

Reciprocal Innervation: A Modern Explanation of *Nei Jing* Branching Methodologies

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Introduction

Paired relationships are an inherent aspect of Oriental medicine: *yin-yang*, superficial-deep, top-bottom, front-back, left-right, ipsa-lateral and contra-lateral. Yet many practitioners are left pondering how and why these dynamics facilitate such potent treatments.

In Chapter Sixty-Three of the *Su Wen*, titled *Miu Ci Lun* (On Contralateral Pricking) Huang Di, the Yellow Emperor, is similarly perplexed. “I am told there is a kind of contra lateral pricking, but I do not know why it is used.” Qibo, his court philosopher and physician explains:

When evil energy invades the skin and enters into the large collateral, it flows from left to right and then from right to left, up and down along the large collateral, which joins the channel and spreads to the four extremities. Because the evil energy runs in all directions not staying in a proper place, contra-lateral pricking is necessary.

Charles Sherrington, one of the first scientists to reveal neural control of posture, suggested, “Axons of associated neurons within a particular limb also cross the midline of the spinal cord to stimulate motor neurons of the opposing extremity.”

Throughout this exploration the comparison of Western models to Qibo’s *Nei Jing* theory will show that Oriental medical practices developed in ancient times can be explained and verified by modern Western neurological truths.

Though separated by time, language, and continents, it seems likely that Qibo and Sherrington might have enjoyed swapping ideas over a cup of tea. In an era where integrative centers are beginning to flourish, this type of cross comparison seems valuable, not only allowing Western trained colleagues to embrace Oriental medicine, but also for strengthening our own capacity to bring focused understanding, and intention to our treatments.

The information presented in this paper will highlight the correlation between ipsa-lateral and contra-lateral branching treatments described in the *Nei Jing*, with neurological responses known as reciprocal innervation and crossed extensor reflexes.

We will begin by looking at relevant citations from classical Chinese literature, as well as describing fundamental components of the peripheral nervous system.

The *Nei Jing*

The Yellow Emperor’s Canon, widely regarded as one of the pillars of traditional Chinese medicine, originally included eighteen scrolls, nine of which were known as the *Su Wen*, or Plain Questions. The remaining nine made up the *Ling Shu*, or Spiritual Pivot. Over time, the original scrolls were separated and expanded so that both books eventually contained eighty-one distinct chapters. Together they are the *Huang Di Nei Jing*, or *Yellow Emperor’s Canon of Internal Medicine*. The theoretical basis for branching treatments comes primarily from chapters twenty-seven and sixty-three of the *Su Wen* and chapter twenty-seven of the *Ling Shu*.

A dynamic banter of questions and answers between Qibo and the Yellow Emperor sets the stage for descriptions of many Oriental medical theories that reach out through the pages of time to inspire the development of neoclassical treatment strategies.

Discussion of Branching Methods By Qibo and Huang Di

In chapter twenty-seven of the *Ling Shu*, titled *Zhou Bi*, (*Bi Syndrome Pain All Over the Body*), Qibo is asked by Huang Di, “How to treat disease by pricking?” He responds, “If the pain is from below, prick above to stop the development of the disease.” Qibo also urges that after the initial treatment, “The site of pain should be pricked repeatedly even if the pain has stopped, to avoid it coming back.”

Ultimately in chapter twenty-seven of the *Su Wen*, titled *Li He Zhen Xie Lun* (Matters Needing Attention), Huang Di demonstrates a better understanding of the methods, “I know there is diverse pricking to the right side, or to the left, contra-lateral pricking of the upper part to cure the lower disease and pricking the left side to cure the right.”

Energetic, anatomical, branching relationships allow for treatments where a

painful elbow, for instance, might be addressed by needling the healthy elbow and knee on the opposite side of the body. Combining treatment methodologies described in chapter twenty-seven of the *Ling Shu* and chapter twenty-seven of the *Su Wen* with recent understandings of neural processes facilitates many possibilities for approaching treatment of pain.

Branching Possibilities

While knowledge of neural pathways was probably undeveloped in the era of ancient philosopher doctors such as Qibo, the concepts of *yin* and *yang* must have initiated a desire to understand the way in which different body areas and muscles corresponded and supported one another. After exploring fundamental components of the peripheral nervous system, we will see how neural pathways explain branching methods such as:

- Treating above for diseases below
- Treating the left side for diseases of the right
- Treating the upper body for diseases of the lower body
- Internal External organ pairs
- Six channel hand and foot pairings

The Autonomic Nervous System: “Normal” Neural Responses Vs. Reflex Arcs

The autonomic nervous system is the branch of the peripheral nervous system primarily associated with the involuntary control of skeletal muscles, smooth muscles, organs and glands. This system is comprised of the afferent nerve network, which includes all sensory nerves leading to the brain and the efferent nerve network, which includes all motor nerves leading from the brain to the muscles.

Pain is a general reaction pattern of three distinct, sequential phases: immediate, acute, and chronic. The mechanisms responsible for all three differ only slightly. During and immediately subsequent to an injury, “hard-wired” reflex arcs allow the body to protect itself by traveling quickly from the site of injury through the spinal cord and then back to the site of injury and

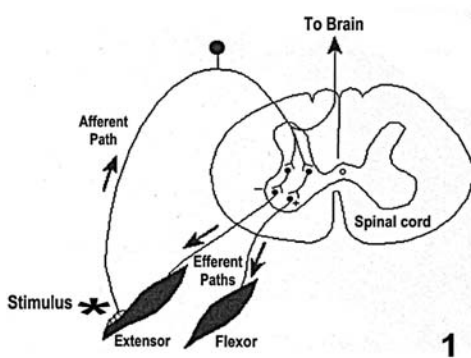
other corresponding muscles. On the other hand, bruised, contracted, and ischemic muscles that have developed from long term injuries elicit sustained neural responses that also involve the brain.

Because “normal” neural activation and reflex arcs differ only in whether the brain is involved, acupuncture, which evokes reflex responses, can be utilized to access muscles suffering from acute and chronic pain. Both reciprocal innervation and crossed extensor reflexes allow us to counteract painful, contracted muscles by activating ipsa-lateral and contra-lateral muscle groups. As we will see, these two neural pathways explain all of Qibo’s branching ideologies.

The Development of Reciprocal Innervation

René Descartes in 1626 was one of the first to conceive a model of reciprocal innervation as the principle that provides for the control of agonist and antagonist muscles. The concept of reciprocal innervation is associated with the notion of paired muscular activity. Skeletal muscles exist as pairs, which work “against” one another in order to reach optimum efficiency. Reciprocal innervation occurs so that the contraction of a muscle results in the simultaneous relaxation of the corresponding other, Diagram 1.

Reciprocal Innervation



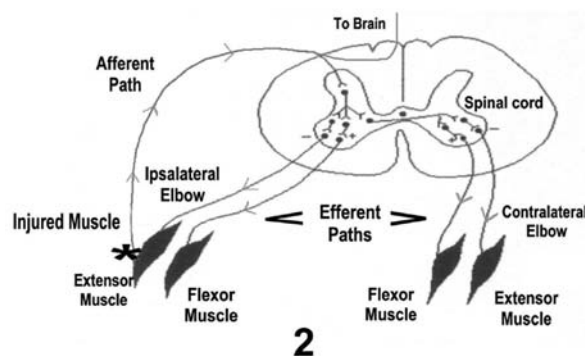
Crossed Extensor Reflexes

In 1884 Sir Charles Sherrington further developed Western concepts of neurological mechanisms while investigating proprioception and the neural control of posture. Sherrington found that reflexes must be considered integrated activities of the total organism. His theory was that the nervous system acts as the coordinator of various

parts of the body, enabling them to function toward one coordinated movement.

Sherrington’s work expanded Descartes’ understanding of opposing muscles on one limb to include “crossed extensor reflex responses” where the axons of associated neurons within a particular limb also cross the midline of the spinal cord to stimulate motor neurons of the opposing extremity, Diagram 2.

Crossed Extensor Reflex Response



Coordinating Branching Methods with the Neural Pathways

The balance methods described by Qibo are amazingly effective in the treatment of musculo-skeletal conditions. Perhaps unwittingly, ancient practitioners looking for appropriate “branching” points made use of reciprocal innervation and crossed reflex responses.

Palpating Shortened, Painful Muscles

Muscle shortening is a fundamental feature of musculoskeletal pain and is a result of continuous involuntary motor nerve activity. Contraction increases joint pressure, upsets alignment, and can bring about degenerative changes such as osteoarthritis. Interestingly, Dr. C. Chan Gunn, clinical professor for the Multidisciplinary Pain Center of Seattle, maintains that “while symptoms are unilateral,

latent signs may be mirrored contra-laterally. Diagnosis of pain requires clinical examination where shortened muscles can be palpated as ropey bands.”

Benefits of Needling

Needle rotation and “pecking” techniques engage and twist muscle fibers and produce intense reflex responses far more enduring than other forms of external stimulation.

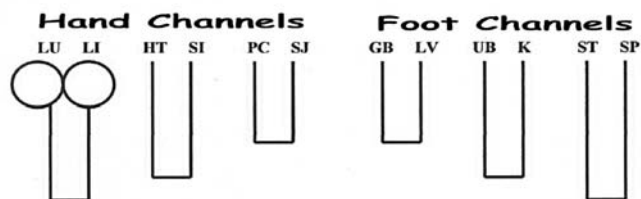
Acupuncture also allows for penetration of otherwise inaccessible para-spinal and gluteus muscles. When a needle is inserted accurately, an electrical discharge will cause muscles to fasciculate, contract, and then relax. Micro-traumas caused by needling dissipate fibrous tissue and cause local bleeding that initiates the delivery of platelet derived growth factor as the tissue heals.

The goal in all of the following treatment examples is to discover, through palpation, appreciation of neural processes, and branching ideology, ropey areas near the site of pain as well as in opposing flexor and extensor muscle groups. The efficacies of these methods have been verified through rigorous clinical application. With just one or two needles, acupuncture can homeostatically realign the balance between paired meridians, and release painful contracted muscles.

The Interior-Exterior Branching Relationships (Biao Li)

Zang-F u, or interior-exterior organ pairs, can access both reciprocal reflex responses and crossed reflex responses by incorporating the idea of hand channels treating hand channels and foot channels treating foot channels. Diagram 3 illustrates the lung and large intestine relationship described in the following case as well as the other hand-hand, and foot-foot pairings.

Hand-Hand, Foot-Foot, Interior-Exterior System



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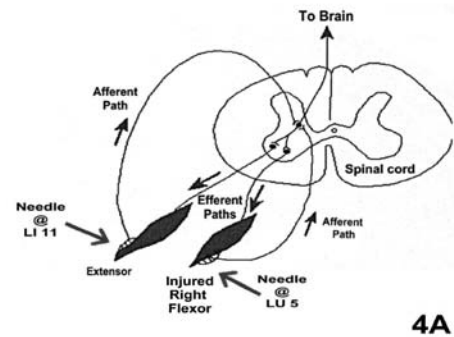
Hand-Hand Branching Case and Treatment

A patient complains of a right elbow pain near L 5, a flexor muscle area. Remember Qibo's advice! "If the pain is from above, prick below to stop the development of the disease first." LI 11 on the same arm, an extensor muscle area, "above", would be needled first. Qibo then suggests, "The site of pain should also be pricked." With this in mind, we would then needle directly into the injured area L 5, Diagrams 4 & 4A.

Ipsilateral Needling



Needle Induced Reciprocal Innervation

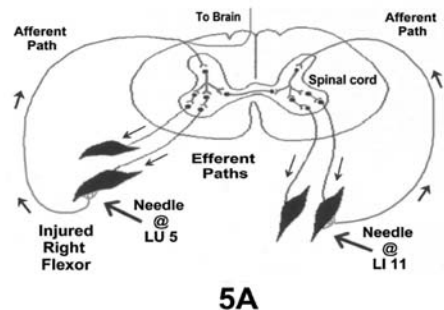


In order to access crossed extensor reflex responses, one treats not only the appropriate muscle group or meridian of the same limb, but also muscle groups on the opposing limb, as *Huang Di* proposes, "There is diverse pricking to the right side or to the left." In this case right elbow pain would be treated by LI 11 on the opposite side and L 5 on the injured side, Diagrams 5 & 5A.

Contralateral Needling



Needle Induced Crossed Extensor Reflex

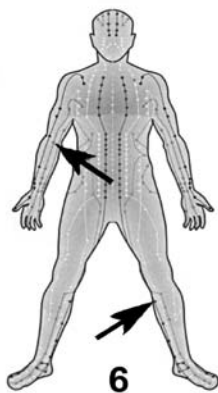


The Anatomical Image, Channel Branching system, (*Bei Jing*)

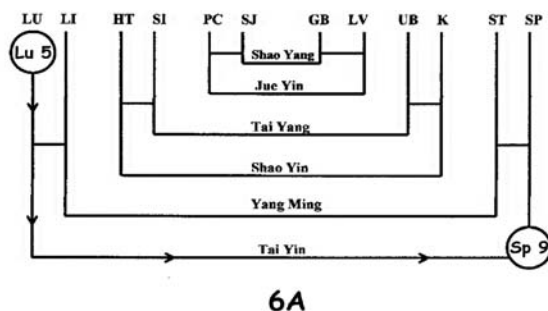
This is a further development of paired organ ideology. Here the Chinese concepts of channel-based anatomical zones are employed. Points are chosen on the opposite, diagonal side of the patients' pain and incorporate crossed extensor reflexes involving hand-foot pairings within a six channel pair. Again we review *Qibo's* instructions, "Contra-lateral pricking of the upper part to cure the lower disease."

Diagnosis of the channel involved is done by identifying the injured area's hand or foot six-channel association such as *tai yin*, *shao yin*, *jue yin*, etc. Next, the appropriate diagonal hand to foot channel pairing would be discerned. For clarity's sake we will again use right-sided medial elbow pain. Sp9 on the left foot-*tai yin* channel would be needled to treat an injury located at the right L 5, hand-*tai yin*, channel, Diagrams 6 & 6A.

Lu 5 & Sp 9



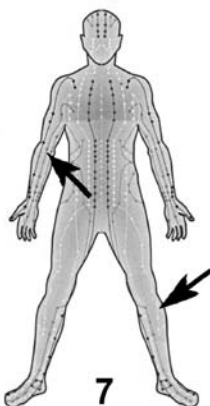
Six Channel, Tai Yin, Hand-Foot Pairing



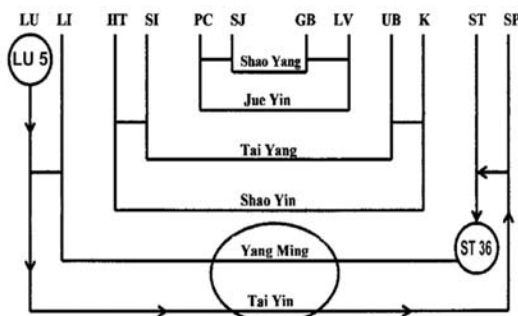
6A

Finally, the relationships of the six channel pairings can be expanded to involve the yin-yang, internal-external six channel relationships: tai yin pairs yang ming, shao yin pairs tai yang, and jue yin pairs shao yang. Using these associations as a guide, right foot-yang ming channel St 36 would be needled with L 5, (Diagrams 7 & 7A).

Lu 5 & St 36



Six Channel, Tai Yin-Yang Ming Pairing



7A

An initial diagnoses always precipitates the choice of which model will be used. In addition to the neurological and palpatory methods described earlier, anatomical correspondences such as ankle and wrist, elbow and knee, and shoulder and hip pairings can also help in finding the relevant muscle groups. Secondary symptoms involving the zang, or fu organs can be addressed with thoughtful selection of the correct branching pair. Finally, treatments can be expanded and consolidated with: Front mu, Back shu, yuan Source and other points that facilitate elemental confluence.

Final Thought

In chapter twenty-five of the *Su Wen* titled, *Bao Ming Quan Xing Lun* (Following the Principle of Nature in Treating), Qibo advises that in order to be a superior doctor one must:

First concentrate the attention, second take care of the body, and third know the actual property of medicine. If one can apply acupuncture therapy according to the principles of yin and yang, curative affects will be acquired as a matter of course. When one is serious in accumulating acupuncture knowledge and experience, unique achievements will occur.

Oriental Medicine’s ancient wisdom seems destined for fusion with the amazing insights that can be gleaned from modern Western technology. Full recognition, dedication, and integration of both will facilitate “superior doctors’” capacity to accomplish “unique achievements.”

References

Ciuffreda, KJ, and Stark, L. *Descartes’ Law of Reciprocal Innervation*.
 Gunn, C. *Gunn’s Approach to the Treatment of Chronic Pain*. Elsevier Science, 2003.
 Low, R. *The Secondary Vessels*. Thorsons Publishers Limited, 1983.
 Netter, F. *Atlas of Human Anatomy*. Novartis, 1998.
Peripheral Nervous System. www.wikipedia.org.
 Porth, C. *Pathophysiology*. Lippincott-Raven Publishers, 1998.
Reciprocal Innervation. http://en.wikipedia.org/wiki/Reciprocal_innervation.
 Rush, S. *The Balance Method of Dr. Richard Tan*. www.drtanshow.com.
Sherrington’s Law of Reciprocal Innervation. http://en.wikipedia.org/wiki/Reciprocal_innervation.
 Tan, R. *Twelve and Twelve in Acupuncture*. San Diego, 1991.
 Unschuld, P. *Huang Di Nei Jing Su Wen*. University of California Press, 1986.
 Wu, N. *Yellow Emperor’s Canon of Internal Medicine*. China Science and Technology, 1997.

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