Promoting Community Health by Applying a New Technique(fMRI) to Treat Neurological Diseases in the Health System

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Dear Editor

Brain is one of the most vulnerable and important organs, might be impaired due to genetically issues or life style. In some cases, the more complicated brain dysfunction may happen related to complex brain connections so brain will be faced more severe problem (1).These dysfunctions result in diseases such as Schizophrenia, Parkinson (A neurological disease caused by dopaminergic pathways destruction), Autism (Autism Spectrum Disorder (ASD)), Alzheimer, etc (2). Most of the cases would be diagnosed just After appearing the symptoms so the disease is in incurable phase.

Therefore early detection is an important and essential issue. Due to detect neurological disease and cure them, it is important to find how neurons and some functional part such as: vision, hearing and motor work(1).

On the other hand, according to statistics have been reported by global burden of disease neurological disabilities are one of the top ten main causes of illnesses and disabilities in Iran (3). Therefore it is important to attempt to reduce result of these illnesses as much as possible

It was the late 19th century when Angelo Mosso invented the 'human circulation balance', that could measure the redistribution of blood non-invasively during emotional and intellectual activities (3).

Charles Roy and Charles Sherrington linked brain function to its blood flow experimentally at Cambridge University in 1890 (4). The next step towards solving to the measurement of blood flow to the brain was a discovery by Linus Pauling and Charles Coryell in 1936 that oxygen-rich blood with hemoglobin was repelled weakly through magnetic fields, while oxygen-depleted blood with deoxygenated hemoglobin could be attracted to a magnetic field although less than ferromagnetic elements like iron. Seiji Ogawa at AT&T Bell laboratory realized that it could be applied for augmenting MRI, which could study merely the static structure of the brain as the differing magnetic characteristics of deoxygenated hemoglobin and hemoglobin due to blood flow to activated brain

regions would cause measurable changes in the MRI signal. BOLD refers to the MRI contrast of deoxygenated hemoglobin which was discovered by Ogawa in 1990 (5).

Neuroimaging is the term for approaches which directly or indirectly provide anatomically or functionally images of brain. There are two methods in this field: First, anatomical approaches such as: X-ray imaging, CT-scan imaging and the second method that studies on brain function is Magnetic Resonance Imaging (MRI) (4). Approaches such as Electroencephalography (EEG), Position Emission Tomography (6), Single Proton Emission Computerized Tomography (SPECT), Magneto Encephalography (MEG) and functional Magnetic Resonance Imaging (fMRI) have been extracted from the second method, fMRI is noninvasive approach, with great space resolution (about 1 to 2 mm) and medium time resolution (about 2 to 3 s for the whole brain), so it is the best approach to detect and treat neurological diseases.

All of the functional methods are established in the same steps. First, a signal is recorded during a sensory or motor or perceptual stimulation, secondly by analyzing the information, functional part of the brain will be estimated. Finally by using advanced statistical methods, neural networks of brain will be found and the results can enlighten brains world.

A few extensive categories are available in which fMRI is likely to contribute to clinical management:

1. Illustrating the abnormal function for diagnosis such as physiological imaging(7).
2. For instance, when structural neuroimaging indicated that people with schizophrenia have enlarged cerebral ventricles since the 1970s, some psychiatrists have persuaded the incorporation of such methods into their field(8).
3. Localizing the normal function related to brain lesions (i.e. presurgical mapping).

For example ,a recent survey from the European Union's E-PILEPSY project indicated that 82% of European epilepsy centers apply language fMRI, mainly while the suspected epileptogenic zone is near eloquent cortex(6).

4. Elucidating the mechanisms of recovery of function or development(e.g., fMRI propose some advanced tools for evaluating the functional reorganization after central nervous system injury(9)).
5. Functional imaging as a biomarker for evaluating disease progression or therapeutic response or projecting the response to therapy.

For instance, fMRI is a relative novel technique in the area of biomarkers for Alzheimer's disease(10).

Some studies have been conducted in the field of fMRI in Iran including the fields of addiction, Alzheimer's, epilepsy, etc. The Iranian Brain Imaging Database (IBID) was founded in 2017 with five main major objectives: providing researchers with easy access to a neuroimaging database, providing normative quantitative measures of the brain for clinical research purposes, evaluating the aging profile of the brain, examining the association of brain structure and function, and joining the ENIGMA consortium(11). Many prestigious databases with similar goals are currently available while they are still at the beginning.

In a nutshell, based on the facts mentioned above, the importance of this new technique is required, but unfortunately due to lack of knowledge about fMRIs benefits among health policy makers, there a few fMRI devices in Iran. On the other hand, by increasing the number of fMRI devices some preparations are required such as: suitable keeping situation, technicians, experts in statistical, neuroscience, medical physics and medical engineering. Using this science has a main and important role in medical researches improvement and can enlighten the new approaches to diagnose, Screening and prevention diseases.

Author's contribution

The authors all were involved in the whole article , M.GH and F.M. conceived of the presented idea. E.S. wrote the manuscript. All authors have read and agreed to the published version of the manuscript.

Conflict of interest

The author had no conflict of interest   .

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