**Event-Related NIRS and EEG Analysis for Assessment of   
Risk Factors in Depression**

**L. Rahman a**, K. Oyama b, K Sakatani c,d

*a Graduate School of Computer Science, b Department of Computer Science,*

*c NEWCAT Research Institute, Department of Electrical and Electronic Engineering, College of Engineering,* *d Department of Neurological Surgery, School of Medicine Nihon University, Japan*

*labiblais.rahman@ieee.org*

**Abstract:** Mood disorder caused by chronic stress is mostly difficult to be aware of by oneself. There are social barriers including financial cost of medical service and lack of perceived need for treatment even if the potential patients have desire to receive mental healthcare. On the other hand, self-report inventories such as the Beck Depression Inventory (BDI-II) can tell the emotional valence as screening test, which requires medical expertise in interpretation of their results. Contingency plans for clinical supervision and referral sources are necessary for sufficient mental healthcare. Recently, Laterality Index at Rest (LIR) [1] was proposed for evaluation of mental stress level from NIRS data in the prefrontal cortex at the resting state, and a significant positive correlation between LIR and the State-Trait Anxiety Inventory (STAI) was found. In this study, we discuss potentials of LIR for assessment of depression risk using BDI-II and long-term monitoring of NIRS and EEG signals. This study first compares LIR and the EEG indices, i.e., Frontal Alpha Asymmetry (FAA) obtained from EEG data and Comfort Vector model (CVM). From the experimental result by periodical NIRS and EEG recordings of 3 healthy subjects who participated more than 4 weeks, feature values of FAA, LIR and CVM were compared with BDI-II scores. Employing Pearson's correlation analysis, we found a strong correlation between BDI-II score and LIR (r = - 0.55). The experimental results also suggested that the changes in LIR were temporally associated with the changes in BDI-II score. These changes were evaluated in association with life events of the subjects.

References

[1] Ishikawa W, Sato M, Fukuda Y, Matsumoto T, Takemura N, Sakatani K. Correlation　between asymmetry of spontaneous oscillation of hemodynamic changes in the　prefrontal cortex and anxiety levels: a near-infrared spectroscopy study. J　Biomed Opt. 2014;19:　027005.

**Acknowledgements:** This work was supported in part by Strategic Research Foundation Grant-aided Project for Private Universities (S1411017) from the Ministry of Education, culture, Sports, Sciences and Technology of Japan, and grants from Ling Co., Ltd. (Tokyo, Japan) and Southern Tohoku General Hospital (Fukushima, Japan).

I prefer: 