

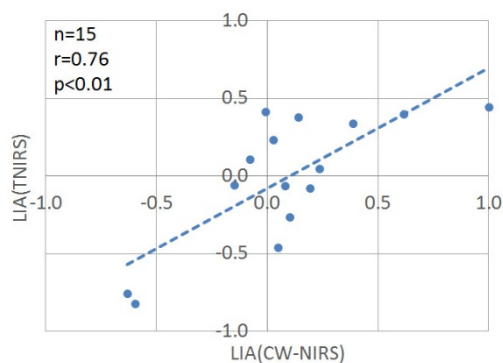
# Reliability of wearable two channel CW-NIRS in measurement of brain function

Y. Komuro, Y. Sato, L. Lin, Z. Tang, L. Hu, K. Sakatani

*NEWCAT Research Institute, Department of Electrical and Electronic  
Engineering, College of Engineering, Nihon University, Japan*

*sakatani.kaoru@nihon-u.ac.jp*

**Abstract:** Multi-channel NIRS, so called optical topography (OT), allow functional mapping of the cortex, however, it takes long time to set optodes on the head and relatively expensive. Thus, OT is not suitable for screening test of brain disorders evaluating many subjects. Recently, wearable two-channel continuous wave NIRS (CW-NIRS) equipment has been developed. Such NIRS may be applicable to screening test; however, its reliability in measurements of brain function is not yet clear. Here, we tested a two-channel CW-NIRS (HOT1000, Hitachi High Technologies), which employs single LED (800 nm) for measurements of total hemoglobin (t-Hb) changes. We measured t-Hb changes in the bilateral prefrontal cortex (PFC) during mental arithmetic tasks, employing the CW-NIRS and time-resolve NIRS (TNIRS; TRS-20, Hamamatsu Photonics). We evaluated left-right asymmetry of PFC activity by calculating the Laterality Index (LIA;  $(R-L)/(R+L)$  of t-Hb), which reflects mental stress [1]. The intervals of CW-NIRS and TNIRS measurements were between 1 to 13 days. We observed significant positive correlation between LIA measured by CW-NIRS and TNIRS (Figure). The results suggest the reliability of the simple CW-NIRS, and it may be applicable to prevention medicine for mental stress. Finally, it should be emphasized that the left-right asymmetry of PFC activity is relatively stable.



## References

[1] Tanida M, et al. *Neurosci Lett.* 369:69-74 (2004)