

National Collaborative Network on Applied Clinical Neuroscience in Iran; Justifications, Limitation, Possible Architectures, Priorities, and Strategic Plans

Neuroscience is the scientific study of the nervous system (Merriam-Webster Medical Dictionary). Currently, neuroscience is not just a branch of biology. Neuroscience is an inter and multidisciplinary science that has many branches and also receives contributions from other fields such as medicine psychology, mathematics, physics, chemistry, and computer sciences. Nervous system could be investigated through molecular, cellular, developmental, structural, functional, evolutionary, computational, systemic and pathological aspects and levels. Although, basic studies in neuroscience inspired scientists in different fields of biology and psychology, philosophers from different schools, and human scientists from various disciplines; but, clinically applied and translational studies in the field of neuroscience attract more attention from public audiences.

Also, it is very hard to dichotomize neuroscience to basic and clinical fields; but, we can consider neurology, psychiatry, neurosurgery, neuropsychology, neuroimaging and neuropathology as medical or clinical wings of neuroscience. Translational neuroscience could play an important role other than medical diagnosis and treatment, it could have a share and application in all sciences and technologies that human or any other innervated organism are subjects of study, such as criminology, sport sciences, ethics, cultural studies and etc. In this editorial, we aim to raise a question about possibilities and necessities for a national network on clinical aspects of translational neuroscience or Applied Clinical Neuroscience (ACN) in Iran.

Iran is one of the most progressing countries in the field of medicine among other developing nations. There are more than 1000 neurologists, 900 psychiatrists, 200 neuroradiologist, 500 neurosurgeons, 500 neurorehabilitationists, 3000 addiction physicians, 200 clinical genetics experts, 12000 registered psychologists, 40000 general practitioners and around 300 basic neuroscientists, neurophysiologists and cognitive neuroscientists (at least PhD holder) in Iran for around 70 million populations. These experts are working with high qualities in their own disciplines, but ACN is a multidisciplinary science and without serious collaborations between different disciplines, we will miss non-deniable number of applications of this field.

In ACN we can use neuroscientific biomarkers from different neuroscience disciplines for early and more accurate diagnosis, treatment planning and outcome surveillance. Molecular, genomic and epigenomic markers (BDNF, Neurotrophins, Neuropeptides and etc.), cognitive and neuropsychological indices, brain structural images (Morphometry,

Corticomtery, Tractography, and etc.) and brain functional markers (both electrical (QEEG and MEG) and molecular (BOLD fMRI, PET, ASL fMRI, and etc.) based functional data) could be used in a multidisciplinary collaborations in clinical practice. But, although, we have capabilities to measure these markers quantitatively and precisely in Iran, we usually do not use them in effective medical practices.

Brain functions in different cognitive domains could be subject of diagnosis for varieties of neuroscientific disorder and also target for treatment outcome measurement. Cognitive and neuropsychological assessment measures and their rehabilitation interventions are among the technologies that could not be transferred easily from another country. Assessment and intervention for decision making and judgment, social cognition, language, verbal learning and memory are cultural bounded and need substantial efforts and studies to validate measures and interventions in our cultural and language context. After development of culturally validated instruments, commercial or academic distribution of these tools and education of related human resources, then, integrating clinical neuropsychological measures in medical decision making, treatment planning and follow up, needs multidisciplinary collaboration among expert psychometricians, inetrpretators and clinicians.

Brain diseases such as dementia, multiple sclerosis, cerebrovascular disorders, traumatic brain injuries, epilepsy, neurodevelopmental disorders, psychiatric disorders, and drug addiction have been divided officially among neurologist and psychiatrists in most of the countries including Iran. But, recent advances in neurosciences, especially on biomarkers, enhanced horizons for diagnosis and treatment of these disorders in a team work from different disciplines of neuroscience. Unfortunately, lack of collaborative partnership as specialized medical teams for each of these brain diseases, seriously, has deprived clients from recent scientific progression in the field of ACN.

As it has been mentioned, we have thousands of experts in different fields of neuroscience that could act as human resources for ACN in Iran. But, most of these health care professionals are not arranged and trained as a part of a collaborative team. Arranging and facilitating multidisciplinary teams focusing on specific problems such as pain disorders, neurodegenerative disorders, traumatic brain injuries or etc. could train essential human forces and also could provide first nodes for building up a real collaborative network in Iran on ACN.

Based on what have been discussed above, we think that there is an essential need for a functional network among different disciplines, active centers, and experts in the field of ACN to enhance the quality of offered services to the clients in a nation-wide scope. Collaborative science and technologies networks are effective instruments for facilitating knowledge flow and values sharing and are essential for making fruitful and effective innovations or solutions in multidisciplinary sciences such as neuroscience. Several missions could be assigned for a network on ACN in Iran such as:

- a. Neuropsychological Assessment and Rehabilitation Material Development
- b. Essential Multi Disciplinary Collaborations Specialized for Different Brain Diseases; Intra and Inter Centers
- c. Collaborative Investment for Common Interests in Cutting Edge Sciences in the Field of ACN
- d. Overcome Regulative Barriers, Legal Deficiencies, and Lack of Needed Medical Certifications for Authorized Activities in the Field of CAN
- e. Sharing Available Instruments and Equipments Based on Signed Agreements
- f. Social Marketing for CAN

For starting a collaborative network in Iran, there are some concerns about architecture of the network, available resources, governmental supports or barriers, assignments and priorities. A Top-Down officially arranged network by a leading point, most probably governmental, such as “presidential office for science and technology collaborations” or a Bottom-Up, mostly non-official, network with members from stakeholder centers or experts with equal votes, is the main first question. TD networks usually receive governmental supports to build up essential background structures and provide first levels of supports to their nodes, but, BU networks should rely on current social networks and self motivation of stake holders. Several attempts have been started to buildup this justified network on ACN or more widely on whole field of neuroscience or even more comprehensively on all cognitive sciences and technologies through both TD and BU models in Iran, but, the final outcome will be appear in the future and we all are very hopeful on these efforts.

Hamed Ekhtiari, MD

Faculty Member and Director ,Translational Neuroscience Program, Iranian Institute for Cognitive Sciences Studies (ICSS).
h_ekhtiari@razi.tums.ac.ir

Mohammad Taghi Joghataei, MD

Head of Anatomy Department and Department of Neurosciences School of Medicine, Tehran Univ. Med, Sci., Iran.