

2.2

Processes of Disease

2.2a Introduction to processes of disease

Classification of disease

Within conventional medical thought, diseases can be classified according to specific, clearly defined criteria. There are various methods of classification that all share the potential benefit of clarifying those features that disparate diseases may have in common, thus aiding communication about these diseases.

Diseases may be classified according to cause, and this is known as classification by etiology. Understanding the language of etiology is essential for the discussion of prevention of disease. A classification system that focuses on the disease mechanisms (pathogenesis of disease) is a prerequisite for beginning to understand which treatments may be most effective for different diseases and also for predicting outcome (prognosis).

All systems of medicine, be they holistic or conventional, have their own systems of classification of etiology and pathogenesis.

Etiology of disease

Etiology, literally meaning the study of causes, is the term used to describe the causation of disease. From a conventional medical viewpoint, the cause of disease can be simplified into a few distinct categories, including:

- congenital defects (acquired between the time of conception and birth)
- infectious agents

- physical trauma (including extremes of temperature and radiation)
- effects of drugs, chemicals and toxins
- degeneration (resulting from overuse and aging)
- psychological stressors
- iatrogenic condition (caused by medical treatment) – this category will, of course, overlap with any one of the others
- unknown cause – the terms idiopathic and essential may be ascribed to diseases of unknown cause (e.g. idiopathic thrombocytopenic purpura and essential thrombocythemia).

The seven processes of disease

Pathogenesis (literally, the birth of disease) is the term used to describe the physical basis of how disease develops in terms of the basic biological processes of disease. The diverse forms of the disease process can be grouped into seven broad categories:

- inflammation (redness, swelling, heat, pain or loss of function of tissues)
- tumors (excessive or inappropriate growth of cells)
- abnormal immune mechanisms (either under- or overactive immune responses)
- thrombosis, embolism and infarction (excessive or inappropriate clotting)
- degeneration (wearing out of tissues through aging or trauma)

- metabolic abnormalities (homeostatic biochemical functions of the cells become imbalanced)
- genetic abnormalities (the cells carry defective genetic material that means they function in a less than healthy way).

From the perspective of the study of clinical medicine, classification of the processes of disease is important because it generates principles of causation of disease that can then be applied to all diseases. For example, if the process of inflammation is understood, this will aid in the study of any one of the diseases that involves inflammation, such as arthritis, dermatitis, meningitis and pneumonia. Because the understanding of the first four basic processes of disease is fundamental to the study of the pathology of all diseases, they are explored in some depth in this text, in Sections 2.2b, 2.2c, 2.2d and Chapter 2.3.

The remaining three processes of disease—degeneration, metabolic disease and genetic disease—are now briefly attended to.

Degeneration is the result of aging. In general, aging (senescence) involves cell loss and atrophy of tissues. Rapidly regenerating active tissue may, through the process of senescence, become replaced with tough, fibrous, less active tissue, and organs may cease to function as effectively. Deformities (e.g. of skin, joints or bones) become commonplace. Degenerative diseases are discussed later, according to the physiological system that they affect.

The category of metabolic abnormality embraces all diseases that result from imbalance in the homeostatic function for metabolism (the chemical processes that go on continuously in living cells). These include common

diseases such as diabetes, and hypothyroidism. Again, the metabolic disorders are discussed throughout the text according to the physiological system that they affect.

The principles of genetic (congenital) abnormalities have been discussed in Section 1.1b, under the heading “Mutation.”

An understanding of the processes of disease can aid thinking about disease from the perspective of another medical system. If it is possible to consider each process of disease in terms of corresponding pathological descriptions described in another medical system, it is possible to take these correspondences and use them to help describe pathological processes in all manner of diseases. For example, inflammation always involves the generation of redness and heat in tissues. According to Chinese medicine, redness and local heat always corresponds to the Pathogenic Factor of Heat. Therefore, it would be reasonable to conclude that all inflammatory diseases will be described, amongst other things, in terms of Heat in Chinese medicine. In this section, all the processes of disease are also interpreted in terms of Chinese medicine, and this will provide the foundation for the Chinese medicine interpretations of all the individual diseases described later in the text.

In summary, it cannot be overstated how much the understanding of the basic processes of disease can enrich the understanding of conventional pathology. An added benefit is that processes of disease can also inform us about Chinese medical pathology and so help us to understand what sort of Chinese medical disease descriptions (syndromes) might be relevant in the diseases described by Western medicine.

Information box 2.2a-i

Processes of disease: comments from a Chinese medicine perspective

As a general introduction, it is important to explain the rationale for comparing the conventional view of the processes of diseases with a Chinese medicine understanding of pathology. As stated in the text, in the study of clinical medicine classification of the processes of disease is important because it generates principles of causation of disease that can then be applied to all diseases. For example, an understanding of the process of inflammation will aid in the study of any disease that involves inflammation, such as arthritis, dermatitis, meningitis and pneumonia.

An important aspect of this system of classification from our point of view is that, although the understanding of conventional processes would have involved knowledge that would not have been familiar to the ancient Chinese, the manifestations of the processes in signs and symptoms are consistent within

each process. It is these that are the bridge between the two systems of medicine.

Inflammation will always have characteristics of heat and swelling, and degeneration will always involve a drying and withering of tissue. As observable phenomena, these would form the basis for making a diagnosis in Chinese medicine. However, the way in which the heat and swelling is generated in each individual case does not share the same consistent internal process as understood in the conventional view, and looking for parallels of process is a trap for the unwary.

When a patient presents with a condition that results from one or more of the seven processes of disease, it can reasonably be expected that the symptoms and signs normally associated with those processes are evident. The meaning and importance

of the signs and symptoms can then be assessed within the entirely different understanding of the manifestation of symptoms and signs described in Chinese medicine. What this means is that the symptoms and signs of the conventionally described processes of disease will help point to the Chinese medicine syndromes that might be expected to be discerned in any medical condition, first assuming the underlying process of disease is recognized.

A Chinese energetic interpretation of inflammation

Inflammation is a basic response to tissue damage that results in increased blood flow to the tissues, swelling from increased tissue fluid, pain as a result of the release of irritant cell contents and loss of function of the body part as a result of pain and swelling. Together these factors result in the five characteristics of inflamed tissue described in medicine as redness, swelling, heat and pain (or in Latin, as “*rubor, tumor, dolor, calor*”), and loss of function.

In Chinese medicine the characteristics of redness and heat would point to Heat, either locally or generally. The excess tissue fluid would often be associated with an underlying Pathogenic Factor such as Damp, especially if there was any oozing of liquids or the swelling was considerable. The swelling in a clearly defined area would itself point to local Stagnation, usually of Qi or Blood, and the character of the pain would indicate which. If inflammation is confined to one peripheral body part, the term Bi Syndrome may be applied in Chinese medicine, as this describes localized manifestations of Pathogenic Factors in the Channels, particularly in the region of the joints.

In conclusion, inflammation in the body might be described as evidence of localized or generalized Heat with Qi or Blood Stagnation, often with underlying Damp.

A Chinese energetic interpretation of tumors

Tumors result from excessive and inappropriate overgrowth of tissue cells. The underlying problem from a conventional medicine perspective is that the genetic control of cell multiplication has become disordered, and the immune system has failed to recognize and control the growth of these disordered cells.

In Chinese medicine, substantial masses that do not move easily are often regarded as manifestations of either Phlegm or Blood Stagnation (or sometimes a combination of both). Blood Stagnation is characterized by hardness and intense boring pain with violaceous color changes. Phlegm is more often associated with numbness, and will usually develop

against a backdrop of Heat and Damp, which will manifest in other signs and symptoms. For long-standing masses to develop there has to be a pre-existing state of Stagnation of Qi, as it is only healthy Qi moving freely that prevents the development of Stagnation and Phlegm. Usually this means there has been underlying Deficiency of Qi together with chronic emotional factors causing the Stagnation of Qi. However, some masses can manifest against a background of good Upright Qi, the strength of which ideally should be considered when determining priorities in treatment.

Chinese medicine recognizes that in addition to Qi Stagnation and the ensuing Accumulation and Blood Stagnation that a cancerous lump may also be manifesting the presence of a Heat Toxin that could well be environmental in origin, and so Chinese medical treatments for cancer would include herbs for clearing Toxins.^{21, 22}

In conclusion, tumors in the body might be described as evidence of Phlegm and/or Blood Stagnation (with possible additional Heat Toxins) having developed on an underlying background of Stagnation of Qi with likely Qi Deficiency.

A Chinese energetic interpretation of abnormal immune mechanisms

Abnormal immune mechanisms fall into two broad categories: those involving an insufficient response to infection, and those involving inappropriate responses, where there is hypersensitivity to specific stimuli or the misrecognition of the body's own cells as a threat.

In Chinese medicine, the functions of a healthy immune system are reflected in the concept of healthy Upright Qi. The foundation of healthy Upright Qi lies in Kidney Essence and also Spleen Qi, and both are the basis of healthy Wei Qi.

Some of the patterns of abnormal immune responses, for example, type I allergic hypersensitivity, which manifest features of acute invasion of Pathogenic Factors, are reflected in recognized patterns of disruption of Wei Qi, and suggest deficiencies either in Wei Qi or in the underlying Kidney Essence itself. The allergen is seen in Chinese medicine as a Toxic Pathogenic Factor, to which healthy people are resistant. In the case of allergy, it is usually chronic Spleen Qi that leads to Wei Qi insufficiency and allows for invasion of Pathogenic Wind Cold (causing rhinitis, for instance) or Wind Heat (urticarial itch). Susceptible individuals may also be susceptible because of chronic Phlegm or Heat affecting their system. These Pathogenic Factors may then become manifest following exposure to the environmental trigger.²³

Others, for example, in multisystem autoimmune disease, present much more of a pattern of Toxic Pathogenic Factors against a background of long-term chronic deficiency that very often appears to be rooted in Spleen Qi Deficiency with Liver Qi Stagnation and resulting Deficiencies of Liver Blood, Kidney Yin and Yang.²⁴

In conclusion, inappropriate immune responses might be described as evidence of Chronic Deficiency of Qi and, in particular, Spleen Qi leading to Deficiency of Wei Qi in the case of allergy, and a wider pattern of mixed chronic Deficiency and Excess in multisystem autoimmune disease. Deficiency of Kidney Essence may well, of course, be at the root of either condition.

A Chinese energetic interpretation of thrombosis, embolism and infarction

Excessive blood clotting in the peripheral parts of the body is characterized by intense pain, coldness, violaceous coloration and loss of function if severe (e.g. arterial blood flow restriction in the lower leg) or by swelling, less intense pain and local inflammation (venous thrombosis) if less severe. Thrombosis in the brain can lead to stroke and, of the other internal organs including the heart, severe life-threatening illness.

The former symptoms of pain, coldness and purple coloration are all associated with what is described in Chinese medicine as Stasis of the flow of Blood, and there are numerous factors, including the Deficient states of Qi, Blood and Yang Deficiency, and also the more Full conditions of Qi Stagnation and Cold that can predispose to Blood Stasis. In most cases of Stasis unrelated to trauma, the patient will be depleted in some way. Causative patterns include Depleted Blood, Qi and Yang Deficiency, which all predispose to invasion of factors that can impair the flow of Blood and Qi, such as Toxic Cold, Heat and Phlegm. Dietary and lifestyle factors as well as emotional imbalance will all contribute to Blood Stasis. Blood Stasis can then also in itself engender Heat, Phlegm, and also Wind.

Peripheral venous thrombosis results from a significant region of blood clot in a deep vein, often resulting from sustained inactivity. The substantial accumulation of solid mass is suggestive of the concept of Phlegm resulting from Blood Stasis in Chinese medicine, and indeed, the symptom of swelling with less intense pain in venous thrombosis is consistent with this. The inflammation seen with venous thrombosis is also suggestive of Heat. Peripheral venous thrombosis can dramatically extend and progress to pulmonary embolus, which, if mild, leads to severe localized chest pain and, if severe, collapse and death. These suggest Blood Stagnation and Phlegm misting the

Orifices of the Heart respectively. Again, the severe Phlegm-related Syndrome seems to be a progression from Blood Stasis in pulmonary embolus.

In angina there is restriction of blood flow to the heart. This manifests as severe stabbing pain in the chest and in Chinese medicine this is understood as Blood Stasis resulting from various factors including severe Deficiency of Blood and Qi (such as occurs in old age) and with invasion of Cold or Phlegm Heat blocking the Channels leading to Blood Stasis and pain. If severe, there can be coronary thrombosis, a result of total blockage of coronary arteries. There are life-threatening arrhythmias that might relate in Chinese medicine to extreme Heart Qi/Yang Depletion due to the Heart lacking in nourishment from Blood and Qi. These may cause loss of consciousness, again, a manifestation of Phlegm misting the Orifices of the Heart.²⁵

A stroke also suggests Phlegm misting the Orifices of the Heart.

In conclusion, thrombosis, embolism and infarction might be described as evidence of Blood Stasis and Qi Stagnation and resulting from prior Deficiency, and with subsequent invasion of Pathogenic Factors that contribute to formation of Phlegm. In severe cases, Yin and Yang may be consumed, and this will manifest in severe life-threatening illness.

A Chinese energetic interpretation of degeneration

In conventional medicine, degeneration of tissues involves excessive cell death, poor healing responses and the formation of less vital tissues, with excessive fibrous tissue and deposits of substances such as calcium salts that impede healthy function. The resulting tissues tend to be less springy and soft and resilient, and may also manifest with deformities (lumps and bumps).

In Chinese medicine language, all these changes, if seen across large areas of the body, would be primarily described in terms of broad deficiencies of Yin and Yang, as these substances are expressed in the vitality and healthy function of the tissues respectively. More particularly, they are linked with a deficiency rooted in the Kidneys, and are characteristic of the aging process as Kidney Essence becomes depleted. The deposits and deformities are evidence of a widespread impairment in flow of Qi, leading to an accumulation of Pathogenic Factors such as Phlegm and Damp and Blood Stagnation. If these are localized, there may be evidence of local Qi or Blood Stagnation impairing the flow of Qi to part of the body, in which case there may be pain and purplish discoloration.

In conclusion, degeneration of a body part might be described as evidence of Deficiency or Yin and/or Yang, in particular, of Kidney Qi/Essence, leading to a tendency to Qi and Blood Stagnation and an accumulation of Phlegm/Damp and other Pathogenic Factors.

A Chinese energetic interpretation of metabolic abnormalities

The metabolic diseases are complex and have diverse symptoms depending on the fundamental abnormality. Most metabolic diseases will be manifest in the function of all the body tissues and so reflect a fundamental and profound state of imbalance.

Chinese interpretations of metabolic disease will be equally complex, and are likely to describe deep deficiency. Often these conditions will fit in to the category of "Knotty Disease"²⁶ in Chinese medicine. This is because a profound and prolonged deficiency will often result in full Pathogenic Factors, which create complex patterns of signs and symptoms. As in conventional medicine, the effects are likely to be widespread in the energetic system rather than confined just to Channels.

A Chinese energetic interpretation of genetic abnormalities

A genetic abnormality may affect every cell in the body (if present from the time of conception), or may be the result of a developmental problem in the womb and

thus affect some body parts and not others. From a conventional medicine perspective, there is no doubt that a congenital abnormality will compromise the health of the child and, unless carefully managed, is likely to affect the growth and development of the affected child.

The ancient Chinese interpreted congenital disease (i.e. a condition present from the time of birth) as a Deficiency of Kidney Essence (Jing). Zhang Jing Yue (c.1563–1640; original name, Zhang Jie Bin) described the Ming Men (which he associated with both kidneys) as the source of Essence and the foundation of full health: "Ming Men is the mansion of both water and fire, the house of Yin and Yang, the sea of Essence and Blood, the nest of Life and Death. If the Ming Men is depleted and damaged, the five Zang and six Fu lose their sustenance, and the Yin and Yang will become sick, causing all types of disorders."²⁷

To the Chinese, Kidney Essence was passed to the fetus from the parents at the time of conception. It was what determined a person's constitutional strength and vitality, and is fundamental to healthy growth and development.^{28, 29} Kidney Essence underlies the health of all the organs, and so more specific imbalances will often be present as the visible sequelae of the congenital disorder (e.g. of Spleen and Lung Qi in cystic fibrosis).

In conclusion, a congenital problem might be described as evidence of primarily Jing Deficiency, but may be described as a specific Organ Deficiency, depending on where the underlying genetic defect manifests.

2.2b Inflammation

The physiology of acute inflammation

Inflammation is the term used to describe a complex bodily response to damage. It is derived from the Latin, meaning to set on fire, reflecting the fact that two manifestations of inflammation are heat and redness. Two other important features are swelling and pain. These characteristics of inflammation have been familiar to doctors over many centuries. They were noted by the 1st-century Roman medical encyclopedist Celsus as calor (heat), tumor (swelling), rubor (redness) and dolor (pain).³⁰

Inflammation has one other major characteristic in that it leads to loss of function of the affected body part. Swelling and pain largely contribute to this loss of function. In mild disease, loss of function can be beneficial, as it encourages the patient to rest the inflamed area, and this should promote healing. For example, inflammation of the voice box (laryngitis) may give rise to discomfort and malaise. This means that the patient avoids talking, and may wish to rest in bed. Both these responses will promote healing.

In severe disease, the loss of function can jeopardize the health of the whole body, and is not beneficial. For example, inflammation of the lining of the brain resulting from bacterial infection (meningitis) leads to swelling of the brain and carries the risk of coma and death.

The five characteristics of inflammation are listed in Table 2.2b-I.

Table 2.2b-I The characteristics of inflammation

Redness
Heat
Swelling
Pain or tenderness
Loss of function

When a body part is inflamed, it is often medically described by the suffix “-itis.” This may be added on to the common name for the affected organ or, more usually, to the Latin term for the organ. Hence in tonsillitis, dermatitis, laryngitis, osteomyelitis and tendonitis we would expect to find inflammation of the tonsils, skin, larynx, bone marrow and tendons, respectively.

The trigger for inflammation is tissue damage. When tissues are damaged, cells are ruptured and release their contents. The presence of cell contents in the extracellular space has a powerful effect on the immune system and the capillary cells. The released chemical contents of cells signal to the immune system and capillary cells that there is cell debris that needs removing, that repairs may need to be performed, and that there might be foreign bodies and infectious organisms to be eradicated. Their presence induces responses in immune and epithelial cells that bring about the inflammatory response, and thus begins the process of healing. The chemicals released include the inflammatory mediators including prostaglandins, histamine, serotonin (5HT) and bradykinin.

The purpose of inflammation in health is protective. It enables isolation and inactivation of foreign material and damaged tissue, and leads to its removal from the body.

Some of the key players in the inflammatory response to tissue damage (described below) are illustrated in Figure 2.2b-I.

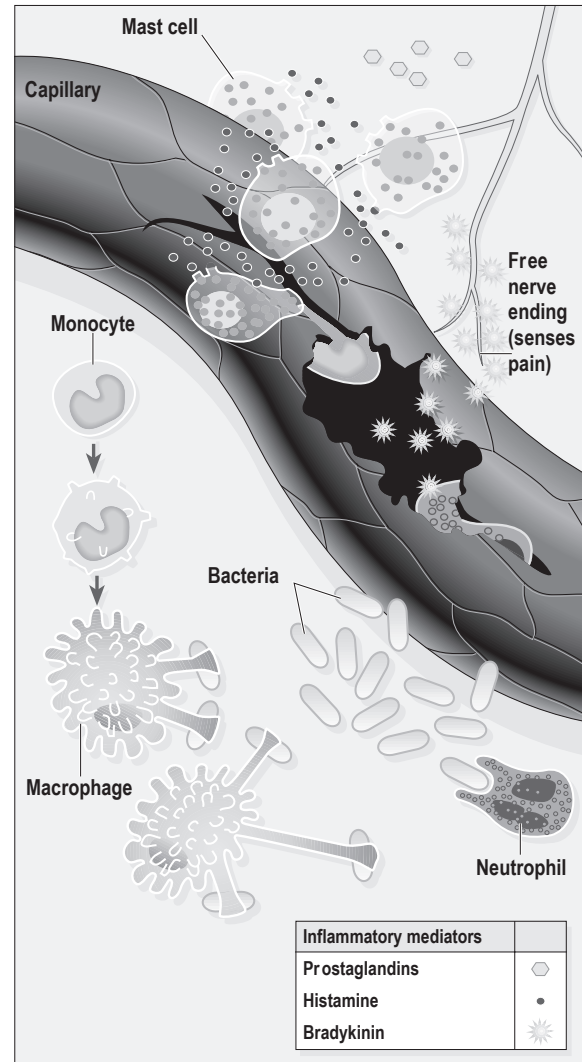
Hyperemia

A cardinal response in inflammation is that blood flow to the damaged area increases, a result of widening of the small blood vessels (vasodilatation). This response is termed hyperemia (literally meaning more blood). Hyperemia leads to the increased warmth and redness that are characteristic of inflammation. Hyperemia also contributes to tissue swelling.

Exudation

Another response of the blood vessels to inflammatory chemicals is that gaps form between the epithelial cells of the vessels so that molecules and fluids move out of capillaries into the fluid surrounding the tissue cells. In this way important proteins such as antibodies and fibrinogen enter the site of the damage. This reaction, known as exudation, leads to the swelling that is characteristic of

inflammation. Fibrinogen, one of the 12 clotting factors in the blood, is converted to fibrin once it enters tissue fluid, and in this way it forms a meshwork that contains the inflamed area and thus prevents the spread of any infection that may be present. Antibodies bind to foreign antigens at the site of the inflammation and so form immune complexes that are then engulfed by phagocytic cells such as neutrophils.

**Figure 2.2b-I** The inflammatory response

Migration of leukocytes

Various forms of leukocytes, which are the basis of the immune system, are attracted from the blood and the tissue fluid to the site of the damage by the chemicals (chemotaxins) that have been released as a consequence of the damage. Neutrophils are amoeba-like white cells that appear rapidly at the site of inflammation. These have the capacity to engulf and digest any material that presents foreign antigens in the form of an immune complex. In this process, the phagocytic cells may die, releasing

their greenish cell contents. It is these discharged cell contents that contribute to the green color of pus, which is usually only formed as a consequence of a heavily infected wound. Macrophages are slower moving, larger phagocytic cells, which, after a few hours, also enter the site of inflammation to engulf and digest cell debris, microbes and dead neutrophils.

Increased body temperature

If the bodily response of inflammation is sufficiently large, interleukin-1, a chemical released by macrophages, can lead to an increase in the core temperature of the body. The fever that results leads to more efficient activity of phagocytes and also encourages the patient to rest. Fever is thus understood to be beneficial to the healing process in inflammation.

Pain

The chemicals released by damaged and inflammatory cells tend to irritate the local nerve endings, so leading to the acute pain and intense tenderness associated with inflammation.

Resolution of acute inflammation

In uncomplicated situations, the inflammatory process leads to removal of damaged cells, dirt and infectious organisms, and provides a clean environment for the process of wound healing. The redness, swelling, pain and heat resolve, the function of the area is restored and healing is complete, with or without scar formation.

Chronic inflammation

The resolution of inflammation may be hindered by a poor blood supply, the presence of a foreign body or as a response to certain organisms. In the case of chronic inflammation, after a time increasing numbers of lymphocytes get attracted to the area and the scar tissue-forming cells, the fibroblasts, are continually activated, meaning excess scar tissue may be formed. The chronic skin ulcer described in Section 2.1b is an example of chronic inflammation.

Tuberculosis is an example of an infection in which the slow-growing infectious organism *Mycobacterium tuberculosis* encourages a chronic inflammatory response and the formation of clusters of immune cells around foci of infection known as granulomas. These tiny clusters of immune cells are characteristic of this disease, and are evidence to the pathologist of its ability to induce damaging chronic inflammation.



Information box 2.2b-1

Inflammation: comments from a Chinese medicine perspective

Redness and warmth signify the presence of Heat in Chinese medicine. The characteristics of pain, with aversion to pressure, and a purplish discoloration suggest a degree of Blood Stagnation. In Chinese medicine, Blood Stagnation can lead to Heat, and Heat can be a cause of Blood Stagnation. Therefore, these Pathogenic Factors are inextricably interrelated in inflammation.

Excess tissue fluid and the swelling and oozing that result could be equated with the Pathogenic Factor of Damp. This may be localized or systemic, in which case there may well be underlying patterns of Spleen Deficiency.

The pathology of inflammation

Boils and abscesses

Boils and abscesses result from excess pus collecting within the tissues at a site of inflammation. Abscesses are simply big boils; there is no clear-cut difference between the two. Pus is more likely to collect if a foreign body is present at the site of inflammation and also if certain pyogenic organisms are present. The most common pyogenic organism to cause medical problems is *Staphylococcus aureus*, one of the many normal and healthy (commensal) skin bacteria.

A collection of pus is a problem because it is a reservoir of microbes that are not in close contact with a blood supply. Because of this it inhibits full resolution of the inflammation. It is also a source of chemicals that act as pyrogens (i.e. lead to fever and malaise).

A boil or abscess ideally heals by means of discharge of pus to the surface. For example, a sty (a boil on the edge of the eyelid) will ideally come to a point after a few days, which then breaks open to release the pus and allow healing.

This ideal outcome is not always achieved. In some cases the pus does not discharge fully, and the channel leading from the pus to the skin does not heal fully, remaining as a sinus that discharges pus in the long term. This can lead to long-term ill health, as the body is always in a state of dealing with infection. An infection in the bone (osteomyelitis) can easily lead to sinus formation, because the bone is relatively protected from the immune system, and thus chronic inflammation can readily develop in bone. This is a particular problem with shrapnel wounds in combat-related injuries, in which case there may be a continual discharge of pus from the bone through a sinus to the skin.

When a sinus is formed, the discharge of pus can go two ways: the first is into closely apposed organs (e.g. stomach and bowel, or bladder and bowel) so that a permanent channel known as a fistula is formed between them. This can have severe consequences. One common cause of a fistula is Crohn's disease, a form of inflammatory bowel disease. Diverticulitis of the bowel is another cause of fistula.

If the pus is not discharged at all, it is eventually phagocytosed. This is a common occurrence with small boils (pustules) such as occur in severe acne. Instead of discharging fully, these form tender lumps that gradually become less painful. This form of healing is more likely to lead to scarring resulting from chronic inflammation, as fibrous tissue is formed to fill the cavity formed by the pus, and this can have severe cosmetic consequences.

The most appropriate medical treatment of boils and abscesses promotes natural resolution. Astringent medication in the form of hot packs (poultices) can be applied to the site of a superficial abscess to encourage the pus to discharge outwards.

Resolution can be assisted surgically by lancing, where a clean wound is made in the skin to allow natural drainage of the pus. A larger abscess may be drained by inserting a sterile tube to connect with the outside for a few days. When the pus has drained, the tube is removed and, ideally, the cavity will then heal by the process of primary wound healing.

Antibiotics are often given to prevent spread of infection whilst the abscess is healing, although in some cases this treatment may be inappropriate. With adequate drainage, most abscesses will resolve without the need for antibiotics. Paradoxically, antibiotics can prevent full drainage of an abscess, as they may inhibit the process of pointing of the abscess to the surface, thus leading to a more chronic situation.

Fibrosis (scar tissue formation)

Chronic inflammation may be characterized by excessive scar tissue formation (fibrosis). This can be damaging, as scar tissue can cause shrinkage of tissues and damage to the integrity of organs. Cirrhosis is an example of the result of chronic inflammation of the liver. In cirrhosis, scar tissue takes over the space of the healthy liver cells and may result eventually in liver failure. Scar tissue in the abdominal or pelvic cavity can cause adhesions between organs, and may promote obstruction of organs and infertility.

The main treatment for fibrosis is surgical removal of scar tissue, in as much as this is possible. Physiotherapy and massage may be used to encourage the stretching of contracted areas of skin and muscle.



Information box 2.2b-II

Boils and abscesses: comments from a Chinese medicine perspective

In Chinese medicine, boils and abscesses are manifestations of Damp and Heat with Blood Stagnation and Heat Toxin in severe cases. Full resolution represents clearance of these Pathogens; therefore, poultices, lancing and drainage are energetically appropriate treatments that can facilitate full cure.

Antibiotics may actually suppress full cure in the conventional sense of the term, as the causative microorganisms may remain relatively protected from the drug deep within the walled-off center of the abscess. From a Chinese medical perspective antibiotics are Cold and Toxic in nature, and so may actually exacerbate the root cause of the problem that is likely to include Spleen Qi Deficiency (leading to poor health of the tissues). Nevertheless, there are situations in which antibiotic treatment is necessary to prevent the dangerous spread of infection from an abscess (e.g. in a brain abscess).

A discharging sinus or fistula suggests Chronic Damp Heat, usually on a background of marked deficiency such as Qi or Yin Deficiency.³¹

An abscess that does not discharge, but instead resolves to form a hard painless or painful lump under the surface of the skin, might be described in Chinese medicine in terms of Accumulation of Phlegm, which may be the consequence of the action of Heat on Damp, with underlying stasis of Blood and Qi.



Information box 2.2b-III

Fibrosis: comments from a Chinese medicine perspective

Scar tissue is unyielding and relatively dry in contrast to the springy, moist nature of healthy tissue. For this reason, scars are often described in terms of local Qi and Yin Deficiency. If the scar tissue is more bulky than the healthy tissue would have been, this could be interpreted as an Accumulation of Phlegm. If purplish, Blood Stagnation would be described.

A more detailed Chinese medicine interpretation would also depend on the site and on the consequences of the fibrosis. For example, intra-abdominal adhesions may lead to intermittent gripping abdominal pain, suggesting Stagnation of Blood and Qi in Middle and Lower Jiao, while fibrosis of the heart muscle may lead to inefficient pumping of the heart and accumulation of fluid in the lower body (edema), suggesting Heart and Kidney Yang Deficiency.

Generalized inflammation

A generalized tendency to inflammation is currently often cited as the underlying basis of chronic debilitating disease as varied as diabetes mellitus, coronary heart disease, rheumatoid disease and Alzheimer's disease. This association is more likely to be found in alternative literature than medical textbooks. According to this theory, the generalized tendency to inflammation leads to over-activity of the inflammatory response with excessive production of potentially damaging inflammatory mediators. The causes of this state include stress, lack of sleep, exposure to environmental toxins and the standard Western diet that is high in processed carbohydrate, saturated fat and processed sugar. As Edwards (2005) states, "Inflammation is now recognized as an overwhelming burden to the healthcare status of our population and the underlying basis of a significant number of diseases. The elderly generally bear the burden of morbidity and mortality, which may be reflective of elevated markers of inflammation resulting from decades of lifestyle choices."³²

According to these theories certain foodstuffs are considered to be "pro-inflammatory" and these include processed foods, sugar, alcohol, coffee and saturated fats and omega-6 fatty acids in unsaturated fats. Foods that are not inflammatory are advised, and include green leafy vegetables, colorful fruit and vegetables, soy, seeds and nuts, fermented foods, garlic, fish, non-wheat grains, olive oil and rapeseed oil. Weil (2011) has published a visual diagram of how these foods might be incorporated into a healthy diet in his "anti-inflammatory food pyramid."³³

The recommendations for healthy living cited by authors such as Edwards and Weil have some striking correspondences with advice on lifestyle and diet that are enshrined in Chinese medicine. This perspective on the causation of chronic disease is only slowly permeating into mainstream medicine, but has an increasing body of scientific evidence supporting its recommendations for a long and disease-free life.³⁴

2.2c Disorders of the immune system

Immune-related disease can be grouped into two broad categories:

- disease resulting from an insufficient immune response – immunodeficiency (also termed immune deficiency) syndromes
- disease resulting from an inappropriate immune response – allergy or autoimmune disease.

These broad categories of immune-related disease are discussed in turn.

The pathology of immunodeficiency syndromes

An insufficient immune response occurs when the complex interaction between the various types of lymphocyte fails to function in a balanced way. A person with immunodeficiency will therefore be less able to fight off infection.

Immunodeficiency may be a congenital condition, and if so, results from specific problems in the function of the leukocytes, the production of antibodies or deficiencies in the complement proteins. The severity of inherited immunodeficiency can vary. In severe forms, a patient may be susceptible to life-threatening infections. In milder forms, the patient may just experience a few more colds and other minor infections than the average person.

Immunodeficiency can also be the result of illness acquired in later life. Illness affecting the ability of the bone marrow to produce white blood cells (bone marrow failure) can become manifest in devastating immunodeficiency. This state can become apparent in conditions such as leukemia and secondary bone cancer. Acquired immunodeficiency syndrome (AIDS) is a particular form of immunodeficiency that is the result of infection with the human immunodeficiency virus (HIV). HIV targets T-lymphocytes and impairs their action in the immune response, and the result is a characteristic pattern of opportunistic infections and vulnerability to tumors (see below), including pneumocystis pneumonia, *candida* fungal infections and Kaposi's sarcoma.

A patient with immunodeficiency can develop unusual infections that most healthy people would be able to resist. Often these opportunistic infections do not present in a dramatic way. Instead, there may be a gradual development of symptoms that are not very specific, such as mild fever or slight sweats. Also characteristic of immunodeficiency are low-grade fungal infections of the skin and the mouth lining, and long-standing but slight diarrhea. The vagueness of the symptoms and signs of opportunistic infections means that there can be a delay in their diagnosis. However, even though symptoms of opportunistic infections may not be marked, the infection can take hold and rapidly become life-threatening. The infectious agents that cause opportunistic infections are often resistant to common antibiotics. This can further complicate their treatment.

The other major health risk that faces a person with an immunodeficiency syndrome is cancerous change, as new cancerous cells are usually destroyed by a healthy immune system.



Information box 2.2c-I

Immunodeficiency: comments from a Chinese medicine perspective

A patient with an immunodeficiency syndrome does not have a strong response to pathogens. From the perspective of Chinese medicine, this suggests that the Upright Qi is weak. More specifically, as many of these infections manifest on the Exterior, with skin rashes and sweats, it points in these cases to the Wei Qi, and its foundation, Kidney Essence, being deficient.

The symptoms of immunodeficiency can also include low-grade fever, night sweats, enlarged lymph nodes, a tendency to diarrhea and fungal skin problems such as athlete's foot and thrush. There is a tendency to develop cancer. Taken together, the wide range of potential symptoms usually reflects an underlying Kidney Qi Deficiency, with a consequent effect on many of the other Organs. Spleen Qi Deficiency, Damp and Phlegm are all possible outcomes, as are specific symptoms arising from Kidney Yin and Yang Deficiency.

Although it is likely that each of these components is present to some degree in a case of immunodeficiency, the symptom picture in each patient will be unique, and it is the skill of the practitioner in tracing the complex etiology of the patterns that will point to a more precise Chinese diagnosis.

The pathology of allergy

Allergy (also termed hypersensitivity) is seen to occur when there is an excessive immune response to a substance that does not normally provoke such a reaction in healthy people. Allergies are common, with up to one-third of people experiencing one at some point in their lives. The substance that provokes the allergic response is called the allergen. The allergic response may be localized to the part of the body that has been exposed to the allergen (e.g. in contact allergic eczema or hay fever), or it may be a generalized response to an allergic trigger (e.g. an anaphylactic response to a bee sting or a penicillin-induced rash).

The incidence of food allergy and also to environmental allergens is known to be increasing, but the reasons for this are scientifically unclear.³⁵

Many people commonly use the term allergy to mean that they do not react well to certain substances, and will complain of symptoms such as fluctuating digestive or respiratory disturbances or headaches. However, conventional medicine tends to recognize only those situations in which a definite abnormality of the immune system can be detected. This is why doctors may deny that

there is an allergic component to conditions such as chronic tiredness and irritable bowel syndrome. Nevertheless, many patients with these conditions will notice a consistent adverse relationship between their symptoms and coming into contact with substances to which they feel they are allergic. It is perhaps more appropriate in terms of medical language to use the term intolerance rather than allergy in these cases.

Examples of diseases that doctors would agree are the result of allergic reactions are listed in Table 2.2c-I. It is clear from the information presented in the table that allergic reactions can have very different presentations. This is because for each type of allergic reaction, different aspects of the immune system may be over-reacting. The two broad ways in which the immune response can result in allergic disease are termed type I and type IV hypersensitivity.

Table 2.2c-I Allergic conditions recognized by conventional medicine

Condition	Symptoms	Allergen
Anaphylactic shock	Extreme bodily reaction, including severe asthma, and swelling and rash of skin	Can be various; common ones include bee stings, peanuts, egg, antibiotics
Worsening of childhood eczema and asthma	Symmetrical itchy rash distributed all over the body	Various, including dairy products, egg, wheat and oranges; sometimes no allergen is found
Hay fever	Streaming eyes and nose, sneezing, itchy throat	Grass and tree pollen
Contact eczema	Rash on the skin at the site of contact with the allergen	Metals, including nickel, detergents, garden plants, sticking plaster
Perennial rhinitis and chronic sinusitis	Blocked and runny nose, sneezing, facial pain	House dust and molds
Urticaria (nettle rash)	Blotchy, raised rash widely distributed over the skin	Dietary allergens such as shellfish and eggs are common triggers
Migraine	Unilateral headache, nausea and neurological symptoms and signs	Cheese, chocolate and red wine are common triggers

Type I hypersensitivity

In some people the white blood cells that release histamine in the inflammatory response, the mast cells and basophils, react excessively to the antigens on certain trigger substances such as house dust, pollen, animal dander, bee stings and specific dietary components (commonly eggs, peanuts and fish). Histamine in excess causes itching, exudation of fluid into tissues and constriction of the airways of the lungs. If extreme, the result is anaphylactic shock, in which the dramatic exudation of fluid causes a drop in blood pressure, and life-threatening asthma can develop within a matter of minutes of exposure to the allergen. In less severe reactions the person might just experience temporary itching, sneezing or breathlessness. This histamine-mediated allergy is known as type I hypersensitivity. Hay fever, rhinitis, urticaria (hives or nettle rash) from eating shellfish and bee sting allergy are all examples of type I hypersensitivity.

Type IV hypersensitivity

Another form of allergy involves the T-lymphocytes reacting excessively to externally originating antigens. The antigens cause a delayed reaction, as lymphocytes are slow to accumulate at the site of injury. Over time, this sort of allergic reaction will cause a local area of inflammation, with itching. The skin can react in this way to contact with substances such as latex, nickel, leather and certain plants. The result is a localized area of skin irritation, with itch and thickening of the skin (contact allergic eczema). This is also the allergic reaction that can cause some forms of transplant operation to fail (e.g. skin graft). This form of T-lymphocyte-mediated allergy is known as type IV delayed-type hypersensitivity.

Type III (immune-complex-mediated) hypersensitivity

Type III hypersensitivity is a less common mechanism for an allergic reaction. It describes the excessive formation of immune complexes (antibody-antigen complexes), which can circulate in the bloodstream before becoming deposited in the kidneys, skin and joints. They then trigger inflammatory damage in these tissues, leading to symptoms and signs such as blood in the urine, a bruising rash and joint aches. The allergic response to penicillin is understood to be a type III response.

Treatment of allergy

It is helpful before treating allergies to diagnose the cause. In some cases this is obvious, but certain hospital tests can clarify a range of potential allergens that might cause reactions in an individual. Skin prick tests involve the injection of tiny amounts of allergen under the surface of the skin, and monitoring for a wheal response. These tests are used to diagnose type I hypersensitivity. It is also possible to test whether or not a patient is sensitive to particular antigens in type I allergic conditions by means of a specific immunoglobulin E (IgE) blood test.

Skin patch tests involve holding an allergen against the skin by means of an adhesive plaster, and assessing the reaction over the next few days. These test for type IV hypersensitivity. Skin prick and skin patch tests are usually designed to test for sensitivity to a battery of potential antigens at the same time.

The first principle in treatment is to avoid the offending allergen, or to protect the skin if avoidance is not possible. This is often very difficult to do, as many allergens, such as pollen and house dust mites, are impossible to remove totally from the environment.

Antihistamines, anti-inflammatories and corticosteroids are all drugs that reduce the effect of the overactive immune and inflammatory responses.

Antihistamines (e.g. cetirizine and loratadine) counteract the effect of the excessive release of histamine that occurs in type I allergic reactions. Side effects include dry mouth, rashes and palpitations in some people. The more sedating, older antihistamines (e.g. promethazine) can also reduce nausea, and may be prescribed to prevent travel sickness and for sedation in children.

There is a wide range of anti-inflammatory drugs, many of which are used to reduce pain. Those that are used in allergy and asthma (e.g. sodium cromoglicate) appear to reduce the release of histamine from the mast cells.

Corticosteroids (commonly described by patients as steroids) can be taken by mouth, applied to the skin or inhaled into the nose according to the type of allergy. These are known to suppress the function of immune cells (in particular, the T-lymphocytes) and also the inflammatory response by reducing the production of pro-inflammatory chemical mediators such as interleukin-2. They are, therefore, both anti-inflammatory and immunosuppressant. Whilst very effective, they tend not to be used in non-life-threatening allergies as their long-term use leads to serious physical side effects including weight gain, increased blood pressure, thinning of the skin and vulnerability to serious infections.

Decongestants (such as oxymetazoline, the active constituent of Afrin and Vicks Sinex nasal sprays) are available in the West in various forms "over the counter" from pharmacists. Because of the ease of their availability they are commonly used preparations. They act by causing constriction of blood vessels in the nose that, in the case of runny nose, reduces the amount of fluid that can ooze out. The main problem with these drugs is that, when they wear off, the nasal drip can be worse than before, so that people can become dependent on using them. Constriction of blood vessels in the head can cause headache, and may increase blood pressure in some people.

Desensitization injections may be administered in hospital settings to help overcome grass pollen or wasp sting allergies. These carry a risk of severe allergic reactions so are only offered in severe cases and always in settings where resuscitation can be performed rapidly.



Information box 2.2c-II

Allergy: comments from a Chinese medicine perspective

Most true allergic reactions have characteristics of what is described in Chinese medicine as Wind Invasion. The runny nose, itchy eyes, itchy skin and rashes characteristic of many allergies often come on suddenly, and change rapidly. The rash of urticaria can move across the body from site to site dramatically. This suggests that the allergic person has a specific Deficiency of Wei Qi, which in some way is exacerbated by contact with the particular allergen.

The allergen has been described as a form of Toxic Xie (Pathogenic) Qi to which only certain people are susceptible. It is thought that vulnerable individuals may have deep lying Phlegm or Heat that only becomes apparent through contact with the trigger. Flaws (2001) explains this in his description of the mechanism of chronic rhinitis,³⁶ which he attributes to Chronic Spleen Qi and Kidney Yang Deficiency leading to Phlegm and also Wei Qi Deficiency. Liver Qi Stagnation will predispose to vulnerability by making Spleen weak as well as promoting upward flow of Qi, thus explaining the often noticed emotional causation to allergic reactions.

Chronic allergic reactions that affect the skin often manifest as pallor and dryness, symptoms usually ascribed to Blood Deficiency. This, in turn, may also predispose the sufferer to Wind Invasions.

Antihistamines reduce the response to the allergen, although this sensitivity returns when the drug is stopped. The usual medical view is that there are usually no obvious long-term side effects or worsening of the condition if these drugs are taken for a long time, but it is clear that many patients become dependent on taking them. As the allergy is usually in the form of acute Invasion of Wind Heat/Cold, this suggests that the drugs in some way prevent the invasion (i.e. expression) of the Pathogen. Subduing the Pathogenic Factor in the Interior is a possible energetic mechanism. If this is the case, then in theory, the root imbalance will have not been attended to as a result of the suppression of symptoms, but this might not become immediately apparent in symptoms that are significant medically. Subdued Heat or Phlegm, for example, may just become apparent in the form of mental agitation or restlessness, which may not be attributed directly to the drug treatment. It is of note that recent research has placed antihistamines in a wider list of anticholinergic drugs that have been associated with dementia in the long term.³⁷ This would be in keeping with the theory that their action might be Phlegm-forming in nature.

Possibly more marked drug-induced disease is occurring with the older forms of antihistamine. These often cause drowsiness and are chemically related to the stronger first-generation major tranquilizers, such as chlorpromazine used to sedate and suppress thought in severe mental illness. This effect suggests a tendency to promote Non-Substantial Phlegm and thus Obstruct the Shen.

Although newer forms of antihistamine do not have this property, both types can cause dryness of the mouth and difficulty urinating. These both suggest damage to Kidney Yin. The palpitations that can be caused by the newer antihistamines also suggest damage of Heart Blood/Yin, and both these side effects also suggest that antihistamines are Hot in nature as well as Phlegm-forming.

Decongestants are chemically related to the ephedrine in the Chinese medicine herb ma huang (*Ephedra sinica*). Ma huang is understood to be able to Release the Exterior, Resolve Wind Cold and help Move Lung Qi, and has been widely used over the centuries in Chinese medicine. Medically it is recognized to open the bronchial tubes, stimulate the heart and nervous system and increase blood pressure. It became popular in the West in the 1970s as a weight loss medication and also as a mental stimulant. Misuse is associated with serious side effects including skin reactions, irritability, trembling, headache, profuse perspiration, dehydration, irregular heartbeat, seizures, heart attack, stroke and even death. These side effects suggest additional Chinese medical effects when used in excess indicating damage to the Liver and Heart Yin and generation of Liver Yang Rising and Liver Wind, presumably a consequence of its powerfully Dispersing effect on Qi.³⁸

Decongestants are medically recognized to have a suppressive action, as the runny nose that they help to resolve returns in a more pronounced form on withdrawal. The headache and hypertension that they can cause suggests that they might also lead to the expression of the syndrome of Liver Yang Rising in susceptible people.

Food intolerances are not considered to be true allergies according to conventional medicine. However, many patients report that certain foods will worsen conditions such as bloating and irritable bowel syndrome. From a Chinese medicine perspective, conditions that manifest in bloating, abdominal discomfort and unstable bowel habit often have Spleen Qi Deficiency with Liver Qi Stagnation as their foundation. In these conditions it would appear that the symptoms brought about by the offending dietary substance (e.g. wheat, citrus or dairy products) are characteristic of weakened Spleen Qi and Stagnated Liver Qi. These syndromes also can permit the generation of a Pathogen such as Heat or Damp, and so the process by which the patient manifests symptoms such as flushing or vaginal discharge.

In contrast to most patients with true allergies, patients with food intolerances may notice that their sensitivity to certain foods fluctuates significantly over time and often in relationship to stress. This is presumably a reflection of the quality and harmony of their Spleen and Liver Qi at a given point in time.