

## Health Concepts in Chinese Medicine


### Historical Outline of Chinese Medicine

Before we start to discuss the core content of the health concepts in Chinese Medicine, let us briefly outline the development of Chinese Medicine up to the 16<sup>th</sup> Century.

In the second half of the fifth century B.C., a feudal society began to develop in China. Chinese Medicine evolved into a unique and integrated theoretical system over a period of 700 years. The long years of accumulation of documented experience and repeated testing culminated in the initial establishment of the four important components of the theoretical basis of Chinese Medicine namely, theory, methodology, prescription, and pharmacy.

More than 2000 years ago, Huangdi's Classic on Medicine, the earliest medical classic extant in China, appeared. The book consists of two parts: Basic Questions and Miraculous Pivot. The book gives a complete and systematic exposition to the following subjects, including the relationship between man and nature; the physiology and pathology of the human body; and the diagnosis, treatment and prevention of diseases. In addition to the book on medicine, Shen Nong's Classic on Herbalism, also known as Classic on the Herbal, is the earliest book on *materia medica* in China - it appeared around the Qin-Han Period but its authorship is unknown. Not only does it list 365 medicinal items – among which 252 are herbs, 67 are animal parts, and 46 are minerals, but it also divides them into three categories according to their different properties and effects. Shen Nong's Classic on Herbalism also gives a brief account of pharmaceutical/formulation principles. The underlying pharmaceutical theories, which still serve as a useful guide in contemporary clinical practice, had profound influence on the development of pharmaceutical science in China.

In the Han Dynasty (3<sup>rd</sup> century A.D.), Zhang Zhongjing, an outstanding physician and renowned as “The Father of Medical Prescription”, authored “Treatise on Febrile and Miscellaneous Diseases”. The treatise was later sub-divided into two books; one entitled “Treatise on Febrile Diseases” and the other “Synopsis of Prescriptions of Golden Cabinet”. The book established scientific principles, which are still used nowadays, to guide the clinical practice of Chinese Medicine.



These scientific principles of clinical practice include: Classification of Symptoms according to the six Meridians, Four Diagnostic Methods of Chinese Medicine, namely, inspection, listening and auscultation, questioning, and pulse-taking/palpation, Eight Principal Syndromes and Eight Therapeutic Methods, Three Causes of Disease, in that the etiologies of all diseases are viewed as falling into one of the three categories. The book recorded 375 prescriptions, involving 214 medicinal items. These included most of the commonly used prescriptions in clinical practice and a variety of pharmaceutical dosage forms.

In the Western Jin Dynasty, Huang Fumi, a famous physician, compiled “A-B Classic of Acupuncture and Moxibustion”. It is the earliest extant work dealing exclusively with acupuncture and moxibustion, and indeed is one of the most influential works in the history of acupuncture and moxibustion.

In 610 A.D. (during the Tang Dynasty), Chao Yuanfan and his co-workers compiled “General Treatise on Etiology and Symptomology”. This is the earliest extant classic on etiology and symptoms in Chinese Medicine. In 657 A.D., Su Jing, together with 20 other scholars, compiled “Newly-Revised Materia Medica” which is the first pharmacopeia sponsored officially in ancient China and also the earliest pharmacopeia in the world.

Sun Simiao in Tang Dynasty devoted all his life to composing two books: “Valuable Prescriptions for Emergencies” and “Supplement to Valuable Prescriptions”. These two books deal with general medical theory, *materia medica*, gynecology and obstetrics, pediatrics, acupuncture and moxibustion, diet, health preservation, and prescriptions for various medical conditions. Because of the profound contribution, Sun Simiao was honored as “The King of Herbal Medicine”. The two books are representative medical publications in the Tang Dynasty.

Li Shizhen (1518-1593 A.D.), a famous physician and pharmacologist in the Ming Dynasty, compiled “The Compendium of Materia Medica”. The book consists of 52 volumes with 1,892 medicinal herbs, including over 10,000 prescriptions and 1,000 illustrations of medicinal items.

After understanding more about the development of Chinese Medicine, we can see that a complete theoretical system of Chinese Medicine is established by the accumulation of more than two thousand years of work and experience.


## Yin-Yang Theory

The Yin-Yang Theory is one of the most fundamental theories guiding the practice of Chinese Medicine in the prevention and treatment of diseases. As mentioned in the video show, matter/subject (such as the Sun and the Moon, female and male gender) has opposing Yin and Yang aspects. According to ancient Chinese philosophy, these are mutually controlled and inhibited by each other, resulting in a state of dynamic equilibrium or balance. If the relative balance between Yin and Yang is disrupted within the body, it will exhibit either an excess or a deficiency of Yin or Yang, which can lead to the development of the disease.

The Yin-Yang concept is not unique to Chinese culture; there are many analogous examples in science – such as positive ions and negative ions, anode and cathode, cGMP and cAMP, and sympathetic and parasympathetic nervous system, all of which are mutually opposing and therefore comparable to the Yin-Yang concept. Prof Sutherland earned a Nobel Prize in 1971 by demonstrating the antagonistic actions of cGMP and cAMP in regulating cellular function in a similar fashion to the Yin and Yang concept. Furthermore, the opposing action of parasympathetic and sympathetic nervous systems is exemplified by slowing down the heartbeat and accelerating the heartbeat, respectively.

According to Chinese Medicine theory, there is an inter-dependence between Yin and Yang in the body, which is reflected in the relationship between material (which is Yin) and function (which is Yang). Whereas Yin refers to the material/structural basis of functional activity, Yang is the functional activity itself. A dissociation of Yin and Yang can lead to death. The activity (Yang) of the body is nourished by its physical structure/form (Yin), and the physical structure/form is created and maintained by the body's activity (Yang). As such, Yin and Yang rely on each other to achieve a balanced state of health.

The presence of Yin in a Yang system and vice-versa allows the two components to interact in three fundamental modalities. First of all, Yin and Yang are opposing forces in a system. For example, one calendar day consists of day time and night time. Temperature is felt as hot or cold. The hand has a backside and a palm side, and the body has a dorsal and a ventral side. A disease can be viewed as progressing or regressing. There is the co-existence of Yin and Yang and dynamic equilibrium between them – the change in one aspect is compensated for by a reciprocal increase or decrease in the opposite component.



Secondly, Yin and Yang are inter-dependent, meaning that there is no Yin without Yang and no Yang without Yin. The character of Yin manifests itself in the presence of Yang. A little Yin can check the excessive expansion of Yang. A total separation of Yin from Yang will inevitably result in the collapse of the system.

Thirdly, Yin can transform into Yang and vice-versa. There is a common Chinese saying that “a matter reaching its extreme will turn into its opposite”. Thus, in a state of excessive Yin, the Yang component will grow. By the same token, the chill one feels during a sustained high fever is an indication of inadequate energy supply. At this point, it is important to keep the body warm by food or by covering instead of cooling it. In extreme debility, it is necessary to warm the body by food or medicine even though one feels warmth in the palms and soles. This is a state of “virtual fever” but not actually a febrile symptom.

Chinese Medicine theory proposes that Yin-Yang disharmony can be the cause of diseases. Disharmony indicates that the proportions of Yin and Yang are unbalanced. There are many factors that can cause Yin and Yang disharmony. All related to “pernicious evils” (that means, pathogenic factors) and the flow of Qi throughout the body.

As described in the video show, the interaction between Yin and Yang in the body generates Normal Qi (simply called Qi), which then circulates along Meridians in a fixed pattern and cyclic manner. When Qi flows smoothly in the body, it functions well and has a fully operational immune system, allowing a speedy recovery from illness. Qi is comprised of Defensive-Qi (responsible for defense) and Nutritive-Qi (responsible for nutrition), whereas the so-called “pernicious evils” consist of Yang types, namely wind dryness, summer heat and fire, and Yin type, namely, cold and dampness. Hence in Chinese Medicine, the disease is viewed as resulting from either a deficiency of Qi or an excess of “pernicious evils”.

By applying the Yin-Yang theory in the diagnosis and treatment of diseases, Yin-Yang harmony can be restored and a healthy status can be achieved and maintained.


## Five Element Theory

Together with the Yin-Yang Theory, the Five Element Theory provides the basis for explaining physiological functions in humans. The Five Element Theory evolved from the study of various processes, functions, and phenomena in nature. The theory classifies matter into one of the five categories represented by Wood, Fire, Earth, Metal and Water, and this is used in Chinese Medicine to explain the functions of various organs and their inter-relationships such as generation and suppression.

The Five Elements have distinct characteristics: Wood grows and flourishes freely like a tree; Fire warms in an upward flaring pattern that can influence functions of organs in the upper part of the body; Earth promotes growth and nourishes life processes like supporting plant growth by soil; Metal descends and clarifies, producing an astringent action relating to the function of the lungs in air exchange; Water moistens, cools and flows downward relating to the function of the kidneys in filtering blood.

Organ functions can be characterized by their respective five elements. For example, Liver Qi has an ascending nature; it can influence the function of the brain which is located at a higher position. Heart Qi brings about warmth by enabling the perfusion of organs with blood that supplies fuel molecules for energy production. Spleen Qi is responsible for digestion and transportation of nutrients. Lung Qi has a descending nature and works in concert with organs in the lower part of the body, and Kidney Qi regulates the circulation of water and body fluid relating to the function of kidneys.

As one needs more than one material to build or achieve something by combining them, one perceives a particular closer relationship between two Elements than the others. For example, Water supports the growth of Wood but quenches Fire. So, the relationship between these two Elements can be either “Pro” or “Con” with a particular Element, or in the words of the Five Element Theory, “generation” or “suppression”. The balance between generation and suppression is important for the normal transformation of the Five Elements. Each Element is under the influence of the other four in some ways (for example, generation Vs suppression, subjugation Vs counter-suppression). In this way, all Five Elements establish intricate homeostasis in nature. Regarding the process of generation, one can promote, aid or bring forth another; it can be viewed as a “mother-child” relationship. In suppression, one can bring under control or restrain another. Generation and suppression among the Five Elements are of functional importance. Without generation, there would be no growth or development. On the other hand, without suppression, there would be no balance or co-ordination during development and change. Subjugation occurs when one of the Five Elements dominates (in terms of



suppression) on another when the latter is weak, whereas counter-suppression is the condition when “the strong bully the weak”, which is the reverse of suppression. The inter-relationships among the functions of Zang-Fu organs can also be depicted by the Five Element theory.

In the case of disease states, the Five Element theory, in particular, subjugation and counter suppression, can explain the pathological influences among Zang-Fu organs. For example, the Liver can transmit its “disease” to the Spleen by subjugation from Wood to Earth; On the other hand, Spleen can affect the “trouble” Liver by counter-suppression from Earth to Wood. The Five Element Theory is an important reasoning process in clinical application, for example, generation and development of a disease, spreading disease from one site to another, or approach in disease management.

The Yin-Yang and Five Element Theories are often used simultaneously to explain natural phenomena. While Yin-Yang refers to the dynamic changes determining an event, the Five Elements correspond to different aspects of the natural world and the body. Different aspects work closely together and have their own internal orders and patterns.

## Qi and Blood


Qi and Blood are two essential components for supporting life activities in the body. Chinese Medicine recognizes Qi as a substance composed of infinitesimal particles and the power it manifests. More than a fluid substance, Qi permeates everywhere without regard to the vessel that conducts it, or the compartment that contains it, or the organ that holds it. The ancient Chinese believed that Qi was the most fundamental entity making up the world. They thought matter in the Universe resulted from the movement and change of Qi.

In Chinese Medicine, Qi is the energy that flows through the body and is responsible for nourishing and maintaining organs and tissues, as well as providing the 'fuel' for metabolic processes in the body. In so doing, Qi travels in energetic pathways called Meridians (also called channels and collaterals through which Qi circulates).

There are three origins from which Qi is derived. Firstly, it is Primordial Qi that is passed on to progeny by their parents; this refers to the ensemble of genetic information carried over by the gametes. Secondly, Grain Qi is transformed from water and cereals and, thirdly, Clear Qi is the clean air one inhales; the latter two constitute the postnatal Qi. Grain Qi obviously consists of nutrients and the clean air, oxygen. Clean air is mixed with Grain Qi to form Pectoral Qi, which in turn combines with Primordial Qi to generate Normal Qi. Normal Qi is mainly constituted by Defensive Qi and Nutritive Qi.

Primordial Qi is the primary motive force of life activities. Primordial Qi derives from the "congenital" essence stored in the Kidney, and sustained by the acquired essence generated by the Spleen and Stomach. The abundance of Primordial Qi ensures the unimpeded functioning of various organs, leading to a state of optimal health.

Pectoral Qi performs two main functions. One involves traveling through the respiratory tract to promote respiration, and the insufficiency of Pectoral Qi influences can lead to pathological conditions of voice, speech or breath. The other transverses through the Heart Meridian to promote the circulation of Qi and Blood. The relative strength of Pectoral Qi, therefore, relates to the flow of Qi and Blood, body temperature and activities of the trunk and limbs, visual and aural perceptibility, as well as the strength and rhythm of the heartbeat.



Nutritive Qi flows in the blood vessels to all parts of the body and becomes an important component of the Blood. Functionally speaking, Nutritive Qi supplies the body with nutrients and promotes blood production to nourish visceral organs.

Defensive Qi circulates swiftly outside the blood vessels and travels between skin and muscle. As such, it defends the body's surface against invasion by exogenous pathogenic factors, warms the visceral organs, muscle, skin, and hair, and controls the opening and closing of pores for excretion of sweat to maintain stable body temperature. Strong Defensive Qi therefore positively correlates with the body's resistance to diseases and to the ability to maintain constant body temperature. Put simply, Normal Qi is the supply of energy that sustains life, its development and responses to challenges.

On the other hand, Blood is the red color liquid circulating within blood vessels. It nourishes and moistens all parts of the body; it is indispensable for the expression of all body activities. Chinese Medicine theory states that Blood is acted upon and energized by Qi.

In Chinese Medicine, the Kidney essence is inter-convertible with Blood and hence plays an important role in Blood formation. The involvement of Kidney in Blood formation is interesting as the importance of erythropoietin (a protein that stimulates red blood cell formation) derived from the kidneys is now well known in Modern Medicine. Chinese Medicine is fully aware that there are different aspects of Blood formation, its nourishment, its oxygenation and the controlling factor of red blood cell formation. For the Blood to move along the vasculature in a smooth flow, it must be driven by Pectoral Qi from the Lung, stored and released from the Liver as need and be retained in the blood vessels through the action of the Spleen. In this way, all visceral organs participate in the generation and operation of the Blood, a fact that demonstrates its primary importance in sustaining life.



## Meridian and Zang Fu Theories

Brief mentions of the Meridian and Zang Fu Theories are made to conclude the discussion on the basic theories of Chinese Medicine.

Qi travels in energetic pathways called Meridians. The network of Meridians not only serves as a means of delivering Qi to all tissues and organs but also acts as a communication network between them. When a disorder of one organ's Qi develops, it influences the functioning of other organs by disrupting the Meridian network as a whole. This forms the underlying basis of “holisticity” in Chinese Medicine, as depicted by the Five Element Theory.

Under physiological conditions, Meridians link up various organs and thereby enable the communication between various parts of the body, facilitate the flow of Qi and Blood and defend the body against invading microorganisms.


Under pathological conditions, invading microorganisms can move from the external surface to the interior portions of the body via the Meridians, favoring the progress of the disease. With the connection through the Meridians, disorders can be transmitted from one organ to another.

“Zang and Fu” refers to all internal organs in the body. The Zang-Fu theory describes how the functional status of various organs can be manifested as external signs and symptoms. Zang and Fu organs and essential elements (those are vital essence, Qi, spirit, blood and body fluid) constitute the body and vitality.

The structural and functional relationships between external organs (such as skin, muscle, tendon, bone, blood vessel, mouth, ear, nose, and tongue) and internal organs are illustrated.

Generally speaking, Yin-Yang and Five Element Theories represent fundamental methods of reasoning that have given rise to the principles of Chinese Medicine in theory and practice. Put simply, Yin-Yang refers to the dynamic aspect of an event, whereas the Five Element Theory refers to the immutable inherent property of an object or a substance. The two theories can relate to one another through the participation of Qi, the energy that makes things move. In Chinese Medicine, Qi is closely associated with Blood, which is also indispensable for the expression of activity.

According to Chinese Medicine theory, following the differentiation of the Universe into Yin and Yang, the reunion between them generates Qi that flows along the Meridians to all Zang-Fu organs; the ensemble of Yin, Yang, and Qi give rise to the myriad facets of life.



In practical terms, optimal health involves a balance between Yin and Yang elements and consequently a sub-healthy status or disease is seen as the dominance of Yin over Yang, or the contrary, to varying extents. The restoration of Yin-Yang balance and thus a normal Qi flow is therefore essential to regaining a healthy status.

## Balance and Interactions

Chinese Medicine concerns about “Balance” and “Interaction”. So, what is Balance? Balance within the body is about maintaining a dynamic balance between Yin and Yang, thus enabling the generation of Qi. On the other hand, what is Interaction? Interaction within the body is about the interactions among visceral organs under the Five Element Theory. The interactions among visceral organs are made possible by the ever-circulating Qi such that the body can function normally. That is why we look at Balance and Interactions together.

Qi serves as an intangible driving force for the manifestation of body function. The concept of Qi in Chinese Medicine covers a broad area, in that it refers not only to the air one breaths but also to a form of energy. The manifestation of normal body functioning depends on whether or not a dynamic balance between Yin and Yang can be maintained in the body for generating Qi, which is referred to as Normal Qi.


As mentioned in the basic theories, there are three sources from which Normal Qi is derived: namely Primordial Qi, Grain Qi and Clean Air. Now, the functional manifestations of different kinds of Qi are discussed.

Primordial Qi, which is the primary driving force of human life, can be functionally related to the pumping action of the heart that energizes the circulation of blood throughout the body. In fact, the beating heart is the earliest observable body function in a developing fetus. Primordial Qi works by driving the circulation of blood or Normal Qi throughout the body.

Pectoral Qi results from the combination of inhaled clean air (that is oxygen) and ingested food (meaning nutrients). The digested and subsequently absorbed nutrients are first transported to the liver for incorporating or converting into biomolecules and cellular structures. In essence, Primordial Qi (Yang) interacts with Pectoral Qi (Yin) to form Normal Qi, which is comprised of Nutritive Qi and Defensive Qi.

Nutritive Qi is responsible for nourishing visceral organs. In this regard, Nutritive Qi is related to the ability of tissues/cells to efficiently generate energy from nutrients, that is the efficiency of mitochondria (the powerhouse of the cell) to generate ATP (the energy currency of the cell) using fuel molecules.

Finally, Defensive Qi is responsible for protecting the body against disease-causing external factors.




Interaction within the body is about the interactions among visceral organs under the Five Element Theory. We are going to explain further on “Interaction”. Let’s take Spleen as an example for illustrating the interactions of organ function.

Spleen works with the Stomach to regulate the transport and metabolism of water and nutrients. Water is absorbed and transported upward to the Lung for the generation of Qi, and excessive water plus metabolic wastes produced by various regions of the body are transported downward to the Kidney for excretion. Spleen also regulates the circulation of Blood. The transport of nutrients in Blood to skeletal muscle is controlled by the Spleen. Therefore, Spleen is an important determinant for maintaining the proper functioning of skeletal muscle. Furthermore, Spleen is also related to immune function.

On the other hand, the Five Zhi (meaning emotions), namely, joy, anger, grief, anxiety, and fright, are characterized by the Five Elements, namely, Fire, Wood, Metal, Earth and Water, respectively. As Zang-Fu organs are linked to the Five Elements, the over-expression of each Zhi can affect the function of its respective Zang-Fu organs. In addition, there is a generation cycle and a suppression cycle in which the five Zang-Fu organs interact. The generation cycle describes the ways in which each Element, serving as a “mother”, promotes the growth and development of the following “child” Element. The suppression cycle provides for a check and balance system among all of the Elements.

Let’s discuss how anxiety affects the Spleen function, both belong to Earth, in the context of Modern Medicine. Anxiety activates the sympathetic nervous system (SNS) and hypothalamic-pituitary-adrenal (HPA) axis. The SNS serves to inhibit digestion. The over-stimulation or under-stimulation of the digestive system mediated by the SNS leads to irritable bowel symptoms or gastrointestinal diseases, which are associated with Spleen Deficiency in Chinese Medicine. On the other hand, the HPA axis regulates a series of endocrine glands, wherein the hypothalamus secretes corticotropin-releasing hormone (CRH) that stimulates the pituitary gland to secrete adrenocorticotrophic hormone (ACTH), and ACTH, in turn, stimulates the secretion of cortisol from the adrenal cortex, with resultant immunosuppression and thus Spleen Deficiency.

Speaking of depression (a neurological disorder relating to inadequacy in Fire), chronic stress disrupts the negative feedback response in the HPA axis, down-regulates GABAergic signaling, and up-regulates glutaminergic signaling. Downstream effects of these processes include the suppression of neurogenesis and the induction of apoptosis in the corticolimbic system, with a resulting decrease in serotonergic signaling, thereby giving rise to depression.



Under healthy conditions, Liver Qi (Wood) nourishes the brain (Fire) by supplying fuel molecules and plasma proteins. According to the Five Element Theory, the experience of anger and/or stress (which negatively influence the Wood) disrupts Qi circulation in the Liver, leading to a deficiency in fuel molecule production and plasma protein synthesis. Thus, the brain (belonging to Fire) is not sufficiently nourished, leading to defective neurotransmitter signaling, resulting in depression. This explains how Liver Qi stagnation causes depression.

To conclude, one crucial factor for a healthy body is the maintenance of a dynamic balance and interaction between Yin and Yang, which results in the generation of Qi. Besides, a holistic manifestation of a healthy body also necessitates a harmonic relationship between organs and their functioning. This phenomenon can be illustrated by the Five Element Theory which assigns an organ and its function to a corresponding element (namely, Wood, Fire, Earth, Metal, Water) and then describes the functional relationship among organs.

Within the conceptual framework of Chinese Medicine, a holistic manifestation of body functioning requires the co-ordination of organ functions. Put simply, a functional imbalance in an organ will not only affect its own performance but also can have an influence on the functioning of other organs.

For instance, a problem in the Liver (belonging to Wood) can affect the functioning of the digestive system, that is, the Spleen (belonging to Earth) because an excessive Wood influence can restrict the Earth.

By and large, an appropriate “generation” and “suppression” relationship among organ functions is essential for the maintenance of optimal health. The holistic view of Chinese Medicine in relation to body function, therefore, forms the basis of the “Health Concepts in Chinese Medicine”, which encompasses “Balancing Yin and Yang, Invigorating Normal Qi and Regulating the functioning of organs”.


## **Preventive Health in Chinese Medicine**

The practice of Chinese Medicine places particular emphasis on the prevention of diseases. In doing so, one's sub-healthy status has to be corrected before it develops into diseases. The practice of Chinese Medicine places particular emphasis on the prevention of diseases. In doing so, one's sub-healthy status has to be corrected before it develops into diseases. The following will describe how a sub-healthy status can be remediated by the practice of Chinese Medicine

The body's constitution is determined by both genetic and environmental factors. As a result of genetic inheritance from their parents, some individuals are endowed with a stronger body constitution than others. This difference in susceptibility to a sub-healthy status can largely be explained by genetic factors. On the other hand, environmental factors such as exercise, diet, emotion and work/sleep cycle can also influence health status. For example, a parallel day/night and work/sleep cycle are the most beneficial to health. A good genetic endowment coupled with a healthy lifestyle should ideally be conducive to optimal health. Furthermore, aging is associated with a generalized decline in body functions, independent of genetic and environmental factors.

Interesting, ancient Chinese philosophy believes that Qi circulates in the Universe in a fixed pattern following a sequential order of the five elements. As such, life evolved within a certain time frame will be endowed with characteristics attributable to the corresponding Five Element, which is a concept similar to that of astrology.

According to Chinese Medicine theory, a person of certain Five Element disposition is more susceptible to some kinds of functional imbalance, leading to a sub-healthy status. You can assess the link given and check out your Five Element type. Many city dwellers are affected by an unhealthy lifestyle, with a resultant decline in their overall health. When this is compounded by aging, the body can no longer function to its full capacity. From the viewpoint of the Health Concepts in Chinese Medicine, the decline in physiological function caused by genetic, environmental, or aging factors, or any combination thereof, results in a less than optimal health status called "Deficiency". If a state of "Deficiency" (in Yin, Yang, Qi, Blood) is allowed to persist and get progress, a disease may arise. To avoid the worsening of an unhealthy or "deficient" body, it is necessary to correct the condition by restoring Yin, Yang, Qi, Blood to their normal levels. This constitutes the approach to preventing diseases in Chinese Medicine. The practice of Chinese Medicine adopts various means to correct functionally deficient states in the body. One approach involves the use of Chinese tonifying herbs, acupuncture and/or massage that act within the body, and



another makes use of changes in lifestyle to up-regulate the deficient bodily status from the exterior of the body. Generally speaking, the use of Chinese tonifying (bu in Chinese) herbs is the most commonly used approach to rectify deficiencies in Yin, Yang, Qi and Blood.

Chinese herbs can be divided into two groups: tonifying herbs and therapeutic herbs, wherein Chinese tonifying herbs can be categorized into four functional groups: Yang-invigorating, Qi-invigorating, Yin-nourishing, and Blood-enriching. Chinese tonifying herbs aim to restore the balance of Yin-Yang and Qi/Blood and hence re-establish and maintain a normal physiological function. This is referred to as ‘Bu’ in Chinese Medicine – a concept closely related to disease prevention. As different types of body deficiencies manifest with various symptoms, one can use “survey questionnaires”, which can also be accessed by the link given, to assess an individual’s body and living conditions in order to determine the nature of the Deficiency in Yin, Yang, Qi, Blood, or some combinations of these. It might then be possible to rectify the Deficiency using Chinese tonifying herbs.


By using appropriate Chinese tonifying herbs to supplement the Deficiency, the balance of Yin-Yang and Qi/Blood can be corrected and normal physiological function be restored. Furthermore, internal and external environmental factors can interact and affect the functioning of the body. To achieve optimal health, one cannot merely focus on regulating the internal environment by using Chinese tonifying herbs.

In conclusion, the adoption of a lifestyle consisting of a healthy diet, sufficient exercise, emotional stability, and a regular work/sleep cycle is desirable to achieve optimal health.

Five practical examples of deficiency commonly occurring in daily life are shown as follows. They are Yin Deficiency due to Overwork; Yang Deficiency due to Long exposure to the cold environment; Qi Deficiency due to the lack of regular exercise and Stressful Lifestyle; Liver Blood Deficiency due to inadequate food intake Qi and Yin Deficiency due to heatstroke.

#### *Yin Deficiency due to Overwork*

Overworking can cause excessive consumption of Yin fluids in the body - these being the Blood and Essence in the context of Chinese Medicine. Individuals may not be aware at the time, but Yin fluids are used up and this can result in serious consequences – notably, Yin Deficiency. Overwork is, therefore, one of the main causes of Yin Deficiency. Of course, this depends on susceptibility relating to one’s training, upbringing, genetic makeup, experience, age, energy, strength, prior health status etc. By way of illustration, an individual might have a daytime job and an



evening job; or one job on weekdays and another on weekends. As a result, that individual is not getting enough rest, not getting enough sleep, constantly worrying (not just about work), taking work home to do late at night, eating while working, and/or not eating enough. The problem is that one will not immediately notice signs of Yin Deficiency as they develop: Yin Deficiency can cause weakness slowly and insidiously. When an individual is healthy but overworked, a few days off to rest, perhaps even just a weekend, may be sufficient to put things right. This is because what has been used up are fuel supplies that can be quickly replenished by rest (for the Qi) and diet (for the Blood). Using a car analogy, when fuel is lacking, it can be readily replaced (meaning, filling up the gas tank). However, mentally overworking more than physically overworking is the main cause of Yin Deficiency. Overworking mentally will usually affect Yin reserves only after a prolonged period of time. Initially, this depletes Qi and Blood and then causes Qi and Blood Stagnation. Common symptoms of Yin Deficiency include Thirsty (prefer to have cold drink); dry throat; dry mouth; night sweat; fever; constipation.

*Yang deficiency can be caused by long-term exposure to a cold environment and an unhealthy lifestyle*


For example, prolonged exposure to cold from not wearing enough clothing (for example, long exposure to low temperature in an air-conditioned environment). Alternatively, many individuals wear too little, especially in the winter (perhaps to be fashionable?). By continually (or frequently) exposing themselves to cold, they can gradually deplete their Yang energy. In addition, consuming too many cold foods or drinks. These are either cold or ice-cold to the touch, or raw, or inappropriately cold for the season, or foods with a cooling or cold-increasing effect on the body. Physical work that is too much for one's constitution can cause a problem. The exertion or load may be too heavy, or have gone on for too long – that means, overwork. All of the above situations can cause Yang-Deficiency. Some basic Yang Deficiency Symptoms are: The body cannot keep itself comfortably warm; feeling of coldness, improved by being covered or warming; poor circulation: cold arms, hands, legs and feet; preference for warm weather, clothing, central heating, or food and drink; low back pain or muscle soreness.

*Qi Deficiency due to lack of regular exercise and/or a stressful lifestyle*

Qi Deficiency, which is an indication that the body's energy (meaning Qi) is not flowing properly due to organ malfunction. Some symptoms of Qi Deficiency are: Constantly feeling tired; shallow breathing; marked reduction in food intake; headache, especially after indulging in strenuous physical activity.

*Liver Blood Deficiency can be due to dieting or inadequate food intake*





Liver Blood Deficiency is particularly noticeable in teenage girls who go on diets; people who do not eat a sufficient amount for their needs; and the elderly; This can be a chronic disorder. However, many individuals experience mild symptoms as they grow older or when they become tired. Some symptoms of Liver Blood Deficiency are Dizziness, faintness: for example on or after exertion, or from standing up too rapidly from a seated or prone position; poor or blurred vision, especially later in the day or after spending extended periods at the computer, or after reading for too long or watching films or television, eyes may ache from tiredness; eyes are dry, often with floaters - floaters are small black specs that can be seen against light surfaces; Insomnia or poor sleep or dreaming that prevents good sleep; numbness of limbs (if they are kept still for too long, or during sleep); in women, menses are scanty and light-colored, with a long cycle: or there may have no periods at all.

*Qi and Yin Deficiency caused by heatstroke*

Profuse sweating due to Summer-Heat or heatstroke, leading to Qi and Yin Deficiency, primarily of the Lung. Some Symptoms of heat stroke associated Qi and Yin Deficiency are throbbing headache; dizziness and light-headedness; red, hot and dry skin; muscle weakness or cramps; nausea and vomiting; rapid heartbeat; shallow breathing.

All the above mentioned five practical examples of Deficiency give you a brief idea about the commonly occurring sub-healthy status in body function, which can be remediated by using appropriate Chinese tonifying herbs.

## Modern Medicine vs Chinese Medicine in Preventive Health

The following will compare Modern Medicine with Chinese Medicine in the context of Preventive Health. Modern Medicine and Chinese Medicine belong to two distinct medical systems, yet both focus on the prevention and treatment of diseases in humans.


The conceptual basis of Modern Medicine has emerged from half a century or more of scientific investigation in the area of preventive health (meaning, prevention of diseases, particularly those are age-related). Recent biomedical research advocates the adoption of three approaches in preventive health, namely, antioxidation, immunomodulation, and neuroendocrine and stress response regulation. For example, by using vitamins or naturally-occurring herbs, it is possible to enhance antioxidant, immune and neuroendocrinological/stress response regulatory functions in the body, in the hope of preventing (or at least delaying) the development of diseases, particularly those associated with aging.

Research findings indicate that while most Yang-invigorating and Qi-invigorating Chinese tonifying herbs enhance antioxidant capacity in the body, many Yin-nourishing and Blood enriching Chinese tonifying herbs also enhance the body's immunity. In addition, some Qi-invigorating and Blood-enriching Chinese tonifying herbs can facilitate the regulation of neuroendocrine function and stress responses.

While Chinese Medicine views the functioning of the body in a holistic way, Modern Medicine typically focuses on a specific organ, tissue or cell type. That's what we call the "Reductionist" approach. The holistic nature of Chinese Medicine is more suitable for treating chronic diseases, which often involve multiple organ dysfunction. While Chinese Medicine aims to remove the cause of the disease, Modern Medicine mainly focuses on relieving the symptoms.

Given the difference in approach between Chinese Medicine and Modern Medicine, their therapeutic actions vary: the fast-acting and specific nature of Modern Medicine therapeutic interventions are appropriately used for treating diseases with acute symptoms (even though long-term use of medication is also effective in such instances as the control of high blood pressure or of high blood glucose levels in diabetes). In contrast, the slower-acting and holistic nature of Chinese Medicine are more suitable for treating chronic diseases, which typically involve multiple organ dysfunction.

The aforementioned arguments support the preferential use of Chinese Medicine or the adoption of the Health Concepts in Chinese Medicine in preference to Preventive Health in Modern Medicine for health promotion and disease prevention. The




multiple herbal components and chemical ingredients in Chinese tonifying herbal formulations enable the regulation of organ functions in a holistic manner and thus achieve a balanced functioning of the body. Antioxidant or immuno-stimulatory actions produced by vitamins or herbals are likely to be limited to the cellular and/or organ level but not extend to the inter-organ level.

Here is an example to illustrate the difference between Chinese Medicine and Modern Medicine in safeguarding the health and to demonstrate the superiority of Health Concepts in Chinese Medicine. As mentioned earlier, while Yang-invigorating or Qi-invigorating Chinese tonifying herbs can produce antioxidant actions, antioxidant vitamins such as vitamin C and vitamin E can also increase the antioxidant capacity of various tissues or organs in the body. Recent research indicates that Chinese tonifying herbs increase antioxidant potential by up-regulating endogenous cellular antioxidant components. In other words, Chinese tonifying herbs can indirectly result in the scavenging of free radicals through cellular antioxidant machinery, whereas antioxidant vitamins act by reacting directly with free radicals. Even though both, directly and indirectly, acting antioxidants can inactivate potentially damaging free radicals, they differ in their capacity to sustain antioxidant activity.

By tapping into endogenous reserves, the up-regulation of cellular antioxidant components by Chinese tonifying herbs can provide a virtually unlimited capacity to scavenge free radicals, as is the case in the glutathione-driven antioxidant network. In contrast, the antioxidant effects provided by antioxidant vitamins are limited by the amount of their intake. In addition, while endogenous antioxidant molecules can be recycled after reacting with free radicals via cellular metabolic processes, antioxidant vitamins are consumed in the scavenging process.

The limited antioxidant capacity conferred by antioxidant vitamins is not a major disadvantage when compared with Chinese tonifying herbs. Studies have indicated that the long-term intake of mega doses of antioxidant vitamins can be associated with side effects, such as shorter lifespan. However, Chinese tonifying herbs are not likely to have such side effects. While up-regulating cellular antioxidant defenses by Chinese tonifying herbs can keep the regulatory machinery intact, the accumulation of high concentrations of antioxidant vitamins by absorption from an exogenous source can lead to the down-regulation of cellular antioxidant defenses under such low oxidative stress conditions. This will compromise the ability of the cell to respond to a sudden increase in oxidative stress, which can result in cell damage or death. This may also explain some of the negative results obtained from human studies investigating the effects of long-term antioxidant vitamin supplementation.



Despite the differences in practice between the Chinese Medicine and Modern Medicine in Preventive Health, both aim at achieving the same outcome – namely, restoring the body to a healthy condition from a sub-healthy status. From a therapeutic point of view, Chinese Medicine and Modern Medicine can both be practiced in a complementary manner. Nevertheless, one must bear in mind that the complementary use of Chinese Medicine and Modern Medicine does not mean to “westernize” Chinese Medicine, that is not mechanically applying the format in the practice of Modern Medicine to Chinese Medicine. It is because this will lead to the loss of the distinct characteristics of Chinese Medicine in producing an effect in the prevention and/or treatment of diseases. As far as the endpoint of disease prevention is concerned, there is no difference between Chinese Medicine and Modern Medicine. However, one should adopt the approach with the optimal health-promoting effect, as well as with no (or negligible) side effects in long-term use.

## **The pharmacological basis of Yang / Qi invigoration**

Over the past two decades, my laboratory at the Hong Kong University of Science & Technology has focused on investigating the pharmacology of Yang/Qi-invigorating Chinese tonifying herbs.


According to Chinese Medicine theory, Yang/Qi is a manifestation of body functions supported by various organs. A 'Yang/Qi-invigorating' action, therefore, involves the enhancement of bodily functions in general and cellular activities that consume ATP in particular. ATP, which is the universal energy currency in the cell, is used for energizing biochemical reactions, which form the basis for expressing cellular function. Yang activity can be viewed as reflecting processes involved in the body's energy metabolism, wherein the digestion of foodstuff provides fuel molecules (such as glucose) that are metabolized, resulting in the production of ATP in mitochondria.

The mitochondrion, the powerhouse of the cell, is regarded as the cellular Origin of Qi and ATP as the biochemical unit of Qi. Under normal conditions, mitochondrial oxidative processes generate reactive oxygen species (ROS) as byproducts. When mitochondrial dysfunction occurs, increased amounts of ROS are produced. Being highly chemically reactive, ROS attack mitochondrial structures, resulting in defective mitochondrial biosynthesis and impaired energy metabolism.

Under normal physiological conditions, mitochondrial antioxidant defense systems, which are mainly dependent on glutathione, can adequately handle the potentially detrimental effects of ROS derived from energy metabolism. Optimal body function requires a large amount of energy. In this regard, antioxidant defense components are essential in sustaining mitochondrial ATP production.

Experimental evidence has demonstrated that while Yang-invigorating herbs (such as Cistanches Herba, Cynomorii Herba) can stimulate mitochondrial activity, Qi-invigorating herbs (such as Asian ginseng and American ginseng) enhance mitochondrial glutathione antioxidant capacity, both of these lead to an increase in mitochondrial ATP generation capacity. The increase in a small amount of ROS arising from the activation of mitochondrial activity induced by Yang-invigorating herbs can trigger retrograde signal transduction, with a resultant increase in the expression of antioxidant genes and cellular/mitochondrial antioxidant capacity – that means, mitohormesis – a process for maintaining a stable and permissive environment for mitochondrial function.

Furthermore, the increased production of ROS associated with Yang-invigoration can activate uncoupling protein in mitochondria. The increase in mitochondrial activity (which increases mitochondrial membrane potential) and the activation of



uncoupling protein (which decreases mitochondrial membrane potential) constitute a substrate cycle that enables a timely increase in mitochondrial ATP production in response to an increased energy demand.

In acute terms, Yang-enhancing herbs can increase ATP generation capacity in mitochondria as well as their responsiveness to energy demand. The induction of mitochondrial mild uncoupling can help control body weight. In the long term, the induction of antioxidant response can lead to a longer and healthier lifespan.

The stimulatory effects of Yang-invigorating herbs on both energy production and antioxidant defense system exemplify the inter-relationship between Yin and Yang, which entails the presence of Yin (that is antioxidant) within Yang (that is energy production).

In addition to the stimulation of ATP production, Qiinvigorating herbs (such as Asian Ginseng and Huang Qi) can produce a regulatory action on neural and/or hormonal systems in the body.

For example, Ginseng can exert a hormonal regulatory action on male reproductive function. A clinical study has demonstrated that the use of Asian ginseng extract significantly increases plasma levels of male sex hormones such as testosterone, follicle-stimulating hormone and luteinizing hormone. Ginseng enhances sexual performance and improves male fertility by modulating neural and hormonal systems. Several ginsenosides (active ingredients from Ginseng) act on ER $\alpha$  – a receptor that mediates the action of estrogens (those are female sex hormones). Daily Ginseng intake in type-2 diabetic patients demonstrated a significant reduction in fasting blood glucose levels and body weight, and an improvement in glycated hemoglobin levels (which is an indicator of blood glucose control), as well as in psychological performance and physical activities.

Huang Qi can amplify the hormonal regulatory response in lowering of blood glucose through a mechanism that may involve glucose-sensing regions of the central nervous system.

In general, pharmacological studies on Chinese Yang/Qi invigorating herbs can help to explain their beneficial effects in safeguarding health in the language of Modern Medicine.

## **The pharmacological basis of Yin / Blood tonifying herbs**

In addition to Yang/Qi invigoration, my laboratory has also investigated the pharmacological basis of Yin/Blood tonifying actions.

According to Chinese Medicine theory, the optimal functioning of the immune system requires a dynamic balance between Yang and Yin. Immune responses are the result of an effective functional interplay between innate (which is natural and non-specific) and adaptive (which is acquired and specific) components of the immune system. While innate immunity is associated with Yang (that is Defensive Qi), adaptive immunity is related to Yin.

Defensive Qi is responsible for protecting the body against disease-causing external factors such as invading microorganisms. In response to pathogen invasion, the innate immune response is triggered, during which phagocytic cells (such as macrophages and neutrophils) migrate to the site of invasion and engulf the invading pathogen. The engulfed pathogen is then degraded by oxidants and degradative enzymes.

On the other hand, bone marrow, blood and body fluids, which are enriched in immune cells, belong to adaptive immunity and is classified as Yin. Adaptive immunity acts to curb the further invasion of microorganisms. Therefore, Yang (the innate immunity) acts in concert with Yin (the adaptive immunity) to counteract invading microorganisms. Both Yin-nourishing and Blood-enriching herbs enhance primarily on adaptive immunity.

Let take two Yin-nourishing herbs as examples for illustrating their pharmacological activities.

Ligustri Fructus stimulates/modulates adaptive immunity. It can prevent the decline in white blood cell counts caused by chemotherapy or radiotherapy and can ameliorate the symptoms of chronic bronchitis – an inflammation in the air tube. Oleanoic acid, the main active ingredient of Ligustri Fructus, can stimulate helper T cells (Th1, a sub-type of lymphocytes), leading to the secretion of Th1 cytokines, with a resultant increase in the promotion of lymphocyte proliferation, thereby favoring an adaptive immune response.

Dendrobium species (or its crude polysaccharides) produce an immune-stimulatory effect on macrophage functions such as phagocytosis. Interestingly, the Yin-nourishing Dendrobium species prevents early diabetic complications in rats. This observation is consistent with the Chinese Medicine theory which describes that diabetes causes Yin-deficiency in the body.



Now let's take two examples of Blood-enriching herbs for illustration.

Polysaccharides from *Angelica Sinensis Radix* (Dang Gui) can protect against damage produced by X-radiation and enhance bone marrow cell proliferation and antibody production. These polysaccharides can also promote the differentiation of macrophages and T cells.

Processed *Rehmannia Rhizoma* (Di Huang) enhances the production of blood stem cells from bone marrow. The root of Di Huang can reduce or minimize impediments in peripheral microcirculation associated with various chronic diseases through an improvement in blood flow characteristics. In addition to influencing the immune function, Blood-enriching herbs can produce regulatory actions on neural and/or hormonal systems in the body.

Dang Gui can produce an estrogen (female sex hormone)-like action, in particular in a decoction with Huang Qi (that is, Danggui Buxue Tang). Dang Gui can induce the dilatation of blood vessels and improve microcirculation, particularly in the brain. In addition, a water extract of Di Huang produces blood glucose-lowering effect in animals by mechanisms involving increases in the activities of liver enzymes that metabolize glucose and stimulation of insulin secretion. Di Huang oligosaccharide exerts a significant blood glucose-lowering effect in rats with experimentally-induced diabetes. It can also significantly reduce the insulin resistance of fat cells.

In general, pharmacological studies on Chinese Yin/Blood tonifying herbs can help to explain their beneficial effects in safeguarding health in the language of Modern Medicine.




## **Biochemical Basis of Qi-Invigorating Action in Chinese Medicine: A Study on the Schisandra Berry**

### Biochemical basis of Qi-invigoration

In Chinese Medicine, Qi is regarded as the primary force for supporting all life activities. Qi is not merely the air breathed into the lungs for oxygenating red blood cells, which then deliver oxygen to various tissues of the body; it is essentially the driving force for all body functions.

According to the Yin-Yang Theory in Chinese Medicine, the interaction between Yin and Yang results in the generation of Qi. In essence, the formation of Normal Qi (or Zheng Qi in Chinese) can be described as follows: the Lung inhales atmospheric air which then descends into the body and forms the Clean air. Grain Qi, which is derived from the Spleen by transforming ingested food and water, combines with the Clean air to form the Pectoral Qi. Although inherited Primordial Qi is stored in the Kidney, it can be mobilized to combine and interact with Pectoral Qi to generate Normal Qi (or simply called Qi). Qi is mainly comprised of two functional components, namely, Defensive Qi (responsible for defense against microorganism invasion) and Nutritive Qi (responsible for providing nutrients to cells and tissues). To enable its functional role, Qi circulates throughout the body through the Meridian. As such, the uninterrupted flow of Qi to various parts of the body is essential for good health with optimal body functioning. By analogy with farming, if one irrigates growing crops with sufficient water and fertilizers, the result will be healthy growing crops.

Qi can also be viewed as a manifestation of function. At the cellular level, a given function is usually supported by chemical processes, which are fueled by energy in form of ATP in the cell. In other words, ATP, which is generated from mitochondria (the powerhouse of the cell), can be regarded as the biochemical unit of Qi. Bioenergy (ATP) is generated from the biochemical oxidation of fuel molecules. In essence, foodstuffs (including carbohydrates, lipids, and proteins) are ingested. Following digestion, molecules such as glucose, fatty acids and amino acids are oxidatively degraded (via glycolysis and the Krebs's Cycle) and ATP is generated from mitochondrial electron transport and oxidative phosphorylation. The mitochondrion can, therefore, be regarded as the cellular origin of Qi. During the course of electron transport in mitochondria, due to the leakage of electrons, reactive oxygen species (ROS) are unavoidably generated as by-products of energy metabolism. These chemically reactive ROS can cause oxidative damage to cellular components and biomolecules, particularly in mitochondria.



This is analogous to the release of waste emissions from a power plant that can pollute the atmosphere. If ROS are not effectively neutralized by cellular antioxidant defense systems, mitochondria and other cellular components can be damaged, resulting in cellular dysfunction or cell death. Given the far-reaching damage produced by ROS, antioxidant supplementation has become popular in preventive health, with the goal of scavenging ROS and thereby preventing diseases, including those associated with aging.


### A Study on Schisandra berry

In a quest for naturally-occurring antioxidants for preventive health measures, we have focused on the Schisandra berry, which is a commonly used herb in Chinese Medicine.

Sun Simiao, who was renowned as the “King of Herbal Medicine” in the Tang Dynasty in China, annotated that “Taking Schisandra berry can invigorate the Qi of five visceral organs”. This statement reveals much about the Qi-invigorating actions of the Schisandra berry in various organs of the body.

The Schisandra berry is called “Wu-Wei-Zi” in Chinese, which literally means “the fruit of five tastes”. According to the Five Element Theory of Chinese Medicine, the five tastes of the Schisandra berry indicate its pharmacological action targeting at five visceral organs: sour to Liver; bitter to Heart; sweet to Spleen; pungent to Lung; and salty to Kidney.

To investigate the pharmacological basis of the Qi-invigorating action of the Schisandra berry in various organs, we first isolated schisandrin B, an active component of the Schisandra berry. We then examined the effect of schisandrin B on ROS-induced tissue damage in rats. Over the past two decades, experimental results have shown that schisandrin B is protective against oxidant injury in various tissues, including the brain, heart, kidneys, liver and skin. The tissue protection afforded by schisandrin B in experimental animals has been validated by studies using cultured cells derived from various tissues. Pre-incubation with schisandrin B was found to protect against oxidant injury induced in cultured cells. Further in-depth investigations have revealed that the biochemical mechanism underlying the tissue/cellular protection afforded by schisandrin B involves an increase in the resistance of mitochondria to ROS-induced oxidative stress. The oxidative stress-induced disruption of mitochondrial structural and functional integrity can eventually lead to cell apoptosis, with the resultant development of age-associated diseases.



The increase in mitochondrial resistance to oxidative stress results in enhanced cell survival and ultimately to a long healthy life span.

With regard to aging, “Mitochondrial Decay” is the leading hypothesis in explaining the cause of aging. Under normal conditions, mitochondria generate small amounts of ROS which are beneficial in safeguarding health. When mitochondria are damaged by ROS, the resulting malfunction generates increased amounts of ROS, with further disruption of mitochondrial structural and functional integrity.

In this regard, a growing body of scientific evidence has suggested the involvement of mitochondrial dysfunction in a number of age-associated diseases such as Alzheimer's disease, Parkinson's disease, cardiovascular diseases, diabetic complications and liver diseases. The “Mitochondrial Decay” theory of aging is supported by the demonstration of a negative correlation between the extent of mitochondrial ROS production in tissues such as that of the liver and maximum lifespan in a number of primates, including humans. The extrapolation from the correlation graph indicates that humans should be able to live up to 120 years. This prediction has been confirmed by a longevity record held by a French woman (named Jeanne Calment) who lived for up to 122 years.

For an ultimate test to determine if schisandrin B (which may mitigate mitochondrial decay) can extend lifespan, a longevity study was conducted using mice. Experimental results indicated that dietary supplementation with schisandrin B improved the survival of both male and female mice.

In conclusion, schisandrin B, which can preserve the structural and functional integrity of mitochondria (the cell origin of Qi), may help prevent or at least delay the onset of age-associated diseases and thus favor a long and healthy lifespan.

## **Chinese tonifying herbs for safeguarding the health**


Aging is an unavoidable process, which is associated not only with changes in facial appearance, but also a decline in bodily function, with an increased likelihood of developing a host of age-associated diseases. Over the past century, there has been a gradual change in the spectrum of diseases from the prevalence of infectious diseases to chronic/degenerative diseases. While the decrease in the incidence of infectious diseases is mainly attributable to the improvement in living conditions and advances in pharmacotherapy, the increased incidence of chronic/degenerative diseases is related to the marked increase in life expectancy in affluent societies.

Chronic/degenerative diseases associated with aging include diabetes and its complications, Parkinson's disease, neurodegenerative diseases, autoimmune disorders such as rheumatoid arthritis and lupus erythematosus. All these have greatly worsened the quality of life of elderly people and have imposed a great economic burden on both families and societies. Given the holistic nature of chronic/degenerative diseases in terms of disease development and symptom manifestation, allopathic Modern Medicine, which emphasizes the investigation of the biochemical basis of the disease followed by therapeutic intervention, cannot effectively manage most chronic diseases, not to mention their prevention. As such, individuals have sought solutions from nature in order to explore a better way of preventing and treating chronic/degenerative diseases. Traditional medicine has, therefore, come of age in safeguarding health particularly in the vulnerable elderly. In this connection, Chinese Medicine is highly regarded as a gold mine for exploring alternative ways to prevent and treat chronic/degenerative diseases.

As far as the prevention of diseases is concerned, a treasure of Chinese tonifying herbs can be used to supplement (or "patch up") impaired body function. This is called 'Bu' in Chinese.

According to Chinese Medicine theory, a deficiency in body function (that is a suboptimal health status) can be caused by genetic factors and/or acquired environmental factors as well as aging. To remediate declining physiological function, one possible approach is supplementation with Chinese tonifying herbs with various functional properties, depending on the particular pattern of deficiency in body function involved.

In essence, Yang/Qi-invigorating tonifying herbs, which are used for individuals with Yang/Qi deficiency, can up-regulate energy metabolism, with a resultant increase in bioenergy production. Alternatively, Yin-nourishing/Blood-enriching tonifying herbs are used for fortifying nutrient supply as well as blood production in the body, with an associated stimulation of immune function. In addition to Yang and Yin-related




functions, Qi and Blood tonifying herbs also participate in modulating neuroendocrine function in the body in order to achieve and maintain optimal homeostasis.

Over the past two decades, my laboratory at the Hong Kong University of Science & Technology has done research on Chinese tonifying herbs, with the aim of building a communication bridge in health concepts between Chinese Medicine and Modern Medicine. Our research has been focusing on investigating the pharmacological basis of Yang and Yin Chinese tonifying herbs, in relation to their effect on aging-associated diseases. We have been able to demonstrate that Yang-tonifying herbs can invariably enhance the energy status of the body, and this observation is consistent with Chinese Medicine theory which states that “Yang” is manifested as body functioning and all body functions are energy-dependent.

A study has indicated that stamina, which reflects the body capacity in expressing Yang activity, begins to decline before the age of 20 in young Japanese males. Our investigations of the biochemical mechanism(s) involved in the enhancement of energy status revealed the ability of Yang tonifying herbs to increase mitochondrial ATP generation capacity in cells and various tissues. Upon the stimulation of ATP generation, the increased reactive oxygen species (ROS) production arising from the activation of electron transport induced by Yang tonifying herbs can trigger retrograde signal transduction, with a resultant increase in the expression of antioxidant genes and hence cellular/mitochondrial antioxidant capacity – that means “mitohormesis” - a process for maintaining a stable and permissive environment for mitochondrial function.

The retrograde signaling can elicit an antioxidant response. It is believed that the glutathione-driven antioxidant network plays a crucial role in combating damage induced by ROS. Cellular reduced glutathione (GSH) levels are maintained by synthesis (from amino acids) and glutathione redox cycling (from oxidized glutathione). GSH works synergistically with ascorbic acid (vitamin C) and  $\alpha$ -tocopherol (vitamin E) by regenerating their reduced forms from oxidized forms. In so doing, antioxidant defense systems can be sustained by cellular metabolic processes through the supply of ATP (energy) for glutathione synthesis and NADPH (reducing power) for glutathione redox cycling.

Pharmacological studies have shown that most Yin tonifying herbs can stimulate immune responses and possess strong free radical scavenging activities. Yin is the basis for adaptive immunity. A decline in body immunity can be caused by a number of factors, including age and body constitution, lifestyle, pollution, and infection. Studies have also shown that an age-associated decline in immunity occurs starting



from the teenage years. Taken together, while Yang tonifying herbs can increase mitochondrial ATP production, Yin-tonifying herbs primarily stimulate immunoresponses against invading microorganisms and cancer cells. Both Yang and Yin tonifying herbs possess antioxidant properties that can preserve mitochondrial structural and functional integrity as well as sustain immunity, with resultant prevention of age-associated diseases and retardation of the aging process.


Now we understand why Chinese tonifying herbs can serve as an effective means for promoting health. If we take the stamina and immunity as examples, the decline of Yang and Yin related body function commences from the teenage years. We should, therefore, start taking Chinese tonifying herbs for safeguarding health before it is too late.

### **Chinese tonifying herbs and delaying aging**

Human aging is an unavoidable process. Not only will the facial appearance change, but also the decline in physical functions, and the incidence of many age-related diseases has also greatly increased. Over the past century, the scope of the disease has gradually changed from the epidemic of infectious diseases to the trend of the spread of chronic/degenerative diseases. The incidence of infectious diseases has decreased due to improved living conditions and the development of drug treatments, and due to social prosperity, people's life expectancy has increased significantly, and the incidence of chronic/degenerative diseases has also increased.

Chronic/degenerative diseases related to aging include diabetes and its complications, Parkinson's disease, neurodegenerative diseases, and autoimmune diseases such as rheumatoid arthritis and lupus erythematosus. These have greatly reduced the quality of life of the elderly and brought huge economic burdens on families and society. In view of the holistic nature of chronic/degenerative diseases in terms of disease development and symptom manifestations, modern medicine's antagonistic therapy emphasizes the study of the biochemical basis of the disease and then intervenes in treatment, so it cannot effectively control most chronic diseases, let alone prevent. Therefore, people are looking for better solutions to prevent and treat chronic/degenerative diseases in nature.

We can view aging, illness and even death from the perspective of Chinese Medicine. There is a saying that "Qi deprivation causes death", suggesting that Qi plays an important role in maintaining human vitality. If Qi cannot be generated, life will end. Therefore, the continuous generation of Qi is the key to delaying aging and preventing age-related diseases. According to the Huang Di Nei Jing, Qi is



generated by mixing "Congenital Qi, that is, Kidney Qi and Acquired Qi, that is, Zong Qi. Among them, Kidney Qi is endowed to parents and cannot be acquired. Zong Qi is formed by mixing "clear air" and "nutrients" absorbed from food. If the formation of Zong Qi is reduced due to weak body functions, more Kidney Qi is needed to produce Qi to support life activities. As a result, Kidney Qi, which cannot be refilled, will be consumed faster, with resultant Qi deprivation and a shorter lifespan. Conversely, if the production of Acquired Qi is abundant and/or the consumption rate of Kidney Qi will be slowed down, the lifespan will be increased. Therefore, using the Chinese tonifying herbs to maintain the normal functions of the body's organs can prevent or reduce the incidence of diseases caused by aging through slowing down the consumption of Kidney Qi and achieve the purpose of delaying aging.