



Georgia State University/Georgia Tech
Center for Advanced Brain Imaging

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CABI NEWSLETTER

VOLUME 5, ISSUE 2

CABI FEATURED RESEARCH

“Patients with post-concussive central vestibular impairment demonstrate over-activation of brain regions providing input to the primary vestibular cortex.”

Dr. Jason Allen, Russell Gore, Michelle LaPlaca, and Anna Trofimova investigated the pattern of brain activation in patients who have post-concussive vestibular dysfunction. It is estimated that up to 3.8 million concussions occur in the United States each year. Vestibular symptoms, such as dizziness and imbalance, are among the most frequent post-concussive complaints. Patients with vestibular impairment may compensate through an overreliance on other somatosensory inputs, such as visual cues, leading to somatosensory dependency. While these changes may be beneficial in the acute phase, persistent dependency on these pathways may become pathologic and maladaptive during vestibular recovery, leading to syndromes such as ‘visual vertigo,’ which are characterized by inappropriate responses such as dizziness to visual environmental motion and other somatosensory cues. In this study, patients and healthy controls watched 30-second video clips of videos that either provoked visual vertigo symptoms or were neutral in content (Figure 1). Provocative videos selectively activated the frontal eye fields, visual association cortex, and parietal lobe adjacent to the primary vestibular cortex in patients with post-concussive vestibular impairment (Figure 2). Activation in these areas was not seen in control subjects viewing the same videos. These results support the hypothesis that over-activity of these regions, all of which supply input into the primary vestibular cortex, may contribute to the symptoms of post-concussive visual vertigo.



Figure 1: Example of screen shots from video stimuli used for t-fMRI paradigm. (A, B) Videos with neutral content. (C, D) Visually provocative videos that induce vertigo symptoms in patients with visual vertigo.

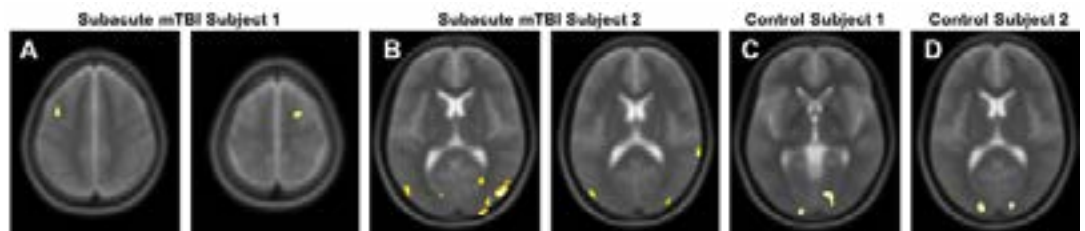


Figure 2. Examples of selective t-fMRI activation in patients with post-mTBI VVS viewing visually provocative videos. t-fMRI block design and BOLD imaging, data from patients with post-concussive visual vertigo and healthy subjects comparing provocative to neutral videos. (A) Selective activation in the region of the frontal eye fields in a patient. (B) Selective activation in the bilateral visual association areas (occipital and parietal lobes) and adjacent to the primary vestibular cortex (posterior insula/operculum) in a patient. (C, D) In controls selective activation is restricted to the region of the primary visual cortex (occipital lobes).



CABI

NEWSLETTER

Publications

Dates To Remember

April 3rd, 2018

Callosum Poster Session @ CABI

4:00 - 6:00pm

June 13th, 2018

**Last Day for Data Collection
before scanner upgrade**

CABI Users Meeting

9:30am - 10:30am
(3rd Thurs of each month)
Monthly meeting of CABI users
to discuss neuroimaging.

*The last users meeting for the
Spring will be Thursday, April 19th,
2018. We will resume the meetings
in August.

Bang, J.W. & Rahnev, D. (2017). Stimulus expectation alters decision criterion but not sensory signal in perceptual decision making. *Scientific Reports* 7:17072.

Bezdek, M. A., Wenzel, W. G., & Schumacher, E. H. (2017). The effect of suspense on brain activation and memory during naturalistic viewing. *Biological Psychology*, 129, 73-81.

Godwin, C. A., Hunter, M.A., Bezdek, M. A., Lieberman, G., Elkin-Frankston, S., Romero, V. L., Witkiewitz, K., Clark, V. P. & Schumacher, E. H. (2017) Functional connectivity within and between intrinsic networks correlates with trait mind wandering. *Neuropsychologia*, 103, 140-153.

Grooms J. K., Thompson, G. J., Pan, W-J., Billings, J., Schumacher, E. H., Epstein, C.M., & Keilholz, S. D. (2017). Intraslow EEG and dynamic resting state network activity. *Brain Connectivity*, 7, 265-280.

Yildiz S, Thyagaraj S, Jin N, Zhong X, Heidari Pahlavian S, Martin B, Loth F, Oshinski J, Sabra KG.(2017) Quantifying the influence of respiration and cardiac pulsations on cerebrospinal fluid dynamics using real-time phase-contrast MRI. *J Magn Reson Imaging*. Aug;46(2):431-439.

2018 Callosum Poster Session

Our annual poster session this year is scheduled for Tuesday, April 3rd from 4:00pm-6:00pm here at CABI.

Please make sure you submit your abstracts to Renee Simpkins @ renee.simpkins@psych.gatech.edu by March 22, 2018.

Seed Grant Applicants

Seed Grant Applications will be due Monday, July 9th, 2018.

Message From The Director

CABI has continued to expand our technical offerings to our users. CABI now has a functioning 32-channel EEG rig available for users. This fall, we welcomed a new Research Scientist, Vishwadeep Ahluwalia. Vish's expertise in Medical Physics has been a welcome addition to CABI. He will be especially helpful this summer when CABI upgrades the Siemen's Trio to a Prisma magnet. The last day to scan on the Trio is June 13th. We expect the Prisma to be ready to use on August 6th. CABI will host our 3rd annual Callosum Neuroscience Poster Session on April 3rd. All members of the Atlanta Neuroscience community are invited to present and attend. Finally, CABI will offer workshops this summer and fall on various neuroimaging topics.

