

Concepts of body constitution, health and sub-health from traditional Chinese medicine perspective

Rose YP Chan, Wai Tong Chien

Rose YP Chan, Wai Tong Chien, School of Nursing, Faculty of Health and Social Sciences, The Hong Kong Polytechnic University, Hung Hom, Kowloon, Hong Kong, China

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Correspondence to: Wai Tong Chien, Professor, School of Nursing, Faculty of Health and Social Sciences, The Hong Kong Polytechnic University, Hung Hom, Kowloon, Hong Kong, China. wai.tong.chien@polyu.edu.hk

Telephone: +852-27665648 Fax: +852-23649663

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Abstract

This paper described and discussed the important literature and ideas about the concepts, types and measurement of body constitution, in terms of healthy, sub-healthy and disease status. In view of traditional Chinese medicine, "healthy" state is a status of relative balance of Yin and Yang to keep our bodily homeostasis. If there are significant physical and/or psychological stressors, such as loss of a beloved one and failure in study or work, the body can no longer keep its own bodily condition balanced and subsequently enter a state of "sub-health" (sub-optimal health). "unhealthy" body constitution such as "Dampness-heat", "Cold-dampness" and "Heat- or Cold- dryness" with a subnormal body temperature and humidity and clinical manifestations such as insomnia, malaise and overweight will be presented. Immediate, appropriate strategies such as modification of life-style and seeking medical treatment can prevent evolution of an illness. Otherwise, the body will enter a disease status with a "pathological" body constitution of "Yin or Yang deficiency", "Blood-stasis" and/or "Phlegm-dampness". To be complimentary with health promotion and disease prevention in Western medicine, understanding about an individual's body constitution, together with its

determinants (*e.g.*, healthy eating and lifestyle behaviors), can contribute to a more proactive, holistic and individualized healthcare.

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Key words: Body constitution; Health; Sub-health; Disease; Traditional Chinese medicine

Core tip: This article discussed the concepts of body constitution in traditional Chinese medicine, which can reveal and advocate an individual's bodily condition and functioning and thus contribute to a more proactive, holistic and individualized healthcare. We critically discussed the concepts, types and measurements of body constitution in terms of three main health statuses - healthy, sub-healthy and disease. With better categorized "healthy", "sub-healthy" and "unhealthy" patterns of one's body constitution, the levels of bodily resistance (strong or weak) and functioning of internal organs (adaptive or mal-adaptive), as well as the balance of "Yin and Yang", can be easily differentiated and maintained.

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INTRODUCTION

Chronic diseases such as cancer, arthritis, dementia and stroke impose wide varieties of medical and health problems and poor quality of life^[1] and even take away a lot of people's lives every year. As a result, these diseases can cause huge burden to the health care costs across countries^[2]. In addition, it is also estimated that the aged popu-

lation (65 years old or above) will increase from about 8% in 2010 to 16% in 2050^[3]. As such, the incidence and prevalence of chronic diseases, especially in the middle age and older people, will continue up-surfing. Besides disease prevention, prophylactic intervention such as healthy eating and lifestyle and early seeking medical advices and treatments can be considered in health promotion and/or interfering the disease development during the pre-morbid stage.

“Sub-health” is commonly used to describe the condition of pre-morbid or prodromal stage of health problems among health professionals in mainland China. The concept of “sub-health” was developed on the basis of the “third state of health” first introduced by Professor Buhemann in the Soviet Union^[4], to describe there is a sub-optimal health status in-between the healthy and disease condition. People who have subjective complaints about early symptoms and discomfort may not receive a confirmed medical diagnosis by the physician (Western medicine) because of the negative or unclear results of medical or pathological investigations. According to a survey conducted in 2006 on 3624 people in China, more than 75% was at the state of sub-health^[5]. The researchers suggested that majority of these people might soon proceed to certain kinds of medical disease, if not treated or intervened. However, many people may feel unacceptable, unbelievable and helpless at the time of receiving a medical diagnosis of one life-threatening disease; and sometimes, they may feel regretful for not having taken care of themselves or their beloved one properly. It is therefore questionable whether we can intervene on the sub-healthy condition with prophylactic treatments before it is confirmed with a medical diagnosis.

Traditional Chinese medicine (TCM) advocates “treating an illness before it happens”^[6], that is to give intervention or treatment according to one’s body constitution whenever it shows changes in patterns and thus appears to be unhealthy. The term “body constitution” (BC) is commonly used in Chinese medicinal literature and culture to describe one’s current health status, reflecting his/her bodily condition and functioning^[7]. People are empowered to take care of themselves with lifestyle modifications and/or proper dietary practices, according to their BC prior to any illness occurrence, and thus crucial to “promote health, prevent disease and enhance longevity”. TCM practitioners give individualized treatment to each client according to his/her BC^[8] and treat disease “from its root” (*i.e.*, the causes or rationale behind the presenting signs and symptoms)^[9]. Therefore, knowing one’s own BC is one of the most important steps to promote his/her health condition, as well as his/her quality of life.

In recent 30 years, TCM practitioners and researchers have put much effort to develop a clear concept of BC. But till now vigorous debates and discussions are persisted on several important topics, including mainly the definition and types of BC, categorization of BC by using the common medical terms of TCM, and symptom dif-

ferentiation in terms of different types of BC^[10]. In views of the complexity of the concept of and different beliefs and perspectives toward BC, this paper is to describe and discuss the important concepts and views of BC in terms of health, sub-health and disease conditions in order to increase our understanding and reveal the significance of BC to the knowledge of TCM, as well as our health and well-being.

CONCEPT OF BODY CONSTITUTION AND ITS MEASUREMENT

Starting from the ancient time, people have been very interested in knowing the commonalities and differences on characteristics and features of human beings, between individuals and/or among ethnic groups/flora. Interestingly, even though different perspectives or systems between the Western and Eastern parts of the world, their central themes or concepts of classification of biological features in humans or animals are very similar. In general, people are classified into groups based on their morphology, which is similar to elephant or deer^[11], or on a whole picture of physiological and psychological conditions such as in terms of “four body fluids” introduced by Hippocrates, including sanguine, phlegmatic, bilious, and melancholic^[12]. This belief is compatible with the principles of TCM in understanding about the “types, shapes and states” of a human body in relation to BC stated in the Yellow Emperor’s Canon of Medicine^[11]. According to the “Yin-Yang” theory, different body appearances and personalities can be classified into “25 Types of People” in terms of their skin color, body shape, personality, and adaptation to natural environment and climate change^[11].

Not until the Hon Dynasty, a famous TCM scholar Cheung Chung-king indicated that the body nature or condition was related to the disease occurrence, development, treatment and prognosis. He suggested that different kinds and severity of symptoms could co-exist in the course of the illness for different people even when they suffered from the same disease, or received the same medical diagnosis. This may be due to the differences on their individual body conditions, which can be categorized people into different types of body characteristics such as strong, weak, ulcer, and bleeding types, regarding one’s risk or tendency of disease development^[13]. Cheung’s suggestions had nourished the concept of BC and researchers started to adopt TCM terms in the classification of BC in the late 19th century. A few TCM experts in China, especially Professor Kuang DY and Professor Wang Q, shared about their views and initiated in establishing the theoretical framework and concepts of BC.

Conceptually, BC represents the nature of the person’s morphosis, physical and psychological components at one point of time, or sometimes a short period^[14]. Although Kuang^[15] argued that one’s psychological status should be classified in terms of temperament, it is well known to be affected by both congenital and acquired factors, together with relative group tendency (in relation to their

environmental and cultural situations) and absolutely personalized bodily condition. Each person should possess a few characteristics similar to their ancestors such as skin and hair colors, bodily appearance and features and stature. Similarities and commonalities of basic bodily health and functioning may co-exist in a racial or an ethnic group, because they are likely to share common characteristics and backgrounds in relation to their living environment, race, eating behaviors and life habits, interest, and basic genetic manifestations^[16]. For instance, a group of children or elderly people who are at the same developmental stage may possess similar bodily features and physiological characteristics earmarked by that particular human developmental stage. Interestingly, the BC of the closest family members such as parents, siblings and twins can be unique, while some diseases such as *Hepatitis B* carriage gene can be inherited from parents. In addition, body frame of the Western people are often bigger than that of the Eastern people because of their differences on genetic manifestation. Due to different combinations of personal, environmental, social, cultural and geographical factors, the BC of people can be absolutely different between each other. Parents' health, especially those mothers during pregnancy and even genetic changes or mutations, can impose much varied levels of impacts to the bodily condition of the next generation. For instance, congenital heart disease may be developed when fetus is growing in his/her mother's uterus^[17], and the HIV infection can be transmitted during birth^[18].

Despite one's BC being influenced by various external (*e.g.*, environment and climate) or internal (*e.g.*, hormonal or sudden changes in biological conditions) factors, it seems relatively stable due to the governance of family inheritance or genetics, race and sex, imposing lifelong effects to an individual's bodily condition. Throughout one's developmental life stages, BC changes progressively within and between each life mileage and, however, critically in a few essential life stages such as from children to adolescence^[19]. But prolonged or significant internal and external factors may induce continuous changes, or capricious shifts in different lifestyle patterns or behaviors such as work^[20], eating behaviors and living environment^[21]. However, these effects to the BC may become settled, or constant, once the person can adapt well to the influencing factors, resulting from an effective buffering mechanism ("strong" in bodily condition) inside the human body^[22,23]. But if the stress or its ill effects are prolonged, negative (maladaptive) and dysfunctional patterns of BC will appear.

Kuang^[24] indicated that BC would initiate pathological changes within body during the transitional periods of pre-diagnosis (prodromal stage) and convalescence. Therefore, it is believed that BC may contribute to the level of susceptibility and clinical outcomes of a disease, presenting in various forms, characteristics (like signs and symptoms), or patterns of resistance and reactions towards the existing internal and external stimuli. Therefore, Kuang^[24] also suggested that physical and psycho-

social development and environmental changes of an individual can induce progressive changes to one's BC; and its obvious changes often occur during the life development milestones such as pregnancy, middle age and menopause^[19].

In addition, shifts of types and features of BC will also be caused by both internal and external factors, including parents' health and inheritance, environmental stressful situations and emotional frustrations, exercise and eating habit^[25], bodily disease and treatment^[26]. Similarly, it is also believed that "unhealthy" BC can be adjusted by medications^[27] and diet^[28]. Modifications of parents' or mother's BC could indirectly improve, or jeopardize, the health status of their baby over the period of fertilization and/or pregnancy^[29].

In order to understand one's own BC, on-going assessment by using the four classical diagnostic skills of TCM^[30], including inspection (patient's facial colour, tongue sign and external appearance), listening (patient's voice and coughing sound) and smelling (patient's body odour), inquiry (patient's complaint) and palpation (patient's body part and pulse) and questioning are crucial.

Different measurement tools of BC can also be considered in TCM diagnosis and research. The 60 items Constitution in Chinese Medicine Questionnaire (CCMQ) is a widely used assessment tool in China developed by Zhu *et al.*^[31] in 2006 to measure nine types of BC, including Gentleness, Qi-deficiency, Yang-deficiency, Yin-deficiency, Phlegm-wetness, Wet-heat, Blood-stasis, Qi-depression and Special diathesis. The strength of the scale is the vigorous face and content validity done by the Chinese Medicinal experts. However, a few limitations are noted. First, only concurrent validity has been demonstrated with SF 36 and body mass index^[32], and thus the sensitivity and specificity of the instrument is in doubt. In principle, healthy BC should not be identified in patients with disease. Interestingly, "Gentleness" (healthy) type of BC was identified in ill persons, using this CCMQ, such as 37.4% of 147 subjects with liver cancer^[33] and 43.6% of 101 subjects with hypertension^[34]. Another concern is the use of retrospective data that examined on the signs of illness within one year is considered unreliable due to the result bias and difficulty in reporting those repeatedly occurring items. Wang *et al.*^[35] criticized that the nine subscale (*i.e.*, nine types of BC) of the CCMQ was confusing, non-specific in categorizing BC types, and indicating inconsistent of results by using both the Chinese Medicinal terms in pattern differentiation and the allergic reaction in Western Medicine (especially for the "Special diathesis" subscale). The specificity of the instruments are questionable in assessment of BC.

Ho *et al.*^[36] in 1996 developed a 96-item Chinese Construction Questionnaire (CCQ) by clustering analysis of > 5000 sets of data from people in different provinces of China to identify six types of BC, including "Strong", "Weak", "Trend-Cold", "Trend-Heat", "Trend-Dampness", and "Blood-stasis". This assessment scale is flexible in detecting types of BC; clustering analysis can be

used in order to identify additional types of BC based on the six basic types mentioned above. Researchers identified eight types of BC in 809 hepatitis B patients^[37], and 16 types in 879 obesity people^[38] by using the CCQ. As the questionnaire is too lengthy and with limited evidence on reliability and validity, it has not yet been widely used.

In Taiwan, Su^[39] in 2008 developed a self-rating 22-item BCQ⁺: A Body Constitution Questionnaire to assess Yang-Xu (*i.e.*, the energy levels of different bodily functions in terms of five internal viscera). The questionnaire is easily administered and indicated satisfactory psychometric properties such as content validity and internal consistency. Nevertheless, it only focuses on a single dimension of bodily condition (Yang-Xu) and thus shows incomplete picture of BC. Similarly, several scales measuring single type of BC such as the Yin-deficiency Questionnaire^[40], Yin Scores and Yang Scores^[41], and Cold-Heat Pattern Questionnaire^[42], Phlegm Pattern Questionnaire^[43], and Kidney deficiency Syndrome questionnaire (KDSQ)^[44] have been found for TCM diagnosis. There are also a few measurement tools of health condition using the concept of BC, such as the Health Scale of Traditional Chinese Medicine^[45] assessing health perception and Chinese Quality of Life Instrument^[46] assessing the health-related quality of life.

In conclusion, BC not only can describe and represent the current bodily condition of an individual, which is relatively stable over time, but also can reveal progressive changes and responses toward the internal and external stimulations in a person's body. A healthy person with strong and functional internal organs is able to better adapt and remain healthy if the overall stimulations and their bodily responses are below one's threshold of bodily resistance or satisfactorily coped with homeostasis mechanisms of the body. This is also compatible to the concept of "health and illness continuum" in Western medicine^[47], in which health of every person condition is not constant, for instance, people may feel mild discomfort during daytime but then they feel better again spontaneously or after taking rest and self-regulatory actions such as taking a snap and drinking cups of water. However, for a vulnerable person with sub-normal function of the internal organ(s), or "sub-health", progressive pathological changes will occur and thus the person's health condition may shift from a normal or "healthy" to an "abnormal" BC.

Common types of BC

In general, two major types of BC, including normal and abnormal, can be categorized and considered to be more simplified and easily understood in describing one's bodily condition and functioning. While the term "normal" implied a healthy, positive and good, a "normal or healthy" BC should be pointed to an absolute healthy condition without any signs of disease and on the other hand, with strong and pleasant appearance and good functioning in all main body organs and systems such as nervous, cardiovascular and respiratory system, as well as being

able to indicate "normal" results in various physical and psychological investigations^[48]. A normal BC should also present with good hardiness and quality of life and having adequate ability of coping with stress, and high adaptability to external socio-economical and natural environments. On the other hand, an "abnormal" BC implied unhealthy, negative or poor bodily condition. Wang^[8] adopted the term "biased" or "deviated" to describe such an abnormal condition, describing it as "sub-health" in association with specific type(s) of disease(s) or ill condition. However, most recent classifications of BC focused on the pathological changes of the bodily condition^[10], thus increasing the use of more complex pattern differentiations to classify different types of BC.

In modern China, researchers based on the perspective of TCM practitioners to develop more than 60 taxonomies of BC^[10]. As suggested by Kuang^[24], while many practitioners may believe that BC were mainly abnormal relating to pathological changes, it is noteworthy that some have recognized a few types of BC to be "healthy" or "normal". The classifications of BC much varied, from two to 16 types. Recently, Kung^[49] has summarized 19 major classifications of BC (see Table 1) developed between 1978 and 2002.

All of them were developed on the basis of the theories of TCM and clinical symptoms of diseases. One major commonality among these classifications is that they have adopted "patterns" (of features or signs) in the concept of TCM to explain the bodily condition. For instance, 10 of them considered the level of "fluid", "Qi" and "Blood", 9 adopted the theory of "Yin and Yang", 10 adopted "Phlegm", and 3 included "Hot" and "Cold". In addition, the other concepts included in the classifications like "Strong" and "Weak" (in 2 classifications), visceral functions (6 of them), and "normal" types of BC (15 of them). In recent years (2006-2013), most TCM researchers based on Wang's^[67] nine types of BC (Gentleness, Qi-deficiency, Yang-deficiency, Yin-deficiency, Phlegm-dampness, Heat-dampness, Blood-stasis, Qi-depression, and Special diathesis) to look into different kinds of illnesses or diseases, in particular dementia^[68], ischemic stroke^[69], osteoporosis^[70] and renal disease^[71]. Based on Ho's^[36] six basic types of BC, a few TCM researchers also identified eight types of BC (Normal, Qi-depression, Qi-deficiency, Stagnation, Yin-deficiency, Deficient-cold, Internal-heat, and Anxious) to assess health condition of people with hypertension^[72] and coronary heart disease^[73].

Another major classification of BC is based on the functioning of internal organs, commonly used in bronchitis asthma^[74] and post-infection condition of children^[75]. "Yin and Yang" types of BC have been used for assessing the BC concerning insomnia^[76], and Five Elements ("Metal", "Wood", "Fire", "Earth", and "Water") and "Cold" and "Heat" types are commonly used in examination and diagnosis of with metabolic disorder^[77] and naso-pharyngeal carcinoma^[78], respectively.

Though there are different types of classification of

Table 1 Classifications of body constitution (1978–2002)

Authors and number of types	Types of body constitution
So <i>et al</i> ^[50] (1996); 3 types	Balance type; Spleen-Lung type; and Spleen-Kidney type
Li <i>et al</i> ^[51] (1996); 3 types	Yang exuberance type; Yin exuberance type; and Yin and Yang harmony type
Hu <i>et al</i> ^[52] (1987); 4 types	Harmony type; Functional exuberance type; Functional deficiency type; and Functional exuberance and deficiency type
Zhu <i>et al</i> ^[53] (1989); 5 types	Normal type; Phlegm-dampness type; Qi-deficiency type; Internal-heat type; and Qi-Yin deficiency type
Wan <i>et al</i> ^[54] (1998); 5 types	Yin and Yang balance type; Heat-stagnation type; Spleen-Stomach Qi-deficiency type; Spleen-Stomach Yin-deficiency type; and Spleen-Stomach Qi-Yin-deficiency type
Kaung <i>et al</i> ^[55] (1978); 6 types	Normal type; Heat-dryness type; Blood-stasis type; Phlegm-wetness type; Yang-deficiency type; and Fatigue-pale type
Ho <i>et al</i> ^[56] (1986); 6 types	Normal type; Yin-deficiency type; Yang-deficiency type; Yin & Yang-deficiency type; Phlegm-wetness type; and Blood-stasis type
Ho <i>et al</i> ^[56] (1996); 6 types	Strong type; Weak type; Trend-cold type; Trend-heat type; Trend-dampness type; and Blood-stasis type
Pang <i>et al</i> ^[57] (1985); 7 types	Normal type; Excess-heat type; Qi-stagnation blood-stasis type; Phlegm-dampness type; Deficiency-cold type; Qi-blood deficiency type; and Yin-deficiency type
Qin <i>et al</i> ^[58] (1984); 7 types	Norma type; Yin-deficiency type; Yang-deficiency type; Phlegm-dampness type; Qi-deficiency type; Heat-dampness type; and Blood-stasis type
Wang <i>et al</i> ^[59] (1995); 7 types	Normal type; Spleen-insufficient type; Kidney-insufficient type; Lung-insufficient type; Liver-insufficient type; Heart-insufficient type; and Fetus-heat type
Chen <i>et al</i> ^[60] (1988); 7 types	Normal type; Yin-deficiency type; Yang-deficiency type; Kidney-deficiency type; Qi-Blood-deficiency type; Phlegm-dampness type; and Blood-stasis type
Chen <i>et al</i> ^[61] (1998); 7 types	Normal type; Yin-deficiency type; Yang-deficiency type; Phlegm-dampness type; Qi-blood-deficiency type; Fatigue type; and Yang-exuberance type
Wang <i>et al</i> ^[62] (2002); 7 types	Gentleness type; Yin-deficiency type; Yang-deficiency type; Qi-deficiency type; Blood-stasis type; Phlegm-dampness; and Heat-dampness type
Wang <i>et al</i> ^[63] (1984); 9 types	Yang type; Yin type; Yin-deficiency type; Yang-deficiency type; Heart-deficiency type; Liver-excess type; Spleen-deficiency type; Lung-deficiency type; and Kidney-deficiency type
Mu <i>et al</i> ^[64] (1983); 9 types	Qi-deficiency type; Blood-deficiency type; Phlegm-wetness type; Blood-stasis type; Yang-deficiency type; Yin-deficiency type; Yin-exuberance type; Yang-exuberance type; and Qi-stagnation type
Tian <i>et al</i> ^[65] (1983); 12 types	Yin-deficiency type; Yin-cold type; Yang-deficiency type; Yang-heat type; Qi-deficiency type; Qi-stagnation type; Blood-deficiency type; Blood-stasis type; Fluid-deficiency type; Phlegm-dampness type; Stirring-wind type; and Toxin type
Niu <i>et al</i> ^[66] (2001); 16 types	Harmony type; Anxious type; Unbalance type; Stagnation type; Interior heat type; Liver-stagnation type; Phlegm-dampness type; Blood-stasis type; Weakness type; Yang-deficiency type; Qi-deficiency type; Essence-depletion type; Fluid-depletion type; Lung-deficiency type; Spleen-deficiency type; and Heart-blood deficiency type

BC, we can conclude that all types of BC can be categorized according to “patterns”, or contrasting (like opposite ends) features or states described in TCM, such as “Yin and Yang” (deficient or excess), “Blood” and “Qi” (stasis, deficiency or stagnation), functional excess or deficiency (Spleen, Heart, Lung, Kidney and Liver), and “Phlegm and Wetness”, except a few “normal” BC. There are 15 out of 19 commonly used classifications included the “healthy” BC as one of the major types; and the rest classifies BC as various bodily conditions at risk of some kinds of diseases with manifestation of certain pathological changes. In addition to the four classical assessment skills in TCM (inspection, auscultation and olfaction, inquiry, and pulse taking and palpation) used, it is recommended that for the purpose of primary prevention and routine screening, user-friendly, efficient and appropriate approaches of BC assessment for the general public should be developed. In order to enhance self-evaluation of one’s own BC, self-report valid questionnaires should be designed, whereas a few have been developed and obtained preliminary evidence on their reliability and validity (*e.g.*, Body Constitution Questionnaire to assess “Stasis” type of BC^[79]).

HEALTHY STATUS

World Health Organization (WHO) defines health as “a

state of complete physical, mental and social well-being, and not merely the absence of disease or infirmity”; and reproductive health also addresses the reproductive processes, functions and system at all stages of life^[80]. This definition is compatible to the concept of TCM in which “Yin and Yang” harmony (balance) makes one “healthy”^[79]. “Yin” and “Yang” works together to make body condition or functions in balanced state or status quo (homeostasis), in order to maintain a normal or healthy condition and functioning of the internal organs, emotional state (*e.g.*, free of discomfort), resistance and adaptation to those internal and external stimulations. Figure 1 presents and illustrates the state of the balance between the four main elements of bodily conditions (*i.e.*, “Cool”, “Wet”, “Dry” and “Heat”) in relation to temperature and humidity^[81].

Relatively constant body temperature is crucial to maintain homeostasis. Because stable body temperature will allow normal enzyme function^[82] and indirectly affect the level of body fluid. The level of humidity and temperature in the human body varies in terms of both the internal and external stimulations, resulting in different combinations of physical, chemical and biological reactions inside the body. “Yang” is the function of the internal organs accounting for producing heat, while “Yin” is the flow of substances or fluids throughout the body or its organs such as water, blood, cells, and endocrine se-

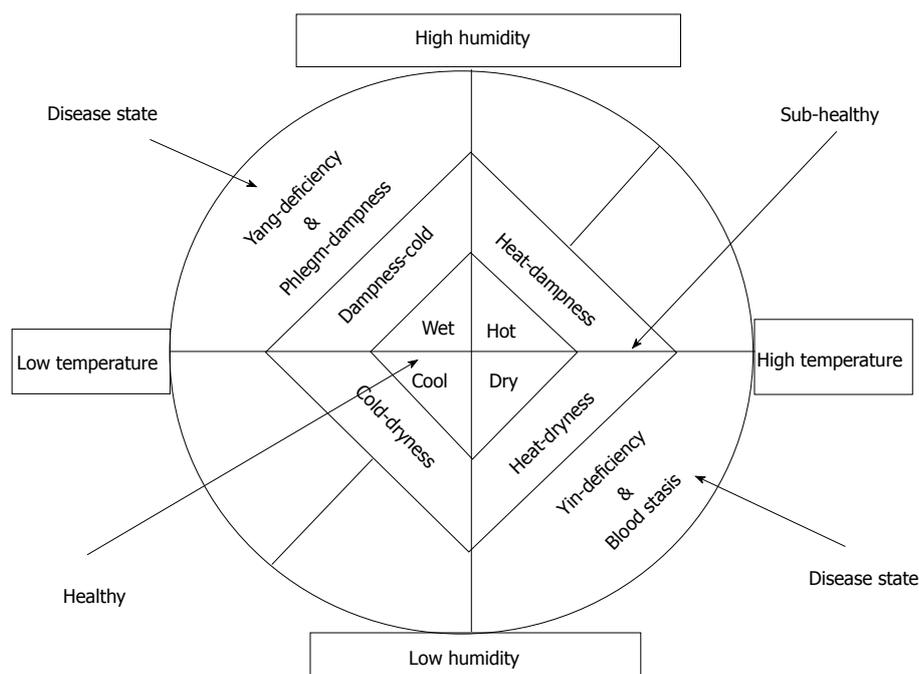


Figure 1 Diagram showing the types of body constitution in relation to health, sub-health and disease status.

cretions in order to support their functioning (“Yang”)^[83]. Therefore, both “Yin” and “Yang” contribute to maintain stable temperature within the human body^[79]. “Yin-Yang” balance refers to the harmony in nature, internal, mental, and physical conditions or statuses, and thus the whole body is in a well-functioned and optimal state to tackle any stimulation against the thresholds of body organs, tissues and other functional units^[23]. Such type of “healthy” BC should include the “Heat, Cool, Dry and Wet (dampness)” dimensions in a somewhat balanced state. For example, when the external temperature is high, a few cups of water can replenish the evaporated body fluid, and allay one’s thirsty, in line with the concept of “health and illness continuum”. Human body can adapt to temperature changes by using a natural physiological response such as sweating and shivering^[82] as “Heat adaptation”^[84] by a series of reactions in cardiovascular, sudomotor and neuro-endocrine of the body. As long as the “Yin” and “Yang” is in a balanced state, the interrelated bodily mechanisms can work well together to maintain the body condition and functions as “healthy” or normal; otherwise, when beyond the thresholds, the body will at risk of “sub-health”, or crossing the border from a “normal” to an “abnormal” BC^[24].

Sub-health status

Sub-health, or called the “third state”, is an individual’s health condition between healthy and being ill as a result of mal-adaptive or abnormal bodily reactions toward internal and/or external stimuli such as infectious diseases, environmental pollution and stressful life situations^[85]. This concept is to describe those who are presenting with a few observable subjective complaints such as low and depressed mood, irritability, anxiety, fatigue and muscle

pain, but their illness condition cannot be confirmed or diagnosed in Western medicine^[86], due to negative results in medical and clinical investigations.

However, the human body at this pre-morbid stage (sub-health) is definitely at risk of some types of diseases due to the person’s inability of keeping his bodily condition in homoeothermic or homeostatic state^[85,86]. Biochemical and psychological regulatory mechanisms inside our body that can sustain our life and maintain harmony could be lost when the person is unable to maintain a stable core temperature (around 97.6-99.6 °C or 36.5-37.5 °C and bodily functions such as normal cardiovascular and excretory functions. For instance, when body temperature exceeds the threshold in case of the internal buffering system cannot working properly, the core temperature will be raised; and such elevated core temperature can have heat-associated symptoms such as muscle weakness, lightheadedness, dizziness, sleepiness, fatigue, and confusion^[87,88]. Without proper adjustment of body temperature by homeostatic mechanisms such as by sweating and vasodilatation, the person will feel discomfort (when skin temperature beyond the normal range of 36.5-37.5 °C)^[89], and even present increasing levels of disabilities and dysfunctions of various body parts when persistent changes in external or internal temperature occur. According to the theories of TCM, “Cold” (Cool) and “Heat” (Hot) nature of BC in response to changes in body temperature would eventually induce pathological changes inside the human body^[90].

Therefore, BC can shift from healthy to unhealthy patterns according to the patterns of symptom differentiation, including “Cold” *vs* “Heat”, “Dampness” *vs* “Dryness”, “Heat-dampness” *vs* “Cold-dampness” at different levels (low *vs* high) of temperature and/or humid-

ity, which are the important parts of natural environment that the person is situated. Dry and hot environment can induce biochemical reactions inside the body to become “Heat” and “Dryness” patterns of BC; but if the body can adapt to this environment and then cool down the bodily functions, the person will present with “Cool” and “Wet” patterns of BC. Before showing full adaptation to any of these stimuli, respective types and levels of clinical manifestations from mild discomfort to heavy headache and fainting may co-exist according to the pathological changes in the human body (*i.e.*, so called BC in TCM). When a person presents mild discomfort or vivid changes in BC, it is not usually, or sometimes difficult, for a Western medical practitioner to prescribe treatment for the person without any medical diagnosis. However from the TCM perspective, inadequate rest, abnormally high or low external temperature and humidity, and/or extreme internal, emotional fluctuations can cause harmful effects to the body if not early intervened. It is because these can disrupt the balance of “Yin and Yang” and change the individual’s BC, thus imposing him/her a higher risk of illness occurrence^[90].

In contrast to WHO’s definition, people are generally considered healthy when they are in absence of a medical diagnosis, or an obvious disease condition. In a recent study of 4832 Chinese people in Hong Kong, 83% perceived “satisfactory health status” irrespective of 27% having strong risk factors of chronic diseases such as obese, hypertension, hyper-cholesterolaemia and diabetes^[91]. Two studies of 400^[92] and > 2000^[93] so called “healthy” people (without clinical significant signs and symptoms) found that only 38.75% and 35% of them were classified with “healthy” BC, respectively; and the remaining majority were categorized having one of the “abnormal” types of BC, including “Fluid insufficiency”, “Internal-heat” and “Heat-dampness”. “Heat-dampness” might also occur when their body temperature was high with fluid overload, resulting in hot feeling, obesity, very tiredness, bitter taste in mouth, and massive yellowish vaginal discharge^[94]. In longer term, such type of BC tends to develop obesity^[95], and at risk of various chronic diseases, such as diabetes mellitus^[96] and coronary heart disease^[97]. With increasing research on BC, the concept of “sub-health” seems to be emerging and showing similarities to the pre-clinical or pre-morbid stage of diseases in Western medicine, but receiving much attention by TCM practitioners. Sub-health condition should be assessed and thus the person would be provided with preventive measures for disease occurrence and related suffering in future.

DISEASE STATUS

Further to the changes in BC discussed above for “sub-healthy” state, more pathological changes in BC would develop into “Yang” Deficiency, presenting with subnormal temperature and/or overload of body fluid^[98], and subsequently proceeding to disturbance of endocrine se-

cretions such as hormones in the hypothalamic pituitary adrenal and/or thyroid axis^[99]. Inability of standing with biological and psychological stressors would result in disease occurrence. On the other hand, “Yin-deficiency” is due to “Heat” and “Dryness”, as well as inability of replenishing body fluid after an excess loss^[83]. The core temperature would then be increased and eventually resulted in cell and tissue damage, which is found compatible to the theory of tissue and cell inflammation and damage as the result of hyperthermia in Western medicine^[100]. In addition, “Blood stasis” due to unsatisfactory systematic circulation can occur if body temperature and humidity are low, presenting with feeling of numbness over the body, poor circulation, cool extremities, and purple lips^[83], while “Phlegm-dampness” can be due to low temperature with high humidity in which people will present with cold feeling, edema, abnormal tiredness, and poor digestive function^[94]. These types of “unhealthy” BC reveal the overall concept of “Yin and “Yang” imbalance, which absolutely contributes to the sickness or disease occurrence.

Recent studies also reported that cancer patients with “Yin-deficiency” BC, which might present with higher heart rate and inability of regulation of body temperature, would increase morbidity and mortality over a few months of follow-up^[101]. “Yin-deficiency” type of BC with inadequate body fluid and high body temperature was evidenced to be one of the risk factors of dementia^[68] and hypertension^[102]. “Yang-deficiency” BC with low temperature and high fluid level, at risk to have osteoporosis after menopause^[70] and cancer^[103].

BODY CONSTITUTION AND DISEASE PREVENTION

It is important to understand the concept of BC and to consider this to be applied to the prevention and treatment of chronic illnesses, whereas medical treatment in Western medicine may not be able to early detect, improve, maintain, or cure these illnesses. When the global population continues aging, the incidences and prevalence of chronic diseases will certainly increase. Prevention and early intervention strategies in these illnesses from the perspectives of TCM (and BC) should be carefully considered, particularly for those presenting with only pre-clinical or pre-morbid features and, at the same time, non-significant or negative results in clinical examinations. As emphasized by TCM, “Prevention is always better than cure”^[6].

Despite different views of BC found in recent research, BC can reflect the current body condition and reveal the functions of internal organs by direct observation of their signs or subjective complaints with four classical examination skills of TCM^[50]. Based on the principles of TCM, once these signs of illness appeared, appropriate early treatments or interventions would be needed for improving the individual’s BC. Yet, the abnormal BC would be modified and improved (converted or

changed to a “healthy” BC) with herbal medication^[7,8,19], as well as diet, nutrition and lifestyle behaviors^[21,104]. Researchers^[105] conducted a dietary intervention study to improve an abnormal (“Yin-deficiency”) BC in 48 people with hypertension. Their results indicated the changes in dietary practice among the hypertensive subjects could modify their abnormal BC to become a “healthy” BC and at the same time, improved their pathological condition such as a decrease in hypertension and its related drug use.

During “sub-healthy” status, lifestyle and diet modifications may help the body refrain from deterioration of health condition or disease occurrence. Eating well with good bowel habit, sleeping well and doing exercise regularly are considered a few key elements to maintain body resistance against disease, from the TCM perspective^[22]. In Western culture, healthy eating is based on the concept of the “food pyramid” such as balanced diet or less fat and oils and more fruit and vegetables. In Chinese culture under the influence of TCM, foods with different combinations of “Cold” and “Hot” properties are thought to maintain harmony and a balance of “Yin and Yang” in our body^[106]. Food intake according to an individual’s BC may be the best way to enhance good health and longevity and prevention of diseases^[107].

All along, the medical terms used for pattern differentiation in TCM have been adopted to set up the categories of “abnormal” or “pathological” BC. As there are more than 60 categories of patterns and many known classifications of BC^[10], many of these patterns for differentiations are not consistent, still developing and modifying with TCM research over the last decade. However, it is useful to develop and use a simple, clear and user-friendly classification of BC with strong evidence-based patterns, in order to let the TCM and healthcare professionals and the public better understand and use of the concept of BC in detecting “sub-health” and ill health or disease.

CONCLUSION

This article critically discussed the BC, “sub-health”, health, and disease conditions of an individual. Recent evidence in TCM supports that an individual’s body condition can be influenced by multiple internal and external factors, mainly including genetic, biochemical, ethnic, family, environmental, psychological and behavioral domains. With better categorized “healthy” and “unhealthy” BC patterns, a strong and weak bodily resistance, an adaptive and mal-adaptive functioning of internal organs, and thus a balance of “Yin” and “Yang” in the human body, can be easily identified and differentiated. Healthy people can easily adjust their body condition below the functional thresholds to prevent illness and stress reactions, and thus be more able to adapt to the changes in their internal and external environments, particularly temperature and humidity. Otherwise, less healthy people will shift from a healthy to a “sub-healthy” condition and then proceed to disease status if not appropriately early

intervened. To be complimentary with health promotion and disease prevention in Western medicine, understanding about one’s BC in TCM, together with its important determinants (*e.g.*, healthy eating and lifestyle behaviors), can contribute to a more proactive, holistic and individualized care in the community.

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