Behavioral Disorders and Acupuncture

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ABSTRACT
Behavioral disorders are considered risk factors for relinquishment of pet dogs and cats to shelters. While acupuncture may be a safe and effective treatment option, there is little in the scientific literature to support its use. There are, however, several reports in human medicine on the use of acupuncture to treat a variety of emotional disturbances, as well as animal model research that has revealed some of the physiologic mechanisms that may play a role in the ability of acupuncture to alter human and animal behavior. Results from human studies have been mixed, in part because studies involving acupuncture are difficult to design. Laboratory animal studies have clearly demonstrated that acupuncture modulates the chemical environment of the central nervous system and its function. Behavioral disorders in companion animals have previously been linked to environmental factors, but the recent focus has been on identifying biochemical abnormalities that may contribute to abnormal behavior. From the TCVM perspective, companion animals frequently present with Shen disturbance, which manifests as anxiety, irritability and hyperactivity. The Shen is housed in the Heart, therefore disturbances of the flow of Blood in the Heart often lead to Shen disturbance. Because reports on the use of acupuncture for companion animal behavioral problems are scarce, further clinical studies are needed to elucidate the mechanisms of how acupuncture affects mood and behavior in companion animals and to determine optimal acupuncture protocols.

Key words: behavioral problems, acupuncture, serotonin, GABA, anxiety, depression

ABBREVIATIONS

5-HT Serotonin/5-hydroxytryptamine
EA Electro-acupuncture
EEG Electroencephalogram
GABA Gamma-aminobutyric acid
MAOI Monoamine oxidase inhibitor
SSRI Selective serotonin reuptake inhibitor
TCA Tricyclic antidepressants
TCVM Traditional Chinese veterinary medicine

Behavioral disorders are considered risk factors for relinquishment of pet dogs and cats to shelters.\(^1,2\) If left unaddressed while the pet is in the shelter, these behavioral problems often lead new pet owners to return the pet soon after adoption.\(^3\) One study found that 50% of adopted cats and dogs exhibited behavior problems one month after adoption.\(^3\) Many of the conditions considered “problem behaviors” by owners are treatable and need not lead to relinquishment and another pet becoming a statistic.

The most commonly reported problem behaviors are house soiling, biting or aggression towards people or other pets, destructive chewing, vocalizing excessively, shy or fearful behaviors and problem behaviors when left alone (separation anxiety).\(^1,2,3\) Common behavioral disorders evaluated in companion animals include separation anxiety, thunderstorm phobia, aggression and house soiling.\(^4\) For more difficult cases, current treatment options include behavior modification and other conditioning or training techniques and pharmacological treatments.\(^5\) Training techniques alter conditioned responses to stimuli, such as counter-conditioning or desensitization. Pharmacologic intervention changes the biochemical environment of the brain to affect changes in behavior, but the exact mechanisms of action are still unknown. Conventional medications are also not an adequate stand-alone treatment and are most effective when paired with appropriate behavior modification techniques.\(^5,6\)

While most traditional Chinese veterinary medicine (TCVM) practitioners would espouse the usefulness of acupuncture to treat behavioral problems, there is little evidence in the scientific literature to support its use. There are, however, several reports in human medicine on the use of acupuncture to treat a variety of emotional disturbances, as well as animal model research that has revealed some of the physiologic mechanisms that may play a role in acupuncture’s ability to alter human and animal behavior.

Treatment of Human Emotional Disorders with Acupuncture

Current scientific literature contains a surprisingly large number of studies on acupuncture treatment for a variety of human emotional disorders. Human patients with disorders as diverse as depression and anxiety have experienced improvement of their symptoms with
acupuncture treatment. There is also increasing evidence of the ability of acupuncture to manipulate levels and metabolism of neurotransmitters, such as adrenocorticotropic hormone, beta-endorphins, serotonin/5-hydroxytryptamine (5-HT) and norepinephrine. What follows is a review of some of the recent research on the effectiveness of acupuncture in the treatment of human emotional and behavioral disorders.

One study investigated acupuncture treatment’s ability to ameliorate anxiety in women undergoing in-vitro fertilization. This prospective randomized trial had two groups of women, a test group that received weekly acupuncture treatments using the same predetermined acupoints and a control group that received weekly sham acupuncture. Treatment outcome was determined using a validated survey tool that assesses the severity of a patient’s anxiety symptoms. Patients completed the survey at the start of treatment and at completion of 4 treatments. After the 4-week treatment period, the survey scores were significantly different between the two groups, showing a clear improvement in anxiety symptoms in the acupoint treatment group.

Another report on anxiety in dental patients studied auricular acupuncture techniques. This was also a prospective, randomized patient-blinded study with a treatment group that received acupuncture at predetermined auricular acupoints, a group that received sham auricular acupuncture and a control group that received no treatment. Anxiety symptoms were assessed before treatment and 20 minutes after using a survey tool designed to measure anxiety associated with specific stressful events. Both the sham and acupuncture groups had decreases in anxiety symptoms after treatment compared to the control group, and the acupuncture group experienced a significant decrease in anxiety compared to the sham group. This study demonstrated the ability of acupuncture to lessen the symptoms of anxiety associated with a stressful event such as dentistry.

A study monitored patients with post-traumatic stress disorder (PTSD) following a major earthquake in China and assessed response to acupuncture treatment as an adjunct to cognitive-behavior therapy. Patients were randomly assigned to either a group receiving cognitive-behavior therapy alone or a group receiving cognitive-behavior therapy plus acupuncture. Clinical progress was assessed using both a standard survey tool and an additional questionnaire. The factors associated with PTSD were compared, both groups displayed improvement after treatment, but the acupuncture group had superior improvement.

One small pilot study in Australia considered acupuncture as an adjunct therapy in the treatment of eating disorders for female patients. The patients were randomized and each underwent a period of traditional treatment alone and a period of traditional treatment with acupuncture. Response to treatment was measured with several survey tools in which both evaluators and patients gauged physical, cognitive and psychological aspects of the patient’s lives. The study did show improvement of scores reflecting improved quality of life and decreased anxiety and feelings of perfectionism. This study was, however, extremely small and the design included no blinding of either patients or evaluators. The crossover design does offer the ability to utilize each patient as their own control, as their scores from each arm of the study can be directly compared, but blinding would have lessened the opportunity for bias to be introduced.

A recent study of patients with major depressive disorder (MDD) separated patients randomly into two groups: one received low dose fluoxetine with acupuncture stimulation and the other received a standard dose of fluoxetine with sham acupuncture. Acupuncture treatments were performed 5 times weekly for 6 weeks, and assessments of treatment were made before treatment initiation and every other week during treatment. The patients and evaluators were both blinded and assessments included a self-reporting patient survey tool, evaluation of anxiety symptoms, and antidepressant and acupuncture side effects. At the end of treatment, there was no significant difference in the patient survey scores; however, the acupuncture group did experience significantly fewer side effects from the antidepressant than the sham group. This study demonstrates how acupuncture can be used as an adjunct treatment to lower drug dosages and lessen potential side effects, while maintaining treatment efficacy for MDD.

Another study utilized dense cranial electro-acupuncture stimulation (DCEAS) in conjunction with fluoxetine. Patients with major depressive disorder were randomly assigned to either a group receiving DCEAS and fluoxetine or a group receiving sham DCEAS, which involved electrical stimulation of needles affixed to the skin with tape but not inserted, and fluoxetine. A standard pattern of acupoints was used in all patients for both treatments groups. All patients were naïve to both treatments before starting the study, and both patients and evaluators were blind to which group they were assigned. Evaluations included a patient reported self-rating scale and standardized survey tools to determine response to treatment. The DCEAS group displayed greater improvements than the sham group, though both groups experienced adverse drug effects. The investigators concluded that electro-acupuncture (EA) is able to potentiate the effect of fluoxetine during the early phase of treatment.

Not all of the literature describes positive results. Black et al described a randomized controlled study in which patients either received auricular acupuncture, sham auricular acupuncture or no treatment for anxiety related to withdrawal from psychoactive drugs. Treatments were performed for three days, and anxiety was assessed before treatment and at the conclusion of the three days. No significant difference was seen in any of the three groups in anxiety reduction, which led the authors to conclude that the evidence was inconclusive. Another article investigated acupuncture’s physiologic
effects on reflex responses to mental stress.\textsuperscript{15} Healthy volunteers were subjected to a mental stress test (such as mental arithmetic) before and after acupuncture treatment. Treatment groups consisted of acupuncture on preset acupoints, needling of non-acupoints, and “no-needle” acupuncture in which the guide tube was tapped on the skin, but no needle was inserted. Researchers measured the patient’s blood pressure, heart rate and muscle sympathetic nerve activity (MSNA) during both mental stress tests. Muscle sympathetic nerve activity has been found to be an effective method of measuring sympathetic response to stress. The results demonstrated no difference in MSNA response in any of the groups, but both the acupuncture and sham acupuncture groups had significantly lower blood pressure increases during the mental stress test. While the sham acupuncture group’s blunted blood pressure response was less than that of the true acupuncture group, the authors still questioned the specificity of traditional acupoints.

Another review article, which examined several alternative methods for treating major depressive disorder, found inconsistencies in the results of various trials on acupuncture treatment.\textsuperscript{16} The authors postulated that these inconsistencies were in part the result of the sham acupuncture procedures, which many practitioners feel create physiologic responses despite not using traditional acupoints. Interestingly, the authors also noted 3 trials in which no difference was noted between standard antidepressant drug therapy and acupuncture. Because of the inconsistent and inconclusive nature of the evidence for acupuncture’s efficacy, this led the authors to question the efficacy of antidepressant drugs, which only have response rates up to 50%.\textsuperscript{16,17}

While most of the mentioned trials are randomized, controlled and patient blinded, there are still lingering problems with study design that leave the results open to interpretation. Studies involving acupuncture are difficult to design. Whether the protocol calls for a standardized set of acupoints or allows the practitioner to choose can greatly alter the outcome and make the results difficult to compare to those of other treatment methods. Adequate blinding of patients can also create design problems. The use of sham acupuncture is one method of “blinding” patients as to whether they are receiving treatment or not. Sham acupuncture, however, can also produce significant effects despite its use as a placebo or control.\textsuperscript{18} It has been suggested that outcome measures include biomarkers of autonomic function to better discern between placebo and actual biological effects, when comparing acupuncture to sham acupuncture.\textsuperscript{19} The use of patient surveys relies on subjective rather than objective evaluation. Also, some of the survey tools used in human medicine tend to overestimate the clinical benefit of treatment.\textsuperscript{16} A recent review of clinical research on the use of acupuncture for anxiety and depression found many trials included small sample sizes and the variation between the types of acupuncture, controls and selected acupoints made it difficult to compare and draw conclusions.\textsuperscript{20} Despite these difficulties, the large number and variety of trials involving acupuncture for treatment of human emotional and psychiatric disease continues to grow and offers increasingly better information about the nature of these diseases and how acupuncture may offer patients relief.

**Brain Chemistry and Other CNS Alterations with Acupuncture – Laboratory Animal Studies**

Animal models and research are offering insight into the underlying physiological factors involved in emotional and behavioral disorders and the possible mechanisms of how acupuncture can be used to manipulate these factors. Many of the mechanisms of how acupoint stimulation at a peripheral location produces a cascade of reactions within the entire nervous system are understood, but more is to be learned.\textsuperscript{21} Recent work using animal models for various human diseases, including depression, anxiety and Parkinson’s disease, has elucidated further details of the interactions of neurotransmitters and how these can be manipulated to alter signs of disease.

A recent study described stress-induced relapse of cocaine-seeking behavior in rats and the effect of acupuncture on these behaviors.\textsuperscript{22} After cocaine withdrawal, the rats underwent foot-shock treatment to induce stress-related cocaine seeking behaviors. All rats received acupuncture treatment after the stress treatment; one group received acupuncture stimulation at HT-7 for 1 minute, and the control group received stimulation at LI-4. Acupuncture at HT-7 was found to lessen both cocaine-seeking behaviors and expression of markers of neuronal activation associated with withdrawal-relapse, when compared with those of the LI-4 acupuncture group. Another study demonstrated the ability of acupuncture to alter both behavior and neurochemical changes associated with withdrawal-related anxiety.\textsuperscript{23} One group of rats was treated daily with ethanol injections and another with saline injections. After a 72-hour withdrawal period, the ethanol treated rats were divided into a control or 2 different acupuncture treatment groups; each treatment group received acupuncture for 1 minute daily for 3 days. One acupuncture group was stimulated at PC-6 and the other at HT-7. Evaluation of anxiety-related behavior was tested immediately following the final treatment, using an elevated plus maze test. This test determines anxiety by monitoring a rat’s movements onto an open and elevated space. An increased time spent in the open-space correlates to decreased anxiety.\textsuperscript{24} The researchers also measured the rats’ plasma corticosterone levels and levels of several monoamines in the central nucleus of the amygdala. When compared with the saline control group, the HT-7 treatment group had similar results in all categories.\textsuperscript{23} The HT-7 group had less evidence of anxiety behaviors during the elevated plus maze test and significantly lower plasma levels of corticosterone and amounts of monoamines, such as norepinephrine and dopamine, in the central nucleus of the amygdala when compared with both the PC-6 and ethanol control
groups. This study clearly demonstrated both behavioral and physiologic changes associated with acupuncture treatment.

A group of researchers studied the ability of EA to decrease immobilization stress in rats. Three groups of rats underwent immobilization stress for 6 hours daily for 21 days. One group received no further treatment. Two other groups received EA daily for 10 minutes, during the last 7 days of immobilization treatment. One group received EA at ST-36, while the other group received sham EA on the tail. These three groups were compared with a control group of rats that did not undergo any treatment. The rat’s anxiety related behavior was evaluated using the elevated plus maze test, and biochemical evaluation included serum levels of corticosterone and immunohistochemical evaluation of tyrosine hydroxylase expression in the locus coeruleus, an area of the brain associated with arousal or wakefulness and stress. When compared with the untreated restraint stress group, the group receiving EA at ST-36 had significantly decreased expression of anxiety related behavior, serum corticosterone and tyrosine hydroxylase expression.

Another study examined the effects of EA using a validated rat model of depression. Rats were randomly divided into two groups: those who received EA at GV-14 and GV-20 daily 5 days a week over a 3 week period and an untreated control group. After the treatment period, a series of tests, including the forced swim test and Morris water maze test, as well as observation for the normal behaviors of rearing and grooming were conducted to examine differences in behavior. Rats used as models for depression do not exhibit as many normal behaviors and do not move as much during the forced swim test or water maze test. The authors found significant differences in all behavioral parameters between the two groups. The EA group exhibited greater frequency of normal rearing and grooming behavior as well as more movement during both the forced swim and water maze test.

Investigators, using a Parkinson’s disease mouse model, found evidence of neurochemical modulation and neuro-protective qualities with acupuncture treatment. Parkinson’s disease is a neurologic condition in which there is progressive loss of dopaminergic neurons and loss of striatal dopamine. Low dopamine levels result in progressive loss of voluntary movement control. Mice either received daily acupuncture treatment at GB-34 or a sham acupoint near the tail for 12 treatments. These mice were then compared to a control group of mice that were neurologically normal. The investigators found that the mice receiving acupuncture at an acupoint had improved motor function and less evidence of dopaminergic neuron degeneration than the sham acupuncture mice. While dopamine levels were not normalized in comparison to that of the control mice, the investigators found evidence that acupuncture stimulated release of dopamine and provided moderate protection of dopaminergic neurons.

Another controlled rodent model of depression, using maternally separated rat pups, explored the effect of acupuncture on 5-HT and 5-hydroxyindole-3-acetic acid (5-HIAA, a metabolite of 5-HT) levels in the prefrontal cortex. Rats either received acupuncture at ST-36 or HT-7 daily for 7 treatments. Behavior testing was then performed (tail suspension test to determine amount of mobility) and the prefrontal cortex was examined. When compared to control rats (no acupuncture), the group that received acupuncture at HT-7 demonstrated significantly more mobility during behavior testing. The investigators did not find differences in the levels of 5-HT or 5-HIAA, but the ratio of 5-HIAA/5-HT was significantly higher in control rats. This suggested that acupuncture might play a role in the metabolism of 5-HT in order to ameliorate the symptoms of depression.

Another study looked at the effect of acupuncture treatment on morphine withdrawal symptoms and the possible involvement of gamma-aminobutyric acid (GABA) receptors. Rats that self-administer morphine were injected with naloxone, thus inducing withdrawal. Acupuncture was then administered at either HT-7 or LI-5. The investigators found significant decrease in withdrawal symptoms in the HT-7 group but not the LI-5 group. The rats were then administered GABA receptor antagonists before acupuncture, and amelioration of withdrawal symptoms was no longer achieved. The authors suggested that the ability of acupuncture to lessen withdrawal symptoms was at least partly via a mechanism involving GABA receptors.

While studies of acupuncture have been conducted using companion animal species, few have looked specifically at effects on the central nervous system. Kim et al assessed acupuncture-induced sedation in dogs using both a scoring system (Ramsay sedation score) and electroencephalogram (EEG) evaluation. Spectral edge frequency of the EEG was measured, because this indicates level of sedation and anesthesia. Acupuncture was performed in 4 groups: 1) GV-20 alone, 2) Yin-Tang alone, 3) GV-20 and Yin-Tang together or 4) sham acupoint. The EEG was monitored at regular intervals before, during and after treatment, and sedation scores were obtained before and 20 minutes after treatment. The sedation scores demonstrated significant sedation in the 3 acupuncture groups but not the sham group. While significant, this is a subjective method of measuring neurologic effect. The EEG spectral edge frequency data showed significant decreases in frequency of all acupuncture groups during treatment, when compared to the frequency of the sham group. This demonstrated measurable alteration in the electrical activity of the brain during acupuncture treatment.

To further investigate possible acupuncture mechanisms, another study was performed to determine which neurotransmitter pathways may be involved with acupuncture-related sedation. Dogs received acupuncture at either GV-20 or Yin-Tang, and the EEG spectral edge frequency was monitored before and
during treatment. After 10 minutes of treatment, either naloxone (opioid antagonist) or atipamezole (α₂-adrenergic receptor antagonist) was administered, and the EEG was monitored periodically for an additional 10 minutes. The data were compared to that of control groups that received acupuncture, but no antagonist medication. Interestingly, the sedative effects of acupuncture at either acupoint were blocked by atipamezole, but not naloxone. This suggested that acupuncture-related sedation is partly mediated thru the α₂ adrenergic pathway.

These studies clearly demonstrate that acupuncture modulates the chemical environment of the central nervous system as well as its function. While extrapolating animal model information from one species to another can be problematic, it still offers some insight into potential uses for treating clinical disease. It also provides the opportunity to understand possible mechanisms of action. Deeper understanding of how acupuncture can modulate the central nervous system could have clinical applications for treating a wide variety of psychological and neurologic conditions.

**How Acupuncture May Help Companion Animals with Behavioral Disorders**

The role of acupuncture for the treatment of behavioral disorders in companion animals has yet to be adequately explored. This may be partly due to a lack of understanding of the underlying causes and biochemical mechanisms involved in behavior disorders. Previously, evaluations of risk factors for behavioral problems, such as separation anxiety and aggression, focused on environmental factors. For example, separation anxiety is associated with a single adult owner house-hold, changes in the environment (death of a family member, relocation) and neuter status. Risk factors for behavior-related euthanasia for aggression include body weight, history of being purchased and unpredictability of aggressive episodes. More recently, the focus has been on identifying biochemical abnormalities that may contribute to abnormal behavior. There are several studies identifying a possible role of 5-HT in aggression in dogs. Alterations in the levels of 5-HT metabolites in cerebral spinal fluid and the concentration and distribution of 5-HT receptor subtypes in the brain have been found in aggressive dogs.

Other studies have assessed the genetic basis of behavioral disorders. Heritability of human-directed and dog-directed aggression traits was demonstrated in a 2007 study of 325 Golden Retrievers. Four genes involved with serotonergic neurotransmission in aggressive Golden Retrievers were investigated, but there was no correlation between variations within these genes and aggressive behavior traits. The lack of correlation may be due to the narrow focus of the study: focusing on 4 genes in 1 breed. Another study utilized cDNA microarray technology to identify 2 upregulated genes in the brains of aggressive dogs. A DNA microarray is comprised of multiple fragments of DNA attached to a small chip and can be used to quickly identify genetic polymorphism or gene expression variation for a large number of genes with one test. Because the sample size of this study was very small and the statistical power low, the results only demonstrated a possible association between the identified genes and aggression in dogs. There is also no information currently about the potential role of these genes in the mechanism of behavioral disorders.

A study investigated the canine androgen receptor (AR) gene and its possible link to behavioral traits in Japanese Akita Inu dogs. Aggressiveness was evaluated via owner survey. It was found that high scores for aggressiveness correlated with male dogs with shorter AR gene alleles. Shorter AR gene alleles result in increased function of AR. No correlation between genetic variation and behavior was found in the female samples. Whether these genetic variations are specific to the Japanese Akita Inu breed or can be demonstrated in aggressive dogs of other breeds has not been investigated. From these studies, there is no specific gene(s) linked to behavioral problems, but the evidence is just starting to be gathered.

As more information about the underlying genetic and biochemical contributions to the development of behavioral disorders becomes available, treatment recommendations also continue to evolve. The use of tranquilizers, such as phenothiazines, has decreased in favor of classes of drugs that target neurotransmitter pathways involved with mood. Current medical treatment “addresses the specific mechanism underlying the neurochemical contribution to the pathology”. Medication options include tricyclic antidepressants (TCAs), selective serotonin reuptake inhibitors (SSRIs), benzodiazepines and monoamine oxidase inhibitors (MAOIs). These medications selectively target 5-HT, norepinephrine, dopamine and GABA through mechanisms involving transcription of receptor proteins, rather than directly on these molecules or receptors. The aim of behavioral treatment is to produce a change in the stimulus perception. Medications cannot achieve this alone but can make it easier to institute necessary training and behavior modification techniques, because these drugs target pathways involved with cellular memory and “learning”.

Acupuncture does hold promise as another treatment option for behavioral disorders. As previously discussed, acupuncture has been shown to influence both the function and physiology of the central nervous system. Distinct changes in behavior and response to stimuli are also clearly demonstrated after acupuncture. The use of drug therapy can result in negative side effects (cardiac and hepatotoxic effects) and requires monitoring. Acupuncture is relatively safe with little concern for side effects. As the understanding of the physiologic mechanisms of both behavioral problems and acupuncture increases, practitioners should increasingly consider acupuncture a safe and effective alternative to...
drug therapy, when designing a behavior modification treatment regimen.

The Traditional Chinese Veterinary Medicine Perspective

From the TCVM perspective, behavioral disorders are expressions of underlying internal imbalance. Unlike conventional medicine, there is no attempt to separate behavior and emotion from physical manifestations of disease. Because of this, many patterns of disease include signs across multiple organ systems, as well as emotional and behavioral signs.

Companion animals frequently present with Shen disturbance, which manifests as anxiety, irritability and hyperactivity.41,42 The Shen is housed in the Heart, therefore disturbances of the flow of Blood in the Heart often lead to Shen disturbance. Pathogenic factors, such as Heat or Fire, from the environment or food enter the body and injure the Body Fluids resulting in Phlegm formation. Phlegm collects in the Channels and leads to Qi/Blood Stagnation. If Qi/Blood Stagnation occurs in the Heart Channel, Shen disturbance can be one of many signs. An animal’s constitution may also make it more susceptible to these pathogenic factors. Weak water constitution pets have less ability to control Fire, therefore, exposure to excessive Heat or Fire is more likely to be problematic.41 Wood constitution animals are prone to Liver Qi Stagnation and aggressive behavior. Liver Qi and Blood Stagnation or Liver Blood Deficiency are other possible contributors to Stagnation in the Heart Channel. Feline inappropriate urination is often related to underlying Liver Qi Stagnation and Liver Blood Deficiency.43 Signs of Shen disturbance and Blood Stagnation in the Heart Channel include anxiety, hyperactivity, panting, increased thirst, dry skin, dandruff, changes in sleep patterns, lack of focus and difficulty with training.41

TCVM and conventional practitioners are aware that behavioral disorders are complicated conditions, often involving environmental, metabolic and emotional components. In TCVM each patient is unique in its presentation and needs to receive an individualized treatment regimen. At least 8 different TCVM patterns of Shen Disturbance have been proposed in animals and include: 1) Liver Qi Stagnation with Liver Yang Rising, 2) Heart Blood and Yin Deficiency, 3) Heart and Spleen Qi and Blood Deficiencies, 4) Global Qi and Blood Deficiencies, 5) Phlegm Fire Disturbing Heart, 6) Phlegm Obstructing Heart, 7) Heart and Kidney fail to link (insufficient Water to cool Fire) and 8) Kidney Jing Deficiency.41,43 Each pattern requires different acupuncture, Chinese herbal medicine, Tui-na and Food Therapy protocols.41,43 There are currently no clinical studies and few case reports on the use of acupuncture for companion animal behavioral disorders. The successful acupuncture treatment of a mixed breed dog with separation anxiety and a Doberman Pinscher with past abuse and recent refusal to go outside after a bee sting have been reported.41 The acupuncture treatment of a German Shepard Dog with hind-limb weakness and separation anxiety has been reported.44 While the details of the dog’s behavior were not included, the acupuncture treatment alone produced adequately positive improvement from the owner’s perspective. Although there are anecdotal reports of the success of acupuncture for behavior disorders, further clinical studies are needed to elucidate possible mechanisms of how acupuncture can affect mood and behavior in companion animals and to determine the optimum acupuncture protocols for the different patterns.

REFERENCES