HORIZON 2020 EXPRESSION of INTEREST

ISTANBUL UNIVERSITY

HULUSI BEHCET LIFE SCIENCES RESEARCH CENTER

COGNITIVE NEUROSCIENCE GROUP

ISTANBUL UNIVERSITY

Istanbul University is the first and longest-standing university in Turkey. Located in 5 Campuses and 7 Research Centers in and around the city, Istanbul University is a public academic institution comprising:

- 20 Faculties
- 7 Vocational Schools
- 2 Colleges
- 1 Conservatory
- 17 Graduate Institutes
- 60 Research Centers

The university is home to a total of

- 90,000 Undergraduate Students
- 15,000 Graduate Students
- 3,500 International Students
- 5,500 Academic Staff
- 6,500 Administrative Staff

Furthermore, Istanbul University holds two of the most renowned Medical Faculties in the country, namely Istanbul and Cerrahpasa, with 5,000 medical students and approximately 1,000 medical academic staff. These two faculties operate 2 grand hospitals. Including the Cardiology and Oncology Institutes and the Faculty of Dentistry, the hospitals of Istanbul University comprise a total bed capacity of 3,500-4,000, 2.5 million outpatients and 100,000 inpatients per annum.

According to the Academic Ranking of Worldwide Universities in 2011, Istanbul University ranked among the first 400 universities. Istanbul University has ongoing protocols with over 50 institutions worldwide spanning from USA to Europe and Asia along with over 500 Erasmus agreements. In 2006, the Nobel Prize for Literature was awarded to Orhan Pamuk, an Istanbul University graduate of journalism.

Hulusi Behcet Life Sciences Research Center has been recently built with support of Turkish Ministry of Development as a multidisciplinary research center to host the large-scale facilities for research in Genomics, Biotechnology, Neurosciences and Drug Research/Pharmaceutics.

COGNITIVE NEUROSCIENCE GROUP

The Cognitive Neuroscience group has a long-lasting background on non-invasive investigation of the neurobiological bases of human behavior by means of Electroencephalogram (EEG), Event-Related Brain Potentials (ERP) and Trans-Cranial Magnetic and Electric Stimulation systems. With recent addition of a research-dedicated 3 Tesla MRI system to the existing infrastructure, the group expanded its measurement capabilities to include high-resolution anatomic, functional and chemical imaging of
the neuronal tissue. The neuroimaging capabilities of the group are strongly backed-up at cellular and molecular levels through collaborations with the Neurobiology, Neurogenetics and Neuroimmunology laboratories of Institute for Experimental Medicine at Istanbul University.

The basic research of the group is focused on the investigation of anatomic, functional and effective connectivities of the brain in order to understand the dynamics of the large-scale brain networks during sensory-cognitive and affective processes. Although personalized medicine acquired currency through the progress in genetics, pathological changes in neuropsychiatric diseases depend by large on environmental factors, hence need the development of further biomarkers based on functional neuroimaging and electrophysiological techniques. Our studies are mainly based on the integration of fMRI, DTI and EEG measurements and relating them with the stimulation of neural tissue by transcranial magnetic (TMS) and electric stimuli (tDCS). Attention, memory, language, affective and cognitive aspects of decision making are primary areas of research. Development of advanced signal and image analysis techniques for multimodal neuroimaging, Brain-Computer Interfaces (BCI), application of BCI, TMS and tDCS methods for neuro-rehabilitation, neuro-ergonomics and neuroscientific evaluation of consumer behavior are applied aspects of the research.

The clinical dimension of the research is run primarily in collaboration with the Behavioral Neurology and Movement Disorders Unit of the Neurology Department of Istanbul Faculty of Medicine, which is the most known behavioral neurology and movement disorders reference center in the country. Unit sees patients from all the country and neighboring countries from the most common to the rarest of movement disorders, dementias and other neurobehavioral disorders and owns a special tissue bank (CSF, DNA, Serum). Academic staff is involved in many multinational studies including a running JPND project and in international clinical guidelines such as Parkinson’s Disease dementia, European Guidelines on the diagnosis and management of dementias etc.

Psychiatry, Neurosurgery, Neuroradiology, Pharmacology Departments and other parts of the Neurology Department such as stroke and epilepsy units are further collaborators of the Center. Hence, a large spectrum of neuropsychiatric patient groups such as stroke, epilepsy, psychoses, brain lesions and neurological risk groups can easily be recruited in clinical studies.

Contact details

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<tr>
<th>Country</th>
<th>TURKEY</th>
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<tr>
<td>Name of the organisation</td>
<td>ISTANBUL UNIVERSITESI (IU)</td>
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- **PHC-22-2015**: Promoting mental wellbeing in the ageing population
- **PHC-11-2015**: Development of new diagnostic tools and technologies: in vivo medical imaging technologies
- **PHC-24-2015**: Piloting personalised medicine in health and care systems
- **PHC-21-2015**: Advancing active and healthy ageing with ICT: Early risk detection and intervention
- **PHC-30-2015**: Digital representation of health data to improve disease diagnosis and treatment

Specific skills related to the research topic

- Development of advanced signal and image processing techniques for efficient analysis of
neuroimaging and electrophysiological data
- Multimodal imaging of brain anatomy and function based on the fusion of EEG, fMRI, MRS, DTI, TMS and tDCS modalities
- Experience in the diagnosis and management of neurodegenerative disorders
- Easy access to a large group of aging population with cognitive decline, movement disorders and other neurobehavioral disorders from the most common to the rarest
- Facilitation of multidisciplinary (translational) studies among a wide range of scientists from molecular biology, engineering, physiologists, pharmacologists and clinicians.

Proposed activities for the specific topic
- Neuroimaging and electrophysiological biomarker development for early detection of cognitive impairment in pre-MCI stage (SCI: Subjective cognitive impairment)
- Network modelling for neuropsychiatric diseases based on multimodal imaging of anatomic and functional brain connectivities using DTI, fMRI and EEG
- Assessment of EEG signatures of the resting-state networks of the brain observed with advanced neuroimaging methods such as PET or fMRI for the development of easy-accessible and cost-effective scanning technique for brain networks
- Assessment of the mechanisms of risks of systemic disorders such as hypertension, hyperlipidemia etc in cognitive decline and rational and personalized use of medication to minimize cognitive impairment in these disorders
- CNS-related mechanisms of systemic disorders such as hypertension, obesity etc.
- EEG and fMRI based neuro-feedback, rTMS, tDCS and exercise for the rehabilitation and slowing of neuro-cognitive decline
- Cancer pathways and their role in neurodegenerative diseases
- Vitamine D and its role in dementias and Parkinson’s disease
- Development for biomarkers for Parkinson’s Disease Dementia

References

Some of the already accomplished EC projects

<table>
<thead>
<tr>
<th>Project acronym / starting date</th>
<th>Main objectives</th>
<th>Main activities</th>
<th>Role in the project</th>
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<tbody>
<tr>
<td>EU Erasmus Program</td>
<td>Training and Supervision of MSc Thesis in Neurosciences</td>
<td>Graduate student from Bremen University performed MSc thesis on EEG biomarkers of PD-MCI</td>
<td>Receiving Institution</td>
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<td></td>
<td></td>
<td>Tamer Demiralp: Thesis Co-supervisor</td>
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<tr>
<td>EU Erasmus Programme</td>
<td>Advanced Neuroanatomy Course at Istanbul University</td>
<td>In collaboration with Dr. Adrian Danek’s group from LMU-Munich</td>
<td>Receiving Institution</td>
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<td>Tamer Demiralp: Coordinator</td>
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Some of the Ongoing EC projects

<table>
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<tr>
<th>Project acronym / starting date</th>
<th>Main objectives</th>
<th>Main activities</th>
<th>Role in the project</th>
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<tr>
<td>JPND BIOMARKAPD June, 2012</td>
<td>Standardization of AD and PD biomarker measurements across Europe</td>
<td>Creating a biobank with samples from well characterised AD and PD patients</td>
<td>Hakan Gürvit: PI</td>
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<td>Tamer Demiralp: Advisor</td>
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Some of the recent publications

Emir UE, Bayraktaroglu Z, Ozturk C, Ademoglu A, Demiralp T, Changes in BOLD transients with


Other

Prof. Dr. Tamer Demiralp served as member of the Advisory Board for Health of the FP7 programme in 2007 and 2008.