A new understanding of the Brain and its clinical application

Tianjun Wang

ABSTRACT

The Brain in Traditional Chinese Medicine (TCM) is traditionally one of the six extraordinary organs and there are very few descriptions or guidance of its relevance in clinical practice. In the development of TCM theories, what constitutes the governor of shen is an important area for exploration. Brain is viewed as another governor of shen and is most important in the regulation of shen. It houses yuan shen, which has two main meanings, spirit and yuan jing (yuan essence) which is the original material of shen. Yuan jing is the base of other materials and of the zang fu organs.

The clinical application of a new understanding of Brain* is to value the role of Brain, particularly in acupuncture, including the affiliated meridian of Brain, the Governor Vessel (GV) or Du Mai and to focus on the application of Du Mai points in the treatment of Brain related diseases, such as emotional conditions and original jing and shen related diseases.

Keywords: Brain, Traditional Chinese Medicine, Acupuncture, yuan shen, du mai

Introduction

There is an inside joke in China amongst scientists, particularly those who are against traditional methods, that ‘TCM has no Brain’. This has two meanings: Brain in TCM is not one of the main organs and also that TCM and its practitioners are not wise, obtuse even.

Brain in TCM is only one of the extraordinary zang-fu organs and its physiological functions and pathological changes are ascribed to the heart and correspond with the five zang-organs respectively. Brain on its own has no patterns and no treatments have been described for it.

Maciocia (2005), in section 2, ‘Identification of Patterns According to the Internal Organs’, listed all the zang-fu organ patterns, but none relating to Brain.

Some TCM practitioners believe that the organs in TCM are described more by their functions than their forms (Kaptchuk, 2000). Brain is discussed as being the meeting of the Marrow, called ‘the sea of Marrow’, which is encompassed by the jing or essence of the Kidney.
In modern Western medicine the brain is the most important organ, acting as a control centre. In contrast, in TCM Brain is not included as one of the major organs, i.e. the five zang-organs (Liver, Heart, Spleen, Lung and Kidney) and six fu-organs (Gallbladder, Small Intestine, Stomach, Large Intestine, Bladder, and Triple-Heater). There is not much written, as a single organ, about its foundation, function, patterns or its clinical treatments.

This paper is going to review the origin and the development of Brain in TCM, attempting to summarise the functions and patterns of Brain. Treatments of Brain itself will be discussed in accordance with TCM practice, particularly in certain areas such as brain related conditions and emotional diseases.

**The origin of Brain**

Brain was one of the important internal organs in TCM going back two thousand years. At the time of the Huang Di Nei Jing (The Yellow Emperors Internal Classic) there were different points of view on Brain and its connections. The Su Wen (Plain Questions), in chapter 11, talks about the different functions of the five-zang “I have heard different comments from different physicians, some take Brain as a zang organ, some take it as fu…” (Wang, 1997).

There are plenty of statements regarding Brain in The Yellow Emperors Internal Classic. The most important one is: ‘In the beginning of human life, the essence of life is formed first, then it develops Brain and spinal cord and Marrow, and finally, the human body is shaped. The skeletons are like the wooden pillars on the two sides of the wall, the channels are like the barracks connecting each other, the tendons are like the strings, the muscles are like the walls, and the skin and hair are protecting the bones, channels, tendons and muscles.’ (Ling Shu (Spiritual Pivot), scroll 3, chapter 10) (Wang, 1997). This indicates that Brain is formed first, before the other tissues and organs and therefore conditions the others.

Other statements include: ‘All the Marrows belong to Brain’ (Plain Questions, chapter 10) and Brain is the sea of Marrow’ (Spiritual Pivot, scroll 6, chapter 33), ‘The head is where the Spirit locates’ (Plain Questions, chapter 17), etc. (Wang, 1997).

The Internal Classic believed that the Brain was related to mental activities, audio and visual senses, as well as certain functions of body movement. It also noticed: When pricking the head,
if Brain is hurt erroneously, the patient will die immediately (Plain Questions, chapter 52). Therefore, Brain is considered to be of the utmost importance and a vital part of life.

Marrow combines to form Brain, which is contained in the cranial cavity. As the locations of Marrow are different, they each have their own names, the bone Marrow, the spinal marrow and Brain. The spinal Marrow communicates with Brain, flowing up to Brain and down to the coccyx, in other words corresponding to the cerebrospinal cord.

The formation of Marrow is related to the congenital essence and acquired essence. Basically, Marrow is manufactured by the Kidney-essence. Kidney stores essence which manufactures Marrow. Furthermore, the essential substances produced from food and drink supply nourishment to the bone marrow via the bone cavity, which reinforces Brain. Thus, either insufficiency of congenital essence, or impairment of the acquired essence may affect Marrow formation.

In summary, Brain is a very important organ and above the other zang-fu viscera. The physiological function of Marrow has three aspects: To nourish Brain, to supplement the bones and to engender Blood.

**Brain is the house of yuan shen**

The TCM theory of Brain did not develop further from the time of the Huang Di Nei Jing until the Ming dynasty when Li Shizhen (1518-1593), in his book the Compendium of Materia Medica (Bencaogangmu 1596), pointed out: “Brain is the residence of the original mind” (Maciocia 2005, p112), explaining that Brain is the source of mentality, consciousness, thought and mental activities. Maciocia (2005, p112) stated that ‘from the Ming dynasty (1368-1644) onwards some doctors attributed the ‘residence’ of mind to Brain rather than heart.’ However the difference between mind and original mind was not explained.

*Yuan shen* refers to the ‘possession shen’ or ‘prenatal shen’ of Brain. It is the source of all the other shen. It is the largest and most honoured shen and dominates life. Yuan shen is innate and governed by Brain.

There are two meanings of *shen* in TCM. The broader meaning refers to the general manifestations of life activities, as essence and *qi* are the substantial foundation of *shen*. The narrower meaning relates only to the mind and mental activities (Wang 2002, p9).
The word *shen* can be translated in many different ways in English, such as spirit, mind, consciousness, vitality, expression, soul, energy, God, psyche or wisdom. From a grammatical point of view, it can be a noun, adjective or verb (Maciocia 2005, p112).

TCM considers *shen* to be one of the ‘three treasures’ that constitute life: *jing*, *qi* and *shen* or, essence, the life force and the spirit. *Shen* is an important integral part of health and well being. The ‘three treasures’ represent three different states of condensation of *qi*, ranging from *jing* (more fluid, more material) to *qi*, more rarefied, and *shen*, even more rarefied and immaterial. Intellectual and emotional functioning are distributed throughout the body. Each *zang-fu* organ system in TCM is associated with an emotion and with a spirit or aspect of intellectual capacity.

In classic TCM theories postnatal *shen* lives in the Heart. *Shen* is specifically said to live in the blood vessels (part of the system of the Heart) and to be nourished by Blood. In TCM pathology, therefore, deficient Blood may fail to nourish *shen*. Alternatively, Heart may disturb *shen*.

The state of *shen* is said to be visible in the eyes (Rossi 2007 p50). Healthy *shen* produces bright, shining eyes, with vitality. Disturbed *shen* produces dull eyes, which seem to have a curtain in front of them - as if no one were behind them. Disturbed *shen* is often seen in those with long-term emotional problems or after serious shock (even a shock that occurred a long time ago).

Healthy *shen* depends on the strength of Essence (stored in Kidney) and *qi* (produced by Spleen and Stomach). Thus, *shen* is dependent on the prenatal *jing* and the postnatal *jing*. If Essence and *qi* are healthy, *shen* will be nourished. As mentioned above, *shen* lives in the Blood, part of Heart system in TCM. Blood is closely related to *qi* in TCM, and is formed from the postnatal *jing* derived from food and fluids, hence Blood formation is simultaneous with that of the formation of *qi*.

In summary, *yuan shen* refers to ‘possession shen’ or ‘prenatal shen’ which is innate and governed by Brain, while *shen* or Heart *shen* is the postnatal *shen* which is housed by Heart and nourished by Blood.

**The function of Brain**

The function of Brain could be summarised as *being*: To dominate life, to be the centre of physical activities and to govern the mental activities.

Chapter 33 in the Spiritual Pivot (Huang Di Nei Jing, Lingshu) states: “If the sea of Marrow is insufficient, there may be vertigo, tinnitus, aching in the neck, dizziness, visual blackouts and lethargy.” (Wang, 1997)

Because Brain is formed by the convergence of Marrow produced by the *yuan qi* (Essential *qi*), the pathological mechanism of Brain occurs when insufficient *yuan* essence brings about a failure to produce Marrow and the deficiency of Marrow fails to replenish Brain, leading to the
decline of Brain functions. The manifested pathological changes include weakness of vitality, decline of intelligence and abnormality in the ears and eyes. The pathological mechanism is caused by the debility of the body, overstrain of Brain, or lack of proper care due to protracted illness.

**Brain and Heart and other zang-fu organs**

According to the classic TCM theory of visceral manifestation, the physiological function and pathological changes of Brain are ascribed to Heart and correspond respectively with the five zang-organs. For example, Heart stores the mind and dominates joy; Lung stores the soul and dominates grief; Spleen stores the intention (memory) and dominates pensiveness; Liver stores the ethereal soul and dominates anger; Kidney stores the will and dominates fear.

In particular, Brain is most closely related with Heart, Liver and Kidney. "Heart is a monarch" and houses the mind and "Heart is the supreme monarch of all the organs"; Liver dominates the conducting and dispersing and regulates emotional activities; Kidney stores Essence and manufactures Marrow to fill up Brain.

Since Brain is closely related to the five zang-organs, in clinical practice many syndromes attributed to Brain are included in the five zang-organ syndrome differentiation and treatment.

Long-term memory is more connected to Kidney whilst short-term memory, focus, and concentration are more connected to Spleen in TCM. Various emotions have a relationship with different TCM organ systems, but the “house” of emotions (the centre of our emotions) comes from Heart.

However, Brain is the house of yuan shen which is the source of all other shen (Li Shizhen, see above). In addition, Brain is formed first, before the other tissues and organs, and then conditions the others. Therefore Brain controls and regulates other zang-fu organs, particularly when they are in a severe condition or unbalanced over a long period of time.

**Du Mai (Governor Vessel) is the Channel of Brain**

All the 12 zang and fu organs have their affiliated channels, which transport qi and Blood, connect the zang and fu and associate external with internal as well as upper and lower.

But what is the channel of Brain? As stated above, Brain is the core of all zang-fu organs, it should have a channel to which it is affiliated. But until now the discussion is blurred and there is no clear representation in any text book. This is a challenge to TCM clinical practice, particularly that of acupuncture.
After reviewing classical books and the new understanding of Brain, it is believed that the *Du Mai* (Governor Vessel) is the channel of Brain. Plain Questions, chapter 60, states: ‘*Du Mai*···enters Brain’ . The Classic of Difficulties, chapter 28 states: ‘*Du Mai*···belongs to Brain’ .

*Du Mai* is the sea of all the *yang* channels and meets all the *yin* channels at the head. Thus *Du Mai* connects all the channels and could regulate all the *zang-fu* organs.

In accordance with other channels *Du Mai* has the following functions:

Circulating *qi* and Blood, nourishing the viscera and tissues

Brain and its connected systems need to be nourished in order to perform normal physiological activities. *Qi* and Blood circulate within *Du Mai* to nourish Brain and defend against exogenous evil in order to protect the body. The body must rely on the transportation and transmission of *qi* and Blood in the meridians and collaterals to remain healthy.

Response and conducting functions

Response and conduction mean that the meridian system functions in response to the conduction of the needling sensation and other stimulations. The phenomena of ‘getting *qi*’ and ‘activating *qi*’ while needling is a reflection of the response and conduction function of the meridians. Needling on *Du Mai* could activate the channel *qi* thus stimulating and regulating the Brain.

Regulating the balance

Similar to other meridians and collaterals, *Du Mai* can circulate *qi* and Blood and coordinate *yin* and *yang* to keep the relative balance of body activities. When a disease occurs, the symptoms of disharmony of *qi* and Blood and excess or deficiency of *yin* and *yang* emerge, which can be treated by acupuncture and moxibustion by stimulating the *Du Mai* regulative functions.

In addition, perhaps *Ren Mai* is also affiliated, or at least closely related to Brain as the Su Wen pointed out:’ *Ren Mai*···enters the orbita’ .(Plain Questions, chapter 60). This needs further study.

Brain is such an extremely important organ that *Du Mai* and *Ren Mai* are affiliated to it, or at least they are all closely related to Brain. Of course there are several other meridians which are directly or indirectly connected to Brain, such as foot-*yangming* (stomach meridian) and foot-*taiyang* (bladder meridian).

**Clinical application of Brain**
Guiding the examination of acupuncture points
In pathological conditions meridians become the routes by which pathogenic factors are transmitted. Pathological changes of the viscera and meridians can be revealed by abnormal reactions along the routes along which the meridians run. So meridians are also helpful for diagnosing diseases, which is recorded in the chapter on back-shu points in the Ling Shu (Spiritual Pivot-The back-shu points, chapter 51). Currently, acu-point diagnosis is made by examining whether there is tenderness, subcutaneous nodules, prominence and depression along the meridian routes or by pressing back-shu points and other related points.

Du Mai is the affiliated channel which could be used to examine the pathological changes of Brain. Zhang et al tested patients with depression on the Du Mai points and found positive reactions in 80% of patients. (Zhang et al, 2007).

Guiding therapeutic methods
The doctrine of meridians is extensively applied to treatment in all clinical specialties, especially to clinical treatment with acupuncture and moxibustion. Such guidance is well reflected in the location of acu-points which is done according to syndrome differentiation and the pertaining meridians, as well as the distribution and cyclical flow of the meridians. That is what 'locating acu-points along the meridians' means.

Only when the theory of meridians is thoroughly understood, can the accurate location of acu-points be ensured. The guiding significance of the theory of meridians is also reflected in the application of needling and moxibustion techniques. As the Du Mai is the affiliated channel of Brain, we can mainly select the Du Mai points to treat Brain and Brain related conditions such as depression, stress, anxiety, stroke, etc.

Also, the idea of 'guiding herbs', developed by attributing medicinal herbs to the meridians, is significant in understanding the indication and action of the medicinal herbs. For example, medical herbs to Du Mai are Fr Xanthii (cang er zi), Fr Lycii Chinensis (gou qi zi), Cx Cinnamomi (rou gui), Hb Pyrolae (lu xian cao), Rx Astragali (huang qi), etc.

Common Patterns of Brain and their treatments
Although similar patterns are included and discussed with regard to the other zang-fu organs, there is so far no text book which systematically explains the patterns of Brain. Rossi (2007), in the book ‘Shen: Psycho-emotional Aspects of Chinese Medicine’, listed two emptiness-xu patterns (emptiness of Heart and Spleen and emptiness of Heart yin with empty Fire) and five fullness-shi patterns: stagnation of Liver qi, Heart Fire, Liver and Stomach Fire, obstruction by

Based on the review of classic TCM books and the understanding of Brain functions, the common clinical patterns of Brain and their possible symptoms could be summarised as follows (they are in the process of being developed):

**Deficiency of Brain Marrow**

Vertigo, tinnitus, dizziness, stress, depression, visual dimness, insomnia or lethargy, infantile retardation of growth and closure of the fontanel, physical stunting, amnesia and dull facial expression, with a light-coloured or light red tongue and a thin and deep pulse.

Points selection: Du 20 (bai hui), Du 14 (da zhu), Du 4 (ming men), Ki 3 (tai xi), GB 39 (xuan zhong), and local area points.

Herbs: lu rong, gou qi zi, he shou wu, nu zhen zi, shu di huang, shan zhu yu, etc.

**Deficiency of Brain yang qi**

Stress, mental depression, insomnia or lethargy, amnesia and dull facial expression, general cold sensation, cold limbs and body, lack of spirited-ness, fatigue, with a whitish or pale tongue and a weak and deep pulse.

Points selection: Du 20 (bai hui), Du 16 (feng fu), Du 14 (da zhu), Du 9 (zhi yang), Du 3 (yao yang guan), plus local area points. Moxa could be applied.

Herbs: lu rong, lu jiao shuang, dang shen, ren shen yang ji gu, xian lin pi, rou chong rong, gou qi zi, etc.

**Stagnation of Brain collaterals**

Hemiplegia, facial paralysis, aphasia, pain or numbness of one-sided limbs, headache, dizziness, anxiety, with a light-coloured tongue with petechiae or purple spots and a wiry or taut pulse.

Points selection: Du 20 (bai hui), si shen cong (Ext), Du 16 (feng fu), Du 14 (da zhu), LI 4 (he gu), Liv 3 (tai chong), plus local or sickness area points. Moxa and / or electronic acupuncture could be applied.

Disorder of Brain *shen*

Mental depression, stress, anxiety, restlessness, insomnia or lethargy, delirium, murmuring, abnormal behaviour, anorexia, polyphagia, dementia, drooling, schizophrenia, etc., with a light tongue and thin coating and a wiry or slow pulse.

Points selection: Du 24 (*shen ting*), Du 20 (*bai hui*), Du 16 (*feng fu*), Du 14 (*da zhu*), *yintang* (Ext), Ht 7 (*shen men*),

Herbs: *cao hua long gu mu li tang* (see above)

Block of Brain orifices

Sudden loss of consciousness, shock, coma with delirium, twitch or convulsion of limbs, epilepsy, with a grey or black tongue and a rapid and weak pulse.

Points selection: Du 26 (*ren zhong*), Du 25 (*su liao*), Du 16 (*feng fu*), Du 1 (*chang qiang*); *shi xuan xue* (ten jing-well points); PC 6 (*nei guan*), Ki 1 (*yong quan*), etc. Also use needle-bleeding, EA, etc.

Herbs: *an gong niu huang wan*: *niu huang qing xin wan*, *zhi bao dan*, etc.

Generally Brain related diseases could be treated according to the above Brain patterns differentiation. They include headache and vertigo, stroke and brain injury, sleep disorders, stress and depression, tinnitus and deafness, Alzheimer's disease, Parkinson's disease, addiction, autism; some types of obesity, infertility, male and gynaecological diseases etc.

Conclusion

Brain controls and regulates other zang-fu organs, particularly when they are in a complex condition or unbalanced over a long period of time. Brain is the house of *yuan shen* which is the source of other *shen*. *Du Mai* (Governor Vessel) is the affiliated channel of Brain. There are commonly five Brain patterns and their treatments can be selected choosing mainly *Du Mai* channel points and related herbs as described above.

References:


