

# **A Model of Juxtaposition, Explanation and Integration: relating Western Medical Biosciences and Traditional Chinese Medicine**

## **Abstract**

The model introduced in this paper is intended to allow the knowledge and perceptions of traditional Chinese medicine (TCM), particularly acupuncture, and those of western medical biosciences (WMB), to be approached and adequately discussed within a single overall framework.

This area of endeavour is one fraught with significant difficulties, perhaps the greatest of which are the vastly different conceptual frameworks and languages which attend these distinctly different paradigms. It is surely no surprise that satisfactory and adequate mutual explanation has largely defied the efforts of decades and centuries past.

The model presented here is thought to encompass the Jing Luo, Zang Fu, Wu Xing, pulse and tongue diagnosis, and the microsystems of acupuncture (hand, face, ear and scalp acupuncture). It is also thought to provide a framework for considering a juxtapositional view of TCM herbalism.

It is built upon a matrix consisting of an integrated notion of Depth, and a three tiered conceptual structure in which homeostatic control is largely considered within the context of a functional central nervous system (CNS) hierarchy - essentially along the caudal-rostral neural axis.

Almost all the papers and case studies posted to this web site do, and will, address issues of therapy and theory within the parameters established by this model.

The author welcomes comments and feedback on the ideas expressed herein.

## **Introduction to the Model**

The model proposed in this paper creates a framework for the explanation and integration of three major theoretical structures of TCM with the scientific knowledge of WMB.

It is thought to incorporate an explanation of the therapeutic procedures of acupuncture (particularly needling and moxibustion), an explanation of diagnosis by palpation of the points, Meridians and pulses, and suggests how TCM herbalism may be viewed within the context of the model.

The three theoretical structures are:

- i) the Meridian system - the Jing Luo,
- ii) the Chinese Organs - the Zang Fu,
- iii) the Five Phases of Change - the Wu Xing, as applied in the concordances of traditional Chinese medicine.

In seeking to encompass the perceptions of both east and west, the suitability and usefulness of any model must lie in the extent to which it combines the knowledge and practice of each within a single framework, and as a consequence, the extent to which it allows dependable,

consistent, and meaningful analysis between (and also within) paradigms. This is thought to be an important attribute of the model proposed here.

The model is grounded in western medical bioscience through its embrace of anatomy, neuroscience, endocrinology, and physiology, and so is inevitably based upon a cellular perspective of life.

Much of western scientific knowledge is validated clinically, as well as in the laboratory. Gross anatomy may be readily confirmed by dissection, and this knowledge has been disseminated in textbooks for many years (e.g. Williams et al., 1989). The validity of general (western) physiology has also been universally accepted for decades (examples of physiology texts are Berne and Levy, 1988; Ganong, 1995; Guyton, 1991). Ongoing research subjects both these areas to continual updating and fine tuning, especially physiology.

TCM is validated with some twenty five centuries of therapeutic experience and authentication (Porkert, 1974; Porkert and Ullman, 1988; Kaptchuk, 1983; Needham and Lu, 1980, Soulié, 1994).

The model presented here is thought to provide a framework for placing TCM theory within a valid and appropriate context in western medical bioscience, and vice versa.

## **Homeostasis and the basic structure of the Model**

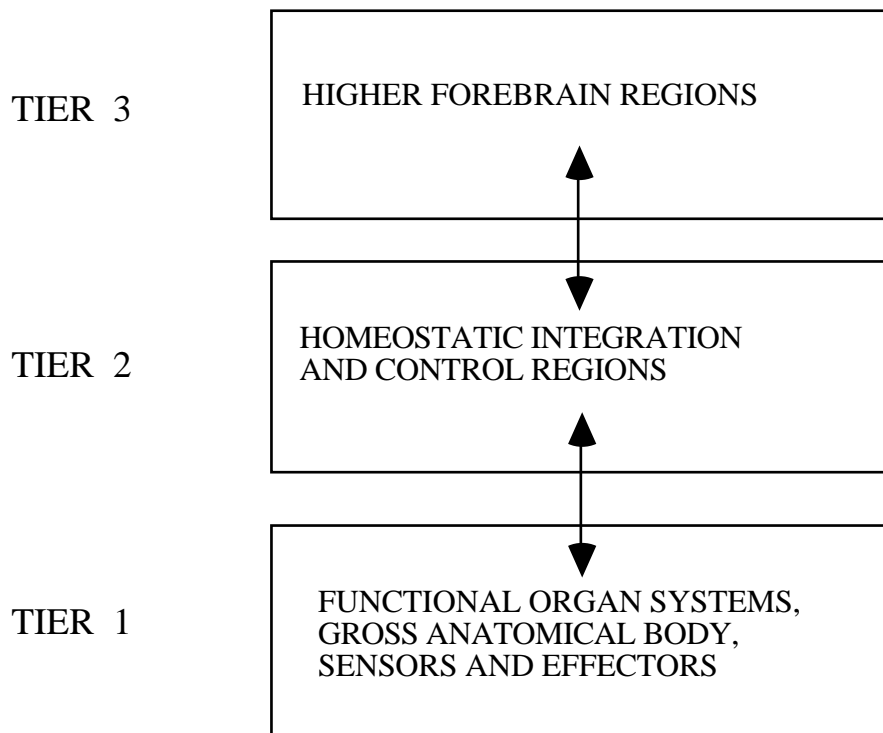
The concept of homeostasis is an essential feature of the model. Each Zang Fu, including its related Meridians (refer to various papers on the 'TCM Theory' web page for a presentation of much TCM theory), may be thought of as encompassing a complex homeostatic loop of large effect. With each being continuously and dynamically active - 'alive'.

Extending this line of thinking suggests that the Meridian System, the Zang Fu and the Wu Xing, may all be identified within the context of such dynamic and interactive homeostatic control mechanisms.

The model consists of three notionally separate (for pedagogic & illustrative purposes) but communicating tiers - refer to Figure 1. These create a functional homeostatic hierarchy, with much of the explanation of juxtaposition between east and west (particularly relating to medicine) found in and between tiers one and two. This is no more than one might reasonably expect as it is here that the existence and functional integrity of all animals is established and manifest.

Each tier communicates extensively and is continuously interactive within itself (termed here 'horizontal communication'), as well as with the other tiers ('vertical communication'). This is especially true of tier two, which may be thought of as acting as a functional bio-pivot between tiers one and three.

While separation into three tiers is useful for purposes of analysis, it is emphasised that *in vivo* the tiers function as an integrated dynamic whole, maintaining the overall health and well-being of the individual within 'normal' physiological parameters (albeit these being considerably variable). Each individual is obviously a single complex entity.



**Figure 1 The Model has three Tiers**

This diagram illustrates the three tiered structure of the model. It is based upon the concept of homeostasis and represents a dynamic and integrated homeostatic hierarchy. The arrows indicate pathways, both neural and humeral, which connect the tiers.

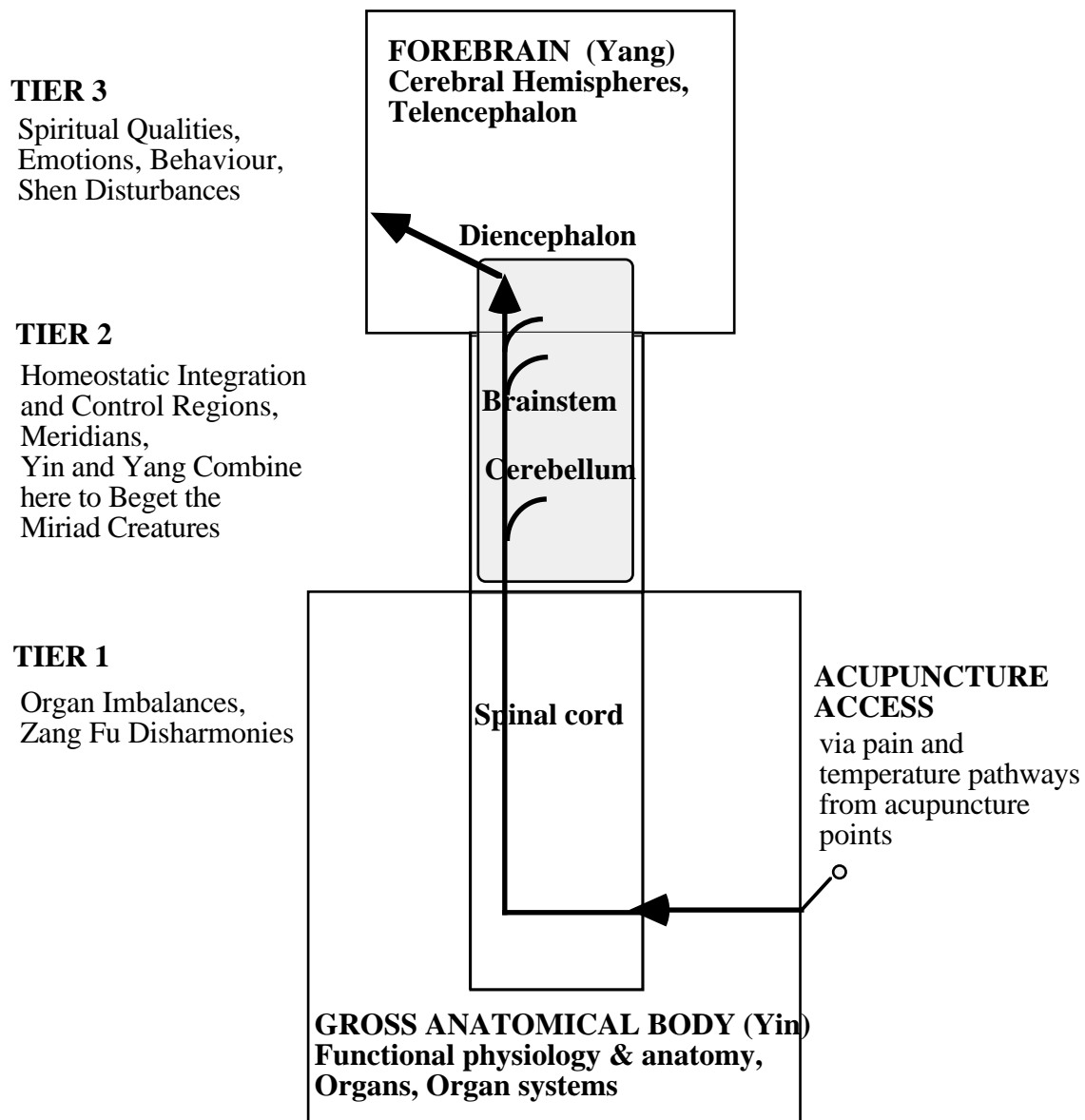
The *first tier* deals with functional physiology and anatomy in the gross anatomical body. It includes various components of organs and organ systems such as epithelium, fascia, bones, connective tissue, joints, muscles, organs, peripheral nerves, arteries, veins, lymphatic vessels and nodes, and endocrine tissue. Many of the sensors and effectors of this tier are primary input and output components of homeostatic mechanisms. This is the initial tier of the homeostatic hierarchy.

The *second tier* is focused in the brainstem, cerebellum and diencephalon. Especially included at this level are homeostatic integration and control mechanisms of the body's various organs and organ systems. This tier particularly includes regions of the central nervous system which control and modulate the autonomic nervous system and endocrine system.

Tier two is the middle tier of the homeostatic hierarchy, and probably the most important in securing the clinical effectiveness of acupuncture. It communicates extensively with both the other tiers. Because of this it may be thought of as a physiological fulcrum - between Heaven (forebrain) and Earth (gross anatomical body) [The idea of a physiological fulcrum is elaborated in another paper on this web page. A TCM theoretical structure, Heaven-Earth-Man, has been applied to this aspect of WMB anatomy and physiology].

The *third tier* deals with the cerebral hemispheres (telencephalon), where higher brain functions such as cognition and language are centred, and personality is largely established. Volitional and behavioural control over some aspects of homeostatic mechanisms are established in this tier. It is the highest tier of the homeostatic control hierarchy.

Figure 2 illustrates these ideas. It gives an overview of the conceptual framework of the model.



**Figure 2 Overview of Model**

This diagram illustrates the conceptual framework of the model.

## THE MODEL IN MORE DETAIL

The model is created by making a series of hypotheses that establish its parameters. It is introduced in three parts which together make up the complete model:

- A The Organs of traditional Chinese medicine: the Zang Fu
- B Therapeutic access to the Zang Fu
- C Interactions between the Zang Fu

### A THE ORGANS OF TRADITIONAL CHINESE MEDICINE: THE ZANG FU Hypothesis 1

Each TCM Organ is made up of functional and structural components (or regions), of each of the three tiers of the homeostatic hierarchy. Pathways which connect the three tiers, both neural and humeral, are included within the functional scope of a particular Zang or Fu.

#### *Elaboration of Hypothesis 1*

**Tier 1** This tier encompasses TCM Organ functions and structures in the gross anatomical body, and obviously embraces WMB functional physiology and anatomy of organs and organ systems. These may or may not correlate well across paradigms. For example, there is considerable debate as to how the San Jiao should be viewed in WMB (Larre and Rochat, 1992a; Kaptchuk, 1983; Maciocia, 1989); and are TCM Blood Vessels the same entities identified as blood vessels by WMB? Whatever the case in particular instances, the reason for creating this model is to establish a viable foundation for such questions to be productively pursued.

An integrated notion of Depth is also developed (refer to papers on this web page) which contributes to detailed integration and explanation between the paradigms. An overview is included here - refer to Table 1 and figure 7 in the appendix.

The focus of Table 1 is mainly, but not exclusively, in tier one. The Integrated Notion of Depth presents a framework which allows detailed east-west analysis of those components of the Zang Fu, and their interactions, which occur in this tier (Davis, 1993b, 1994a,b, 1995, 1996a,b). In other words, it is mainly a framework for the analysis of 'horizontal' communication in the gross anatomical body - particularly in tier one.

Together with the homeostatic hierarchy, the notion of Depth gives the model a three dimensional character which grounds and establishes it in the physical world of gross anatomy and physiology. A comprehensive three dimensional matrix is thereby created which facilitates detailed analysis. An example of such application is demonstrated in the juxtapositional analysis of the San Jiao in other papers on this web page.

In Table 1 the main functional focus of each Zang Fu is identified with a particular level of Depth in the gross anatomical body, and each level of Depth is correlated with a particular functional/ anatomical focus of western medical bioscience. [Refer to the appendix].

The Lungs, Spleen, Pericardium and Liver Zang have intentionally been placed midway between Depth levels C (Half External/Half Internal) and D (Internal). It is thought that while

the functions of these Organs are focused mainly in Depth level D, each also contributes in some measure to Depth level C. This is an issue for future detailed analyses.

**Table 1 Overview of an Integrated Notion of Depth**

(Focus is mainly but not exclusively in Tier One)

	<b>DEPTH A</b>	<b>DEPTH B</b>	<b>DEPTH C</b>	<b>DEPTH D</b>
<b>Depth Level</b>	<b>External</b>	<b>Strictly External,</b> but subject to direct physiological control	<b>Half External,</b> <b>Half Internal</b>	<b>Internal</b>
<b>Depth Image</b>	Completely External	External Controlled Workspaces; entrance to, exit from	Conduit of Communication, Distribution, Circulation, Irrigation, Unity	Completely Internal
<b>TCM Organ</b> (functional focus of)		Stomach Small Intestine Large Intestine Urinary Bladder	San Jiao Gall Bladder	Heart Kidney Lung Spleen Pericardium Liver
<b>WMS Correlation</b>	Everything external: air, water, soil, clothes, etc.	Lumina of: gastrointestinal tract respiratory system urinary system female reproductive tract	Internal Environment. Extracellular Fluid Compartment	Intracellular Compartment. Individual Identity is Established.

**Tier 2** This tier encompasses homeostatic control regions which are found mainly within the hindbrain, midbrain, and diencephalon. It necessarily includes aspects of the autonomic nervous system and endocrine system, and particularly includes the cranial nerve nuclei, reticular formation, hypothalamus and pituitary gland.

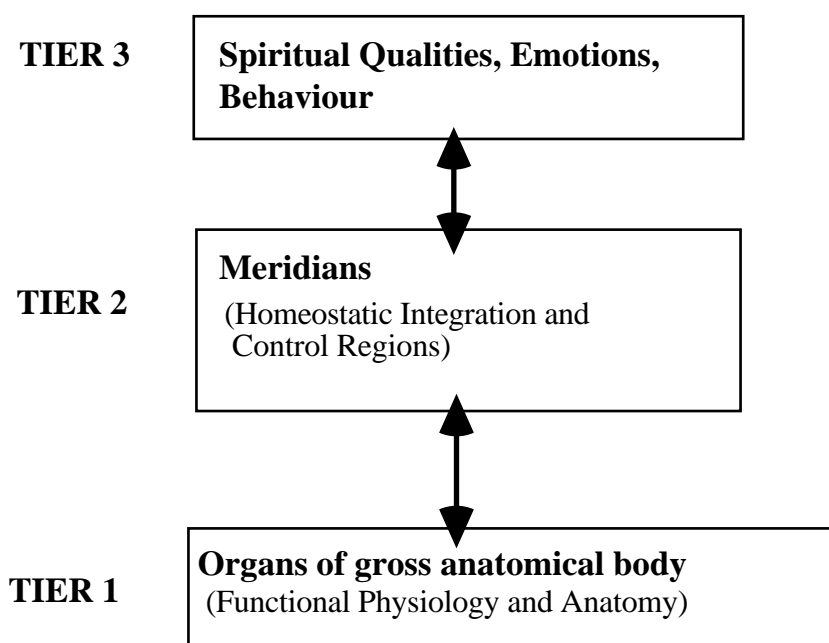
The Meridians are considered to be focused in this tier - refer to hypotheses 2 to 6 below.

Local homeostatic control mechanisms, such as gastrointestinal neurones and hormones, may be included in this tier or in tier one. They generally function under the overall control of the autonomic nervous system.

The spinal cord may be thought of as a transition zone between tiers one and two. At times it may be appropriate to include it in analysis of tier one, while at others, inclusion in analysis of tier two would be of greater value.

**Tier 3** This tier encompasses regions of the telencephalon which are involved in homeostatic control mechanisms, emotions and behaviour. The limbic system is included, as are areas such as the insula, sub-callosal gyrus, orbital cortex, and prefrontal cortex generally.

Figure 3 illustrates the application of the three tiered model to the Zang Fu. The diagram is drawn so that it may represent an individual Zang Fu, or the Zang Fu as a group. It shows the Meridians to be an integral component of the Zang Fu. This is true of all Meridians, but especially so of the twelve primary Meridians.



**Figure 3 The Zang Fu**

This diagram applies the three tiers of the model to the Zang Fu. It may represent an individual Zang or Fu, or the Zang Fu collectively. Note that the Meridians are an integral component of the Zang Fu.

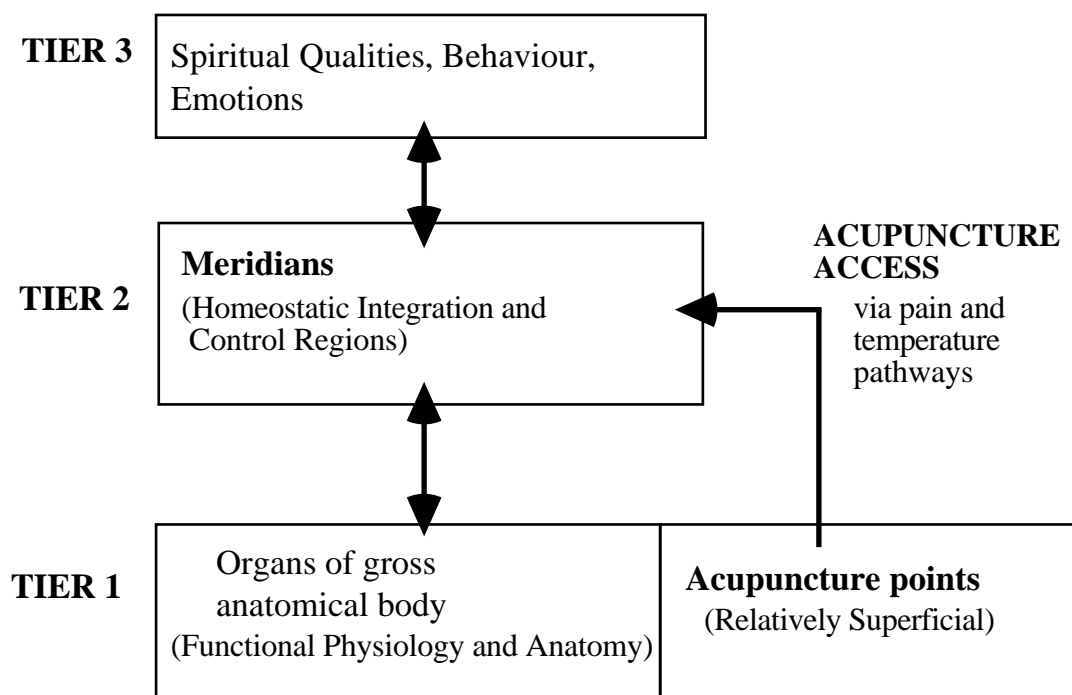
**B THERAPEUTIC ACCESS TO THE ZANG FU****Hypothesis 2**

Each Meridian is an integral component of its pertaining Zang or Fu. The Meridians are mainly focused in tier two of the homeostatic control hierarchy. Each one contributes directly to (i.e. participates in) the homeostatic integration and control area of its pertaining Zang Fu. Major bio-pathways between the tiers, both neural and humeral, are considered to contribute to the Meridians.

**Hypothesis 3**

The Jing Luo represents on the periphery (on skin, superficial fascia, skeletal muscle) the major neural relationships and interconnections that occur in homeostatic control regions. The Jing Luo may therefore be thought of as representing a peripheral 'reflection' of the functions of tier two and its interactions with the other tiers.

Each Meridian may be viewed in this light, as may the whole Jing Luo system. This view includes the various types of Meridians such as the twelve primary Meridians, Luo Mai, Eight Extra Meridians, Divergent Meridians, etc.



**Figure 4 The Meridians**

This diagram applies the three tiers of the model to the Meridians. It is similar to Figure 3 except that here the Meridians are emphasised and acupuncture access to homeostatic control regions is included.

## **Hypothesis 4**

Acupuncture points provide precise access to homeostatic control regions via neural pathways from the periphery. Each acupuncture point provides a different point of entry into a homeostatic hierarchy and consequently has a different impact, however great or slight that difference. This is the basis of specific acupuncture point functions, and the basis of different treatments for different illness presentations. Refer to Figure 4 for an overview.

## **Hypothesis 5**

Therapeutic access to integration and control regions of the homeostatic hierarchy (of the central nervous system) is gained in the first instance via neural pain and temperature pathways from acupuncture points. Such neural pathways include the spinothalamic, spinoreticular, and spinomesencephalic pathways.

## **Hypothesis 6**

There is a dynamic cybernetic therapeutic relationship between acupuncture points and Meridians on the periphery, homeostatic integration and control regions of tier two, and then either rostrally with tier three (higher forebrain regions), or caudally with tier one (gross anatomical body), or more likely, a combination of both these tiers.

Such a cybernetic relationship, between the periphery and tier two, is continuously and dynamically interactive and works in both directions. Manipulation of acupuncture points has an impact upon tier two, but equally, the activity of tier two determines the current 'state' of the points and Meridians on the periphery. They therefore 'reflect' tier two, as per hypothesis three.

This is the foundation of diagnosis by palpation of the Meridians and points, and clarifies the significance of Ah Shi points. The current state of tier two (and its interactions) is therefore able to be investigated and 'exposed' in diagnosis.

This approach clarifies the Chinese inclination to focus upon the somatic (physical) expression of what may otherwise be regarded in the west as affect - emotional expression - when discussing signs and symptoms.

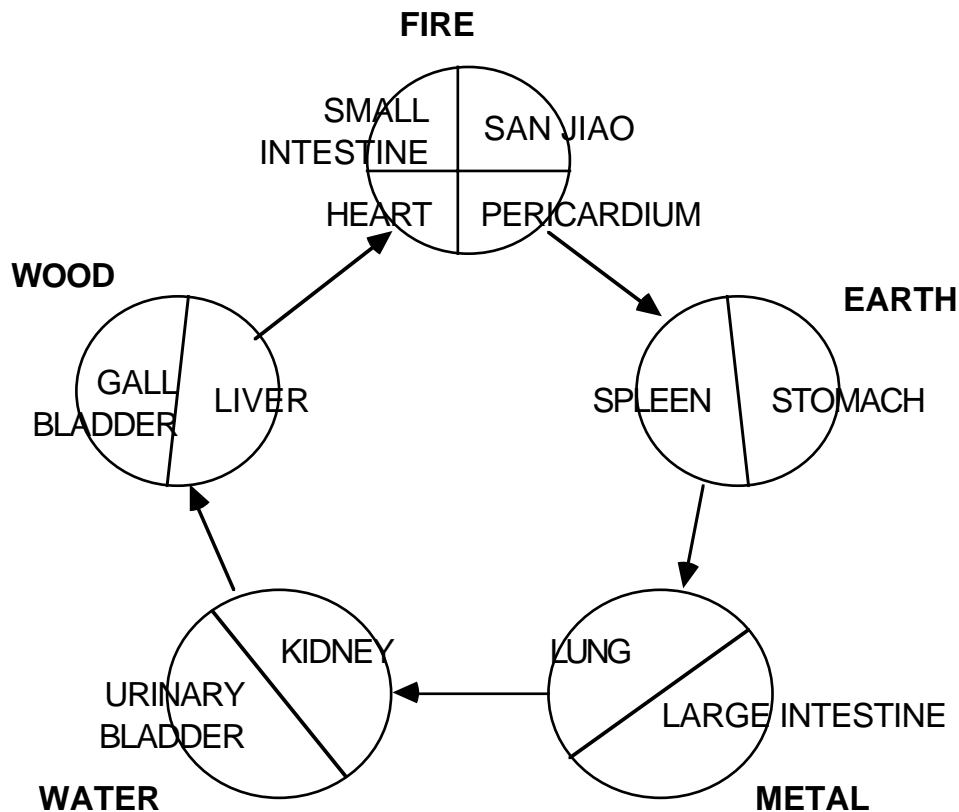
**C INTERACTIONS BETWEEN THE ZANG FU**

Interactions between Organs may occur within an Element or between Elements.

Those that occur within an Element must necessarily occur between Yin and Yang partners unless the Fire Element is involved, in which case interactions are possible between four Zang Fu.

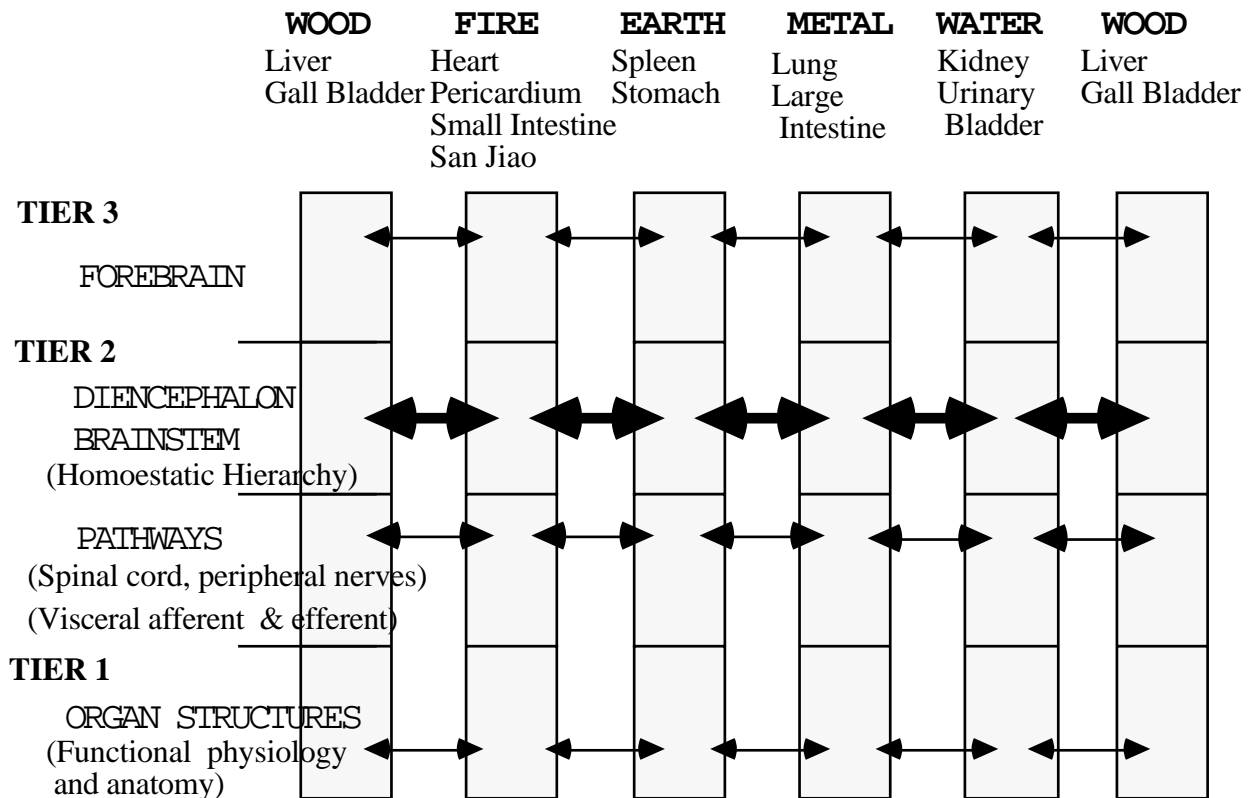
**Hypothesis 7**

Connections between TCM Organs of different Elements may occur within any tier (horizontal communication). But such interconnections are largely centred in tier two. It is in this tier that Meridian activity and interactions are mainly thought to occur, as are the interactions of the Wu Xing. This is illustrated in Figures 5 and 6. Figure 6 places most TCM interactions within the framework of the model.



**Figure 5 The Wu Xing**

This diagram is a typical illustration of the Wu Xing. All TCM Organs and their related Elements are shown. Interactions between the Elements are largely thought to occur in homeostatic control regions of tier two.



**Figure 6 WMS and the Zang Fu: Interactions within the Wu Xing**

This diagram places the interactions of the Wu Xing within the context of the model, so it is an elaboration of Figure 5. The Wood Element is placed on either side of the diagram to emphasise the circular nature of the normal presentation. The heaviness of the arrows gives an indication of the intensity of interactions. The spinal cord and peripheral nerves are separated in tier two to emphasise the considerable interactions which occur in these components of the central nervous system.

**Hypothesis 8**

Interactions between Organs of the same Element (e.g. Liver and Gall Bladder, Kidney and Urinary Bladder), may occur in a 'vertical' direction between the tiers (vertical communication), or in a 'horizontal' direction within a tier (horizontal communication). Functional relationships between such Organs may occur in any of the three tiers.

**Hypothesis 9**

Pulse and tongue diagnosis are both thought to fit within the parameters of the model. Both these diagnostic methodologies can be seen to monitor peripheral expressions of the current state of bio-activity in tier two.

The central neural pathways and homeostatic control mechanisms which participate in these systems are found along the neural axis of the spinal cord, brainstem and diencephalon - mainly in tier two, although all tiers participate.

The micro-systems of acupuncture - ear, face, hand, foot and scalp acupuncture - access tier two homeostatic control mechanisms in a similar way to conventional meridian acupuncture.

## DISCUSSION

Although the model is presented at a high level of abstraction and may appear too schematic to be useful in detailed analysis, it has been applied on several occasions to shed (WMB) light on a number of areas of TCM theory (Davis, 1992, 1993a,b, 1994a,b, 1995).

This analysis has included topics such as the nature of the relationships between Heart/ Small Intestine (Davis 1994a), Stomach/ Small Intestine (Davis 1994a,b), Spleen/ Small Intestine (Davis 1994b), gastrointestinal tract and Small Intestine (Davis 1994b), Bladder/ Small Intestine (Davis 1995) and Kidney/ Bladder (Davis 1995). Asthma (Davis 1993a) and Diabetes Mellitus (Davis 1992) have also been considered.

It is also applied in other papers of this web page where the San Jiao is discussed in some detail. In the analysis of the San Jiao it becomes clear that taking the pulse (at any site, not just on the radial artery at the wrist [*cun kou*]), is a matter of monitoring the activity of the cardiovascular centres of the medulla oblongata and subsequent autonomic connections.

This is a key component of the homeostatic hierarchy of the Fire Element, so this major diagnostic tool, taking the pulse, fits squarely within the framework of the model. Tongue diagnosis is thought to fit in a similar way.

By thinking of the Zang Fu in this way, TCM herbal medicine may be seen to be encompassed by the model as well, with particular herbs or formulae having their therapeutic impact on individual Zang Fu in one or more of the three tiers.

While space does not permit a review of previous efforts at east-west explanation and integration, the author believes this has very likely been occurring in some form (formally or informally) since early missionary contact with the Chinese some three and a half centuries ago. The model proposed here contributes to that ongoing process.

Readers interested in the history or current state of east-west integration are encouraged to consult authors such as Bensoussan (1991), Lu & Needham (1980), Pomeranz & Stux (1989), O'Connor & Bensky (1981), Jayasuriya (1989), and Soulié de Morant (1994), as well as the various papers available on this web site.

In conclusion, this paper is offered to the profession as a starting point for a healthy and vigorous debate on the matter. It is hoped that it stimulates sufficient interest for this to occur.

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## **APPENDIX: A WESTERN PERSPECTIVE OF 'DEPTH'**

An integrated west-meets-east view of the Six Divisions has been discussed briefly elsewhere (Davis 1995).

The diagram, figure 7, A Western Perspective of Depth, illustrates the WMB framework of Depth that the author has used in this approach to integration and explanation. It presents a highly schematic WMB view of the body as a functional continuum from external to internal, or superficial to deep, with four conceptual levels of Depth (A,B,C,D), and three Barriers (1,2,3) separating the Depth levels.

The Shao Yang Division, and particularly the San Jiao Fu, is thought to be largely focused in Depth level C (Half External/Half Internal), which represents the internal environment of the body. Tai Yang and Yang Ming are considered focused in Depth level B (Strictly External). The Yin Divisions are considered focused in Depth level D (Fully Internal), and perhaps also C (Half External/Half Internal).

A fuller discussion of this concept of Depth may be found in other papers on this web page.

Figure 7

A WESTERN PERSPECTIVE OF DEPTH

