention Program, Stiftung zur Förderung von Psychiatrie und Psychotherapie, Zurich, Switzerland.

Lead; 01-2020 ; Still ongoing

Total funded amount: CHF 150000

Amount allocated to me or my group: 150000

Project-related Narrative *

My whole Research Career has been dedicated to Algorithms that use Electrophysiological Patterns as assessed via Electroencephalogram (EEG) or Electrocardiogram (ECG) for Prediction of Psychiatric Treatment, especially in Major Depression. I am the President of the International Pharmacological EEG Society and a founding Member of the Swiss Society for Interventional Psychiatry, that allow me to rely on a large national and international network for Cooperation and

* For further information on the academic age, the h-index, SciCV narratives, the Dimensions link and the RCR see: <https://www.scicv.ch/about>

Knowledge Exchange. My specific work in the field of treatment prediction showed that there are promising signals in EEG recordings that allow prognostic statements on treatment outcomes [1]. Using data from the largest study for treatment prediction on patients suffering from major depression (International Study to Predict Optimized Treatment in Depression (iSPOT-D) we were able to show that information on EEG-Vigilance regulation and ECG activity can help to optimize psychopharmacological treatment [2]. We extended the ability to predict treatment outcome to psychotherapy approaches in obsessive and convulsive disorder [3] and for electroconvulsive therapy in major depression [4], again using EEG-resting state data. Lately, EEG datasets were processed using cutting edge machine learning methods, proving that Deep Convolutional Networks can enhance EEG analysis [5] and may open the doors for new and innovative possibilities for Treatment Prediction in Psychiatry.

[1] journal-article. Olbrich, S., & Arns, M. (2013). EEG biomarkers in major depressive disorder: Discriminative power and prediction of treatment response. *International Review of Psychiatry*, 25(5), 604–618. <https://doi.org/10.3109/09540261.2013.816269> .

[2] journal-article. Olbrich, S., Tränkner, A., Surova, G., Gevirtz, R., Gordon, E., Hegerl, U., & Arns, M. (2016). CNS- and ANS-arousal predict response to antidepressant medication: Findings from the randomized iSPOT-D study. *Journal of Psychiatric Research*, 73, 108–115. <https://doi.org/10.1016/j.jpsychires.2015.12.001> .

[3] journal-article. Dohrmann, A.-L., Stengler, K., Jahn, I., & Olbrich, S. (2017). EEG-arousal regulation as predictor of treatment response in patients suffering from obsessive compulsive disorder. *Clinical Neurophysiology*, 128(10), 1906–1914. <https://doi.org/10.1016/j.clinph.2017.07.406> .

[4] journal-article. Kirsten, A., Seifritz, E., & Olbrich, S. (2019). Electroencephalogram Source Connectivity in the Prediction of Electroconvulsive Therapy Outcome in Major Depressive Disorder. *Clinical EEG and Neuroscience*, 51(1), 10–18. <https://doi.org/10.1177/1550059419888338> .

[5] journal-article. van Putten, M. J. A. M., Olbrich, S., & Arns, M. (2018). Predicting sex from brain rhythms with deep learning. *Scientific Reports*, 8(1). <https://doi.org/10.1038/s41598-018-21495-7> .

Contributions to Science *

Contributions to Science (1) | My goal is to improve the treatment of psychiatric diseases by using neurophysiological signals as predictive biomarkers. As the president of the International Pharmacology EEG society I dedicate my work to the advances on this field [1]. However, up to today, treatment decisions for disorders like major depression or obsessive compulsive disorder are mainly based on the personal experiences of the treating physician and not objective markers that would allow a more precise allocation of treatment. To achieve the goal of clinically usable,

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reliable and effective biomarkers, i always tried to understand the associations between electroencephalogram (EEG) patterns and ongoing neuronal activity [4]. In a combined EEG-fMRI study we were able to show the tight linkage between EEG-vigilance regulation (as MDD biomarker) and the BOLD signal, paving the way for potential clinical usage of EEG-algorithms [2]. Not only the brain generates signals that reflect activity of the central nervous system (CNS), but also the autonomous nervous system (ANS) can be assessed via electrophysiological recordings, in particular the electrocardiogram (ECG). During my research, I found out that the coupling between the ANS and CNS is tight and alterations might contribute to a possible set of (predictive) biomarkers in neuropsychiatric disorders [3].

[1] journal-article. Olbrich, S. (2018). Treating Brain Waves is not an option. *Nature*,557(7705), 309-309. doi: 10.1038/d41586-018-05150-9 .

[2] journal-article. Olbrich, S., Mulert, C., Karch, S., Trenner, M., Leicht, G., Pogarell, O., & Hegerl, U. (2009). EEG-vigilance and BOLD effect during simultaneous EEG/fMRI measurement. *NeuroImage*,45(2), 319-332. <https://doi.org/10.1016/j.neuroimage.2008.11.014> . RCR: 6.1 *. [Dimensions Link](#) *.

[3] journal-article. Olbrich, S., Sander, C., Matschinger, H., Mergl, R., Trenner, M., Schönknecht, P., & Hegerl, U. (2011). Brain and Body. *Journal of Psychophysiology*,25(4), 190-200. <https://doi.org/10.1027/0269-8803/a000061> .

[4] journal-article. Olbrich, S., Tränkner, A., Chittka, T., Hegerl, U., & Schönknecht, P. (2014). Functional connectivity in major depression: Increased phase synchronization between frontal cortical EEG-source estimates. *Psychiatry Research: Neuroimaging*,222(1-2), 91-99. <https://doi.org/10.1016/j.psychresns.2014.02.010> .
