

Systems Traditional Chinese Medicine

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Given the complexity of the human body, a systematic investigation of all building blocks at different levels, including molecules, cells, tissues, organs, and organisms, will give us a better understanding and more appropriate management guides for our body. Current mainstream medicine lacks such a global view. By treating a single symptom, mainstream medicine tends to overlook the fundamental causes of illness and often risks undesired side effects. Growing public awareness and social and economical pressures have called for more personalization, predictability, and prevention in modern medicine. These have increased interest in existing traditional medicines, particularly traditional Chinese medicine (TCM), which has been widely practiced in many eastern Asian countries outside of China. Unfortunately, TCM can be difficult to understand and to appreciate as it involves a highly complicated holistic system view. TCM stresses harmony and balance at several different levels within human body and with the surrounding environment.

We first summarized the attractions of TCM including its abilities to cure both symptoms and related causes, to suppress unwanted side effects, and to personalize treatment and promote prevention. We then briefly discussed problems in applying TCM, particularly over subjectivity in diagnosis and its dependence upon expert practice. We pointed out that the lack of sound explanation for TCM's efficacy and TCM's reliance upon philosophical bases have undercut wide acceptance for TCM among doctors and patient. We thus applied the approaches in modern systems biology to explore and to elucidate TCM. These approaches can foster broader acceptance for TCM and help to inspire advances in mainstream medicine.

First we have examined the guiding principles for diagnosis, analysis, and deduction of diseases in TCM. We have investigated six of the so-called "eight guiding principles" including exterior and interior, cold and hot, excess and deficiency. Using bold but reasonable simplification, we have identified the essence of those six principles. We have found that we can construct a three mutually perpendicular axes coordinate system (Fig.1) with X1 axis to express the nature of diseases, X2 axis to show the location and severity of the diseases, X3 to show the strength of body in combating against diseases. All of the positive directions, namely leftward, backward and upward, coincide with the direction of yang, while all of the negative directions, namely rightward, forward and downward, agree with the direction of yin. We can thus describe the status of a patient in a three dimensional TCM space. We have also identified all regions of different combination of yin and yang along the three axes X1, X2 and X3. (Fig. 2)

With such models, we can provide TCM practitioners many different routes for treatment, as well as suggest the most effective treatment plan. These models help to explain two special features in TCM, namely, different treatments for the same disease and same treatment for

different diseases in a more rational way. Furthermore, our results will also be able to help TCM practitioners to quantify TCM.

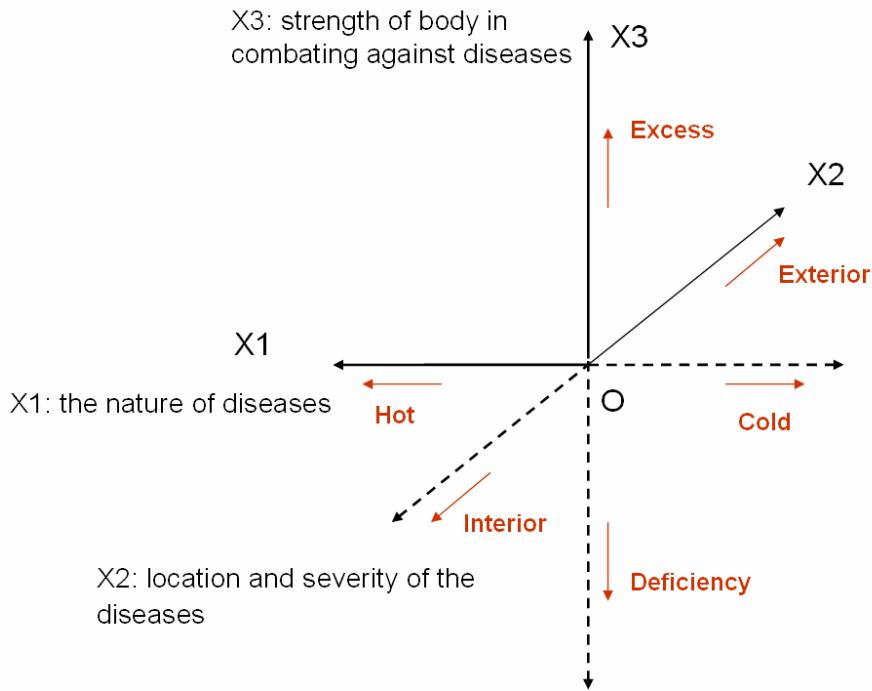


Figure.1 Three Dimensional TCM Space

$X1 \geq 0$ Yang $X2 \geq 0$ Yang $X3 \geq 0$ Yang	$X1 \leq 0$ Yin $X2 \leq 0$ Yin $X3 \leq 0$ Yin
$X1 \leq 0$ Yin $X2 \geq 0$ Yang $X3 \geq 0$ Yang	$X1 \leq 0$ Yin $X2 \leq 0$ Yin $X3 \geq 0$ Yang
$X1 \geq 0$ Yang $X2 \leq 0$ Yin $X3 \geq 0$ Yang	$X1 \geq 0$ Yang $X2 \geq 0$ Yang $X3 \leq 0$ Yin
$X1 \leq 0$ Yin $X2 \geq 0$ Yang $X3 \leq 0$ Yin	$X1 \geq 0$ Yang $X2 \leq 0$ Yin $X3 \leq 0$ Yin

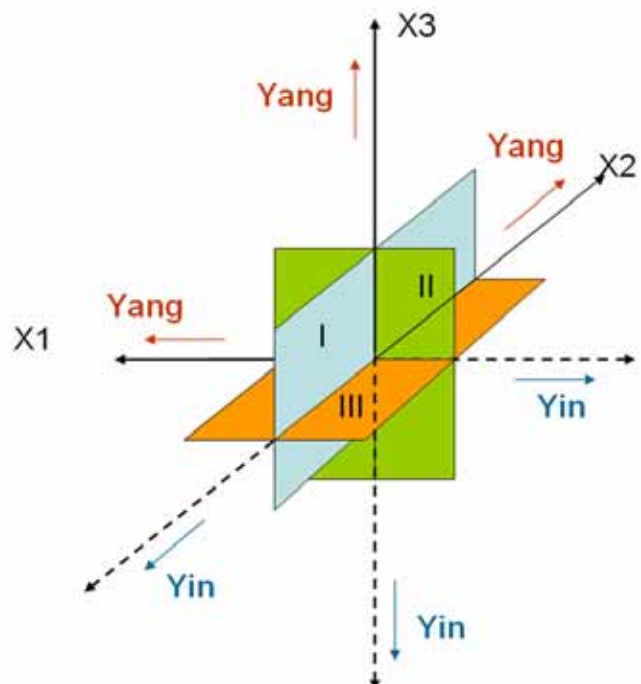


Figure.2 Regions of Yin and Yang.