Traditional Chinese Veterinary Medicine Immunology and its Application in the Treatment of Canine and Feline Diseases

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ABSTRACT:
The word immunity, i.e. preventing epidemic disease, has the same basic meaning in both Traditional Chinese Veterinary Medicine (TCVM) and conventional western medicine. However, theories of how to prevent and treat disease vary between the two medical systems. Each has its own distinctive features, advantages and disadvantages. In TCVM Zheng Qi is the “anti-pathogenic Qi”, which is the body’s power to resist diseases, to adapt and to maintain homeostasis. Xie Qi is “pathogenic Qi”, which includes the various causes of disease. Many of the conventional immunomodulating drugs have negative side effects and may not address the “root cause” of the problem. Many Chinese herbs have immunostimulant, immune suppressive and immune-balancing effects, which may be useful alone or in combination with conventional drug therapy to improve the treatment response while reducing the negative side effects. Integrating TCVM and conventional western medicine to treat and prevent diseases and produce a healthier food animal supply may be the best way to ensure optimum human and animal health.

Key words: TCM immunity, Zheng Qi, Xie Qi, Wei Qi, Chinese herbal therapy

The TCVM Basic Concept of Immunity

In Traditional Chinese Veterinary Medicine (TCVM), the concept of etiology and pathology is based on the relationship between the Zheng Qi and the Xie Qi. Zheng Qi is the “anti-pathogenic Qi”, which is the body’s power to resist diseases, to adapt and to maintain homeostasis. Xie Qi is “pathogenic Qi”, which includes the various causes of disease.

Zheng Qi and Xie Qi resemble concepts in conventional immunology. The “anti-pathogenic Qi” is the immune system, while the “pathogenic Qi” is the disease-causing agent (e.g. an invading organism). Conventional immunology demonstrates how the immune system components identify invading organisms and act to neutralize those pathogens in order to maintain health. If the immune system is weakened, it is unable to fight off the pathogens and disease results. Similarly, TCVM suggests that a body with sufficient anti-pathogenic Qi can identify and eliminate invading pathogens, thereby preventing a disturbance within the body.

This knowledge of immunologic function was recorded during 475 to 221 B.C. in the text, Huang Di Nei Jing (Yellow Emperor’s Classic of Internal Medicine). It states that “When Zheng Qi is very strong, then Xie Qi is unable to invade” and “If Xie Qi is able to invade, there must be some degree of Zheng Qi Deficiency.” A later veterinary text, Yuan Heng Liao Ma Ji (Yuan-Heng’s Therapeutic Treatise of Horses) written during the Ming Dynasty (1368–1644 A.D.) states, “If anti-pathogenic Qi is kept inside and Spirit is consolidated outside, there would be no disease in the body.”

From the writings during the Jin Dynasty in the 3rd century A.D., it appears that the ancient people thought that material related to immunity
was located in the brain.\textsuperscript{1} This is evident in the text, \textit{Zhou Hou Bei Ji Fang (Pocket Book for Emergency Therapies)} in which Ge Hong wrote, “When a person is bitten by a mad dog, we can kill that dog, take out its brain, and apply it to the affected part so that disease will not recur.”

An original concept of “smallpox vaccine” was created in Ming Dynasty (16th century A.D.) during which time the book, \textit{The Method of Smallpox Vaccination}, was written. This book was spread abroad in the 17th century, and an Englishman Edward Jenner created the vaccination.

During the Ming Dynasty, Li theorized in his text, \textit{Similar Specific Prescription for Immunity}, about avoiding infectious disease. The word “immunity” came into use as a result.

About 300 years ago, there was a legend in veterinary medicine about avoiding rinderpest by drenching (administering liquid medicine in a large oral dose) with blood; a treatment called “Guan Hua.”\textsuperscript{2} To prevent disease in Tibetan cows, the animals were drenched with the blood of an argali (a wild sheep) with a naturally acquired rinderpest infection.

Conventional medicine believes the immune system acts in three ways to defend, to “clean house” and to monitor.\textsuperscript{3} To defend the immune system’s anti-infection actions resembles the anti-pathogenic Qi fighting against the pathogenic Qi in traditional Chinese (veterinary) medicine. The immune system’s housekeeping functions of eliminating aging or dead cells and maintaining the physiological activities of normal cells resembles the TCVM idea of anti-pathogenic Qi regulating Yin and Yang to maintain balance in the body. The immune system monitors for cancerous transformation of normal cells, and if cancer is recognized, it mobilizes the immune system to remove the abnormal cells. In TCVM, the supervision between Yin and Yang helps to avoid their abnormal conversion.

The \textit{Huang Di Nei Jing} states that Wei Qi moves outside the vessels (meridians) and permeates the body surface. Wei Qi helps ward off exogenous pathogens by strengthening the resistance of body surfaces. Thus, Wei Qi resembles the conventional understanding of nonspecific immunity as seen with the barrier or antimicrobial actions of skin and mucous membranes, lymph nodes, leukocytes, macrophages, body fluids with lysozyme and complement. The innate immune system components guard against a variety of pathogens and are present at birth.

The \textit{Ling Shu} (an ancient TCM script from 2600 BC) states that Ying Qi refers to the essential substances that circulate in blood vessels as a major component of blood and nourish various parts of the body. TCVM relates Ying Qi to blood and veins. This fits with conventional medicine which shows that immune cells and molecules exist in blood circulation. T lymphocytes, B lymphocytes, mononuclear macrophages, NK cells, K cells, mast cells, and granulocytes are examples of immune cells. Antibodies, lymphokines, interleukins, complement, interferon, and lysozymes are examples of immune molecules. These immune cells and molecules work together as part of specific immunity. Thus, the action of Wei Qi in TCVM mainly relates to nonspecific immunity; while the action of Ying Qi mainly relates to specific immunity.

\textbf{Immune Organs, Internal Organs, Meridians and Immunoregulation}

According to conventional medicine, the immune organs include the bone marrow, thymus, spleen, lymph node, vitellolutein, fetal liver during embryonic stage, and the bursa of fabricius (poultry). TCVM does not use the same names or associate the same functions to these organs as does conventional medicine. However, the immune functions are still accounted for by figuratively associating them with certain internal organs.

TCVM theory indicates that the kidney is in charge of the bone and produces bone marrow. Additionally, the brain is the sea of the marrow; thus, a close relationship exists between the kidney and brain marrow. The development and diminishment of kidney Qi is parallel to its age. Moreover, it is the same as the thymus so that it reminds us that kidney Qi includes the immunity effect of the bone marrow and thymus. Birds have the immune effect of the bursa of fabricius.

The Spleen is in charge of the blood and governs the transportation and transformation of energy. TCVM attributes to the Spleen similar immunologic functions as the actual spleen has according to conventional medicine.

The Triple Heater controls various kinds of Qi, is the way of transmitting Yuan Qi (Source Qi),
and is the way to transport and transform water and food. The Triple Heater exhibits immunologic functions resembling those of the lymphatic system (including the reticuloendothelial system) in conventional medicine.

As previously stated the immune organs, cells and molecules have 3 functions (defense, monitoring and cleaning house) while coordinating with the nervous system and helping to regulate hormones. It has been shown that the hypophysis plays an important role in regulating the immune system. The hypophysis stimulates the release of adrenocorticotropic hormone (ACTH) from the pituitary, which then causes the adrenal gland to secrete corticosteroid. At the same time, by excreting growth hormone, the hypophysis promotes immunity and reinforces deficient immunoreaction so as to regulate immunologic balance and keep the relative stability of an organism’s immunologic function. TCVM suggests that the immune system accomplishes the 3 functions through the meridians and regulation by the kidney.

The TCVM Rationalization for Immunotherapies

Medications for treating immunological disease consist of immunosuppressants and immunostimulants. It is similar to the classification of Yin medication (cold, cool, bitter, sour, salt) and Yang medication (humoral, heat, pungent, sweet) in TCVM. Thus, TCVM can also be divided into medications which promote immunity (Yang medication) or those which repress immunity (Yin medication). The immunity has two categories, i.e. cellular immunity and humoral immunity.

The Classification and action of Chinese herbs that stimulate the immune system are outlined in Table 1. Other Chinese herbs for supressing the immune response are outlined in Table 2. Some substances used in TCM have a bidirectional immunoregulatory effect and can be combined to balance immunologic function in the manner outlined in Table 3.

In Chinese herbal medicine different active ingredients affect immunity. Herbs which contain polyhexose can stimulate immunity. Polyhexose (Duo tang) containing herbs include Codonopsis (Dang shen), Astragalus (Huang qi), Epimedium (Yin yang huo), Bee glue (Feng jiao), and Isatidis (Ban lan gen).

Immunosuppression is caused by alkaloid containing herbs. Such herbs include: Cephalotaxin (San jian shan jian), Gentianine (Long dan jian), Camptothecin (Xishu jian), and Wilfordine (Lei gong teng jian). Herbs containing glucosides have a bidirectional immunoregulatory effect and are found in such herbs as Flavonoid glycoside (Huang tong dai), Saponin (Zao dai) and Anthraguinone glucoside (En kuan dai).

Herbs which contain attar affect cellular immunity. Herbs containing attar (Hui fa you) and the organic acid You ji suan effect cellular immunity and include Garlic (Da suan), Foeniculum (Xiao hui xiang), Cinnamomum (Rou gui), Menthe (Bo he), Angelica (Dang gui), and Dahurical (Bai zhi). Glycyrrhetic acid (Gan cao suan) is an organic acid with an overall immunostimulant effect.

TCVM Immunity and the Control of Canine and Feline Diseases

According to TCVM, a puppy or kitten’s body contains young Yin and Yang. The Wei Qi is not stable and Ying Qi is not fully developed, which is similar to immune knowledge in conventional medicine. As discussed, Wei Qi is related to the body’s nonspecific immunity and Ying Qi mainly includes specific immunity. In very young animals, these two kinds of immunity are weak and cannot fully respond when there is disease. Thus, we advocate a single-agent vaccine (only one disease per vaccination) for puppies and kittens in the initial vaccination and later taking turns to use a two-in-one vaccine, four-in-one vaccine and five-in-one vaccine, etc. At present, rabies is still a problem in some areas. For this situation, a single rabies vaccine is the preferred choice for young puppies and kittens. However, the five-in-one or even seven-in-one vaccines have commonly been used for young animals and violate both the opinions of TCVM, conventional medicine and National Act of Controlling Epidemic Diseases.

Interferon is an important immune molecule and a universal defense system in cells. It is an antiviral and anti-knob agent, and has the effect of immunoregulation. Interferon is a group of low molecular weight soluble proteins produced from genome coding due to live virus, other interferon inducers and some cytokines.
### Table 1: The classification and action of Chinese herbs commonly used to stimulate the immune system

<table>
<thead>
<tr>
<th>Classification</th>
<th>Qi Tonic Herbs</th>
<th>Effects</th>
<th>Humoral immunity</th>
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<tbody>
<tr>
<td>Spleen energy supplement</td>
<td>Astragalus (<em>Huang qi</em>), Rinseng (<em>Ren shen</em>), Lucid Ganderma (<em>Ling zhi</em>), Codonopsis (<em>Dang shen</em>), Atractylodes (<em>Bai Zhu</em>), Poria (<em>Fu ling</em>), Coix (<em>Yi ren</em>), Jujube (<em>Da zao</em>)</td>
<td>Increases T-cells, Lymphoblastic transformation and white blood cells. Enhances the effect of phagocytic cells.</td>
<td>Increase IgG and IgA. Generate interferon.</td>
</tr>
<tr>
<td>Blood Tonic Herbs</td>
<td>Angelica (<em>Dang gui</em>), Milletia (<em>Ji xue teng</em>), Asinum (<em>Ejiao</em>), Prepared Rehmannia (<em>Shu di</em>), Paeoniae (<em>Bai shao</em>), Morus (<em>Sang shen</em>)</td>
<td>Increases T-cells, lymphoblastic transformation and white blood cells</td>
<td>Extends the time antibodies exist.</td>
</tr>
<tr>
<td>Kidney tonic</td>
<td>Epimedium (<em>Yin yang huo</em>), Cuscutae (<em>Tu si zi</em>), Cistanche (<em>Rou con grong</em>), Cynomorium (<em>Suo yang</em>), Morinda (<em>Ba jitian</em>), Morus (<em>Sang shen</em>), Hominis (<em>Zi heche</em>), Cordyceps (<em>Dong chong xia cao</em>)</td>
<td>Increases T-cells, Lymphoblastic transformation and white blood cells. Enhances the effect of phagocytic cells.</td>
<td>Increases IgG and IgA. Promotes formation of antibodies</td>
</tr>
<tr>
<td>Other Herbs</td>
<td>Bupleurum (<em>Cai hu</em>), Polyporous (<em>Zhu ling</em>), Polygonum (<em>Huz hang</em>), Scutellaris (<em>Huang qin</em>), Coptis (<em>Huang lian</em>), Houttuynia (<em>Yu xing cao</em>), Sophora (<em>Ku shen</em>), Lonicera (<em>Jin yin hua</em>), Chrysanthemum (<em>Ye ju hua</em>), Ligusticum (<em>Chuang xiong</em>), Carthamus (<em>Hong hua</em>), Salvia (<em>Dan shen</em>)</td>
<td>Have a small effect on T-cells; mainly enhance the effect of phagocytic cells and increase white blood cells.</td>
<td>Have a small effect. Stimulate antibody formation.</td>
</tr>
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</table>
**Table 2: The classification and action of Chinese herbs commonly used to reduce the immune response**

<table>
<thead>
<tr>
<th>Classification</th>
<th>Medication</th>
<th>Effect</th>
</tr>
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<tbody>
<tr>
<td><strong>Dispel pathogenic wind and remove Dampness</strong></td>
<td>Cicada (<em>Chan tui</em>), Bombyx, (<em>Jiang chan</em>), Xanthium (<em>Cang’erzi</em>), Ephedra (<em>Ma huang</em>), Cinnamomum (<em>Gui zhi</em>), Asarum (<em>Xi xin</em>), Schizonepeta (<em>Jing jie</em>), Ledebouriella (<em>Fang feng</em>), (pungent and warm)</td>
<td>Prevents hypersensitive response. Enhances the effect of neutralizing antibody to neutralize the antigen. Prevents antibody formation.</td>
</tr>
<tr>
<td><strong>Removing dampness:</strong></td>
<td>Alisma (<em>Ze xie</em>), Stephania (<em>Fang ji</em>), Aurantium (<em>Zhi ke</em>), Amomum (<em>Sha ren</em>), Gentiana (<em>Qin jiu</em>).</td>
<td>Stainates phagocytes to eliminate antigen so that the thymus shrinks. Prevents T-cell and antibody formation.</td>
</tr>
<tr>
<td><strong>To clear away heat and toxic materials</strong></td>
<td>Oldenlandia (<em>Bai hua she she cao</em>), Andrographis (<em>Chuan xin lian</em>), Isatis (<em>Da qing ye</em>), Taraxacum (<em>Pu gong ying</em>), Gentiana (<em>Long dan cao</em>), Phellodendron (<em>Huang bai</em>), Rheum (<em>Da huang</em>), Solanum nigrum (<em>Long kui</em>).</td>
<td>Prevents antibody and B-cell production. Stimulates macrophages to phagocytose antigen.</td>
</tr>
<tr>
<td><strong>To invigorate blood circulation and eliminate blood-stasis</strong></td>
<td>Paeoniae (<em>Chi shao</em>), Moutan (<em>Mu dan pi</em>), Persica (<em>Tao ren</em>), Sparganium (<em>San ling</em>), Zedoaria (<em>Ez hu</em>), Olibanum (<em>Ru xiang</em>), Myrrh (<em>Mo yao</em>).</td>
<td>Prevents antibody and B-cell production. Stimulates macrophages to phagocytose antigen.</td>
</tr>
<tr>
<td><strong>To eliminate toxic material and attack blood-stasis</strong></td>
<td>Mylabris (<em>Ban mao</em>), Bufonis (<em>Chan su</em>), Tripterygium (<em>Lei gong teng</em>), Arsenic (<em>Pi shi</em>), Torreyae (<em>Cu fei</em>), Camptotheca (<em>Xi shu</em>).</td>
<td>Directly kills the antigen (oncocyte). Restrains antibody, and prevents oncocyte’s DNA from synthesizing.</td>
</tr>
<tr>
<td><strong>Others</strong></td>
<td>Mume (<em>Wu mei</em>), Artemesia (<em>Ai ye</em>), Glycerhiza (<em>Gan cao</em>).</td>
<td>Stimulates macrophages to phagocytose antigen. They may enhance suppressor T cell’s effect so as to prevent B-cell from excreting antibody.</td>
</tr>
</tbody>
</table>

Interferon inducers are divided into grades A and B. Grade A has a strong force of induction. It includes RNA viruses, DNA viruses, plant viruses, insect virus, and artificially synthesized double strand RNA. Grade B includes inducers such as Brucella, rickettsia, mycoplasma, chlamydia, and kanamycin. These have a weak force of induction. Viruses are the best interferon inducers and RNA virus is stronger than DNA virus. Of the RNA viruses, myxovirus and paramyxovirus have the strongest force of induction. At the same time, the induction force of many attenuated strains is better than that of virulent strains. Recent research shows that sodium butyrate (*Ding suanna*), insulin, Sodium carboxymethylstarch (*An jia ji dian fen*), calcium chloride (*Lv hua gai*), and many Chinese herbs such as Astragalus (*Huang qì*) and Acanthopanax (*Ci wu jia*) can help interferon inducers produce more interferon.

According to this theory, we have treated common infectious diseases of dogs by using a mixture of measles (paramyxovirus) virus strain and radix astragali extract given as an injection or orally. Especially it is usually effective for the
Table 3: How to prescribe Chinese herbs to regulate the immune response

<table>
<thead>
<tr>
<th>Mode of adjusting</th>
<th>Magistral herbs</th>
<th>Effects</th>
</tr>
</thead>
<tbody>
<tr>
<td>To coordinate Energy, Blood, Yin and Yang</td>
<td>Use the herbs for strengthening spleen and replenishing energy and herbs for regulating Kidney Yin and Yang</td>
<td>Acts on vegetative nerve system or nerve-humor. Holistic regulation: Rapid regulation-acting on cAMP/cGMP. Slow regulation-acting on DNA and RNA.</td>
</tr>
<tr>
<td>To strengthen healthy energy and to eliminate pathogens</td>
<td>Use the herbs for restoring Qi and for activating blood circulation and dissipating blood stasis together.</td>
<td>Enhances the effect of T-cells, prevents antibodies from forming, stimulates cellular immunity and inhibits humoral immunity.</td>
</tr>
</tbody>
</table>

canine distemper in acute and subacute stages. The mixture induced twice the results because the measles virus can produce reciprocal immune and interferon for distemper and the radix astragali stimulates the measles virus to produce more interferon.

Atopic dermatitis, also called inhalant dermatitis due to the usual route of exposure, has an idiosyncratic inheritance. The allergens generally include materials such as pollen, mildew, dust, dander, wool, feathers and tobacco. This disease mostly occurs in dogs between the ages of one to three, but it also occasionally occurs in cats. Susceptible dog breeds include the Shiba Inu, Collie, Shetland Sheepdog, Dalmatian, Pekingese, Shih Tzu and others.

The symptoms include an evident pruritis of the face, limbs, and axilla. Acute stages may include whole-body erythema, but the chronic stages may have hair loss, pigmentation, thickening skin, and seborrhea. The symptoms may quickly improve with steroids, but they soon recur.

Using a principle of treating the symptoms if the disease is acute and the source if it is chronic, we inject 0.25-1.0 mg/kg of dexamethasone intramuscularly at acupoints including GV-11 (Shen-zhu) and Bai-hui. If there is pyoderma, we add antibiotics (lincomycin or Cephalosporin), and administer orally the Chinese traditional medicine Fu zheng qu feng tang. The ingredients of this herbal formula include Gynostemma (Jiao gulan), Astragalus (Huang qi), Prepared Rehmannia (Shou di), Fructus Schizandrae (Wu wei zi), Poria (Fu ling), Semen zizyphi spinosae (Suan zao ren), Lycium (Gou qi), Cinnamomum (Gui zhi), Polygonum (He shou wu) Ligusticum (Chuan xiong), Magnolia (Hou pu), Fructus kochiae (Di fu zi), Fennel (Hui xiang) and Apium graveolens (Shui qin) (See Tables 1 and 2 for specific actions). We have found that this herbal formula can prolong the effects of the steroids while reducing the side-effects.

Babesia canis is a parasite that cannot propagate indefinitely because of the host’s immunity, but it cannot be completely eliminated. When these animals carry these parasites in their bodies, they may not develop disease, but they become reservoir hosts. When the host’s resistance decreases, the parasites multiply and destroy erythrocytes causing fever and anemia. Conventional drugs are used to stop propagation, but the parasite persists and the disease usually has the possibility of recurring. However, using the conventional drugs can often seriously injure the liver and kidney. The ideal effect can be achieved using an integration of Chinese herbal medicine and conventional drugs. We mainly use Jia Jian Jie Nue Qi Bao San which contains antipyretic dichroa (Chang shan), Sweet Wormwood (Qing hao), Bupleurum (Chai hu), Amomum Tsaoko (Cao guo), Tangerine Peel (Chen pi), Polygonum (He shou wu), Prepared Rehmannia (Shu di), Astragalus (Huang qi), Angelica (Dang gui),
Paeoniae (Bai shao), Ligusticum (Chuang xiong) and Glycerrhiza (Gan cao) (for specific actions see Tables 1 and 2).

**CONCLUSION**

The word immunity has the same basic meaning, i.e. preventing epidemic disease, in both TCVM and conventional medicine. However, theories of how to prevent and treat disease vary between medical systems. Each has its own distinctive features, advantages and disadvantages. To ensure the health of humans and animals, an integration of Traditional Chinese and conventional western medicine may be the best alternative. We may be able to prevent and cure diseases by using the strengths of one system to make up for the weaknesses of the other. Although, conventional veterinary medicine has developed many vaccines, there are some problems. Some of them have weak immunity or stability, short duration, or adjuvant-related side effects or toxicity. Some epidemic diseases can be treated by synthetic drugs; however, they may have side effects or toxicity. Also, drug residues in animal products place people in danger of indirect negative effects. It is important to choose immunopotentiators matched to the bacterin in order to produce specific Chinese immunologic adjuvant or complex immunologic irritants according to the TCVM principles. It is often necessary to integrate TCVM and conventional western medicine when developing and administrating a new drug according to the TCVM pattern differentiation.

For example, during the time of SARS (severe acute respiratory syndrome) in 2003, the drugs which were an integration of Chinese herbs and pharmaceutical drugs were more effective than the herbs or pharmaceuticals alone. In order to ensure people’s healthiness, livestock breeders should provide reliably organically grown food products and make sure that livestock grow healthily without synthetic drug additives in the feed, especially those additives that have side effects or toxicity in humans and animals. So we suggest using instead herbal medicine that can enhance immunological effects as the feed additive. It is possible that with further knowledge of the effects herbal medicine have on molecular biology, Chinese herbal medicines will be recommended for use in food animal production in the future.

**REFERENCES:**