UBSN
University Research Facility in Behavioral and Systems Neuroscience
神經科學中心實驗室

NEWSLETTER
ISSUE 07 (SEP 2023)

Participants on PolyU podium, practising Tai Chi in Dr. Grace Xie's MRI Study

Dr. Grace Xie's MRI Study on Exploring Mechanism of Tai Chi Training in Migraine Prophylaxis

Repeated migraine attacks are not only a physical pain but also an emotional burden, as their recurrences often impair social and personal life. The general public does not consider migraine serious because it does not cause death, is not contagious and is mostly episodic. Whereas the public health importance lies in its causal relationships with pain, disability, and increased disease burden. Non-pharmacological treatment plays an important role in migraine prophylaxis. It is relatively safe and has high tolerability. Several studies have found that aerobic exercises can significantly reduce the frequency of migraine attacks and alleviate pain. As a mind-body aerobic exercise, Tai Chi's potential therapeutic efficacy as a migraine prophylaxis remains largely unknown.

Dr. Grace XIE has conducted a pilot randomized controlled trial funded by her department's General Research Fund among 73 female migraineurs. The results showed that participants receiving 12-week Tai Chi training had significant reduction in the frequency of migraine attacks. Consequently, her team took interest in further investigating the underlying mechanisms of how Tai Chi works in alleviating migraine attacks. The key issues she wants to address are whether Tai Chi is appropriate as a stand-alone preventive strategy that has comparable treatment efficacy to standard prophylactic medication, or at least is not worse than the latter; and if it is proven to be effective, what mechanism leads to such treatment efficacy. Emerging data has reported that migraineurs are at increased risks for clinically silent brain lesions, such as white matter abnormalities (WMA), detected by magnetic resonance imaging (MRI). These abnormalities are reported to be linked with migraine frequency. This suggests a representation of the disorder in the form of an anatomic progression. Evidence indicated that Tai Chi could produce significant changes in white matter small-world attributes, cerebrovascular blood flow and reactivity. The team infers that, at least partly, Tai Chi reduces migraine attacks through these pathways.

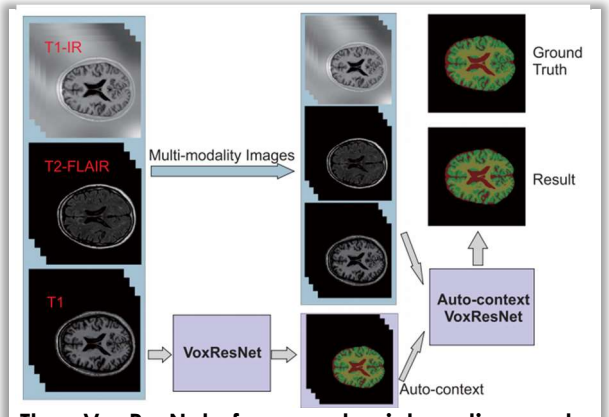
A "Thank You" letter to the Tai Chi training masters

Supported by the General Research Fund of the Research Grants Council (RGC), Dr. Xie and her team is implementing a two-arm individual level non-inferiority randomized controlled trial. A total of 220 local women diagnosed with episodic migraine between 18-65 years old will be randomly assigned to one of two groups: 1) a Tai Chi training group receiving the 33-short form Yang-style Tai Chi training; or 2) a standard prophylactic medication group receiving the regular medication prescribed by the neurologist. The intervention period will be 24 weeks with

another 24 weeks follow-up. The frequency of migraine attacks, migraine days, intensity and duration of headaches will be recorded by a migraine diary at the baseline, at 24th weeks, and at 48th weeks. The MRI and Transcranial Doppler will be used to measure the white matter lesions and cerebral vasculature activity before and after the intervention, respectively. The clinical efficacy will be determined by comparing the differences of outcomes from baseline to the end of the trial between two groups. The mechanism of intervention effect will be explored by analyzing the changes and associations of migraine features with the process of brain white matter and neurovascular changes after the Tai Chi training.

Understanding the mechanism can help us gather further insights into the structural changes in the brain of migraineurs. Dr. Xie's team hopes to learn about how and through which channels the brain structure and neurovascular function could be improved by Tai Chi training.

Dr. Xie has another ongoing cohort study funded by the Early Career Scheme of the RGC, to investigate the relationship between migraine exposure and cardiovascular outcomes. This cohort contains 4221 Hong Kong Chinese women aged 30 to 74 years, 362 of whom were diagnosed with migraine. Dr. Xie has interests in applying an interactive deep learning model based on previously developed voxelwise residual networks (VoxResNet) from a collaborating computer expert, to conduct brain MRI segmentation and then identify the WMA among participants.



The VoxResNet framework, integrating auto-context with multi-modality information. (by collaborated computer expert: Prof. Harry Qin)

Given the importance of reducing the disease burden and financial cost of both migraine attacks and cardiovascular diseases (CVD), the findings of this study will provide new valuable insights about the associations between migraines and CVD by investigating the role of a subclinical marker, WMA, in the progression of CVD among migraineurs.

Dr. Grace XIE

Associate Professor

School of Nursing

Recipient/ beneficiary of UBSN's Capacity Building Scheme 2023 *

*Our Capacity Building Scheme application is open **only for FH and FHSS principal investigators.** Next round of application will **open on 1st October 2024** and will **close on 31st December 2024.** For more information: https://www.polyu.edu.hk/ubsn/internal/capacity-building-scheme/scheme-detail/

Introducing UBSN's new human equipment

NIRSport 2

The ***NIRSport 2***, is a functional near-infrared spectroscopy (fNIRS) platform. It is used to measure cerebral hemodynamics using a non-invasive method. The NIRSport 2 is lightweight and hence also suitable for application in motion-based studies!

Applications:

- Human brain mapping
- Cognitive neuroscience
- Diagnosis of psychiatric disorders: depression, bipolar disorder and schizophrenia

Tobii Pro Glasses 3 is a wearable eye-tracking system. The head unit consists of eye tracking cameras, a high-definition scene camera and a microphone, allowing simultaneous recording of eye tracking data and a detailed first-person perspective. A wide range of real-world environment could be explored, e.g. sports and consumer behaviour studies.

Applications:

- Neuroscience studies, e.g. combined with EEG data
- Ophthalmology studies, where large freedom of head movement is needed
- Reading studies, especially those where large freedom of movement is important
- Psychology research, e.g. developmental psychology and psycholinguistics
- Minimal latencies enable tests with a gaze-contingency paradigm.

Officer-in-charge: Dr. Tommy LAM (lh-tommy.lam@polyu.edu.hk)

More information on UBSN equipment: https://www.polyu.edu.hk/ubsn/facilities/equipment/

Extended MRI Service Hours Effective from 4 September 2023

UBSN is pleased to announce that the MRI lab at UBSN will have **extended opening hours** after 4 Sept 2023.

The new schedule will be as follows:

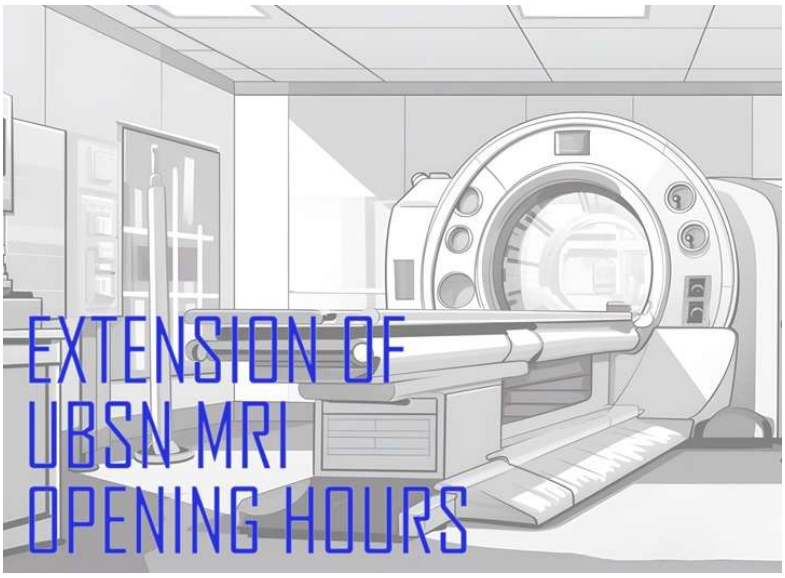
- Monday to Friday: 09:00-13:30 and 14:30-18:30
- Saturday: 09:30-12:30
- Closed on Sundays and Public Holidays

The Saturday sessions will be specifically designated for brain projects (excluding magnetic resonance spectroscopy) involving adult health participants.

Due to the limited manpower, Saturday sessions will only be available for 3 out of every 4 weeks.

Please note that UBSN reserves the right to determine the feasibility of conducting your project on weekends.

The weekend sessions will be charged at a rate of 2000 HKD/hr for PolyU projects and 6250 HKD/hr for other university projects. It can be booked up to 30 days in advance.



(Policy is subject to further reviews and adjustments by UBSN)

For booking of the weekend sessions, please e-mail Dr. Celia DONG (celia.dong@polyu.edu.hk).

Learn more:
https://www.polyu.edu.hk/ubsn/news-and-events/news/2023/extended-mri-service-hours-effective-from-4-september-2023/

Biofeedback posture training for correcting abnormal curvature of the spine

Associate dean and professor, **Prof. Joanne YIP**, at PolyU's School of Fashion and Textiles, was recently on TV to introduce her newly developed training system for sitting posture.

This sitting posture training system mainly consists of detecting sensors and a computer feedback system, as explained by Prof. Yip. During the training at her clinic, the user's sitting posture can be monitored based on the information extracted by the detecting sensors. The computer feedback system then gives a visual cue, reminding the user to correct their sitting posture.

Prof. Yip also applied this concept to a smart vest that users can bring home with them after training at the centre. After connecting the smart vest to a mobile app, whenever an incorrect sitting posture is detected, the app will remind its user to adjust their sitting posture via vibration generators in the vest. That way even when the user is doing regular daily tasks at home, they can further strengthen the posture taught at the clinic and develop a good sitting habit.

This system is currently at the clinical stage and 30 patients have already completed the treatment course. Prof. Yip's research team will keep monitoring the sitting postures of their patients to ensure the efficacy of this treatment.

Online source: https://news.tvb.com/tc/local/63f4b2cf2e94f886334912f9

Recent events at UBSN

In September, UBSN's first series of equipment seminars and workshops has begun! We have invited **Tronda Electronics Ltd.** to introduce and demonstrate our newly acquired and highly anticipated eye tracker - **Tobii Glasses Pro 3**.

Tobii Glasses Pro 3 Workshop and Lab Visit

Workshop
Date: 15 Sep 2023
Time: 3:00pm-4:30pm
Venue: Z414

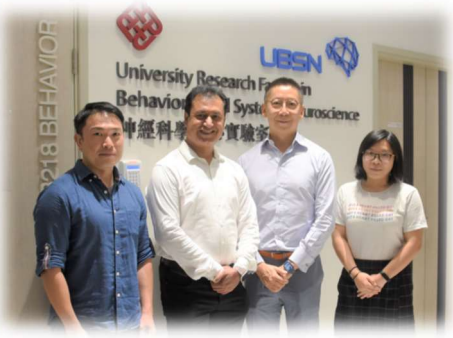
Lab Visit
Date: 15 Sep 2023
Time: 4:30pm-6:00pm
Venue: ZB216-218

Speaker/ Instructor

Mr. Jason YEUNG, Product Manager at
TRONDA Electronics Ltd.

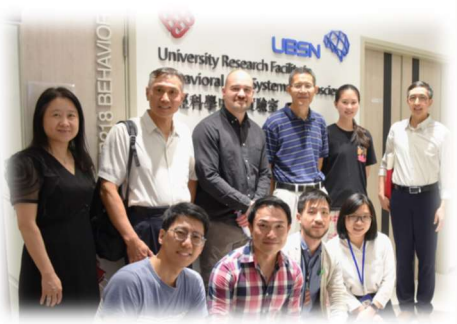
Scholars and guests

UBSN has had the pleasure to have some highly respectable scholars and guests visiting our UBSN laboratories in the past few months.



Dr. Sanjiv K JHA
President of the Indian Association of Physiotherapist

Overseas academic experts invited by HTI



Overseas academic experts invited by CBS

Undergraduate Physiotherapy Students at Western Syndey University

Participants of PolyU Junior Researcher Mentoring Programme 2023

Participants of Tobii Glass Pro 3 Lab Visit

At UBSN, we hope to bring users useful knowledge regularly and inspire more innovative research at PolyU. If you have any requests or suggestions on equipment, please drop us a message!
For more UBSN news, please visit our website: https://www.polyu.edu.hk/ubsn/news-and-events/news/

Upcoming Events at UBSN

UBSN started hosting a series of equipment seminars and workshops.
A selected piece of UBSN equipment will be featured every few months.

This bimester features the "**Tobii Pro Glasses 3**" (Human eye tracker);
Up next in November we have **MED64** (Animal *In Vitro* electrophysiology).
We also have our first-ever **Open Day** in 2024. Seminars, lab tours and souvenirs will be organised!

Schedules will be posted digitally, stay tuned to our website and Instagram!
News or events can be accessed on our website:
https://www.polyu.edu.hk/ubsn/news-and-events/news/ and
https://www.polyu.edu.hk/ubsn/news-and-events/events/

Follow on Instagram:

@UBSN.POLYU

Have any questions? Interested in using our equipment? Please contact us!
Website: https://www.polyu.edu.hk/ubsn **E-mail: ubsn.enquiry@polyu.edu.hk**