

## Reviews

# The Validity of Acupuncture in Veterinary Medicine

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### ABSTRACT

Acupuncture is becoming an increasingly popular treatment in veterinary medicine. Scientific validation of the effects and benefits of acupuncture is essential for acceptance by colleagues and clients and integration of acupuncture into conventional veterinary medicine. An ever-expanding body of evidence-based research supports acupuncture as a clinically useful modality and over 10,000 references to acupuncture can be found in the United States Library of Medicine search through PubMed. Prestigious organizations such as the World Health Organization have concluded that acupuncture is valuable in treating many human diseases. Imaging studies now validate acupuncture theories, and clinical studies demonstrate that acupuncture is an effective, safe treatment for many animal diseases. Acupuncture is currently taught at seven AVMA-accredited veterinary schools, with others planning to add it to their curriculum and many more employing clinical staff with certification or interest in acupuncture. The annual AVMA Convention and other national and international meetings frequently include lectures on acupuncture. The Recovery Act of 2009 provided \$31 million to complementary medicine research, including acupuncture, showing the importance of acupuncture research to the National Institutes of Health. Veterinary acupuncture training is restricted to veterinarians, involving over 130 classroom hours and rigorous examinations to become a certified veterinary acupuncturist. The American Journal of Traditional Chinese Veterinary Medicine was launched in 2006 to publish scientific, evidence-based research on acupuncture. Although further research is needed for some disorders, the scientifically-proven efficacy for other disorders, low incidence of adverse effects and comparatively low cost combine to validate its place in current veterinary practice.

**Key words:** acupuncture, validity, evidence, research

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### ABBREVIATIONS

<b>DN</b>	Dry needle acupuncture
<b>EA</b>	Electro-acupuncture
<b>fMRI</b>	Functional magnetic resonance imaging
<b>IVDD</b>	Intervertebral disc disease
<b>NCCAM</b>	National Center for Complementary and Alternative Medicine
<b>NIH</b>	National Institutes of Health
<b>PET</b>	Positron emission tomography
<b>TCM</b>	Traditional Chinese Medicine
<b>TCVM</b>	Traditional Chinese Veterinary Medicine
<b>WHO</b>	World Health Organization

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Acupuncture is currently one of the most popular and commonly used complementary and alternative treatments in veterinary medicine due to its long history of use, increasing scientific evidence of efficacy and inclusion in curriculums of United States Colleges of Veterinary Medicine.<sup>1-4</sup> Acupuncture has been used to treat animal diseases in China for more than 2,000 years.<sup>4</sup> Today, the number of veterinarians in the United

States (US) who practice acupuncture is estimated to be 4,300, which is approximately 6% of all practicing veterinarians.<sup>1</sup> As the use of acupuncture becomes more accepted in veterinary practice, veterinary acupuncturists are commonly asked by their colleagues and the general public, "Is acupuncture really effective?" The following review provides information about the effectiveness, acceptance and quality of acupuncture as a valid treatment in current veterinary practice.

### SCIENTIFIC RESEARCH THAT SUPPORTS THE USE OF ACUPUNCTURE

An increasing volume of research on the basic mechanisms and clinical applications of acupuncture in animals and humans can be found in the US National Library of Medicine searched through Pubmed. A recent Pubmed search using the keyword "acupuncture" and limited to papers with abstracts and published in English produced over 10,000 papers on acupuncture.<sup>5</sup> Among these papers, 287 articles specifically relate to veterinary medicine and provide evidence to validate acupuncture's theories and effectiveness. Despite the challenges inherent in designing clinical trials for acupuncture (e.g. difficulty blinding a study and standardizing a single treatment for all animals in a group), research supports the use of acupuncture as a safe and effective treatment

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for many disorders in animals.

In recent years, a large amount of data has been accumulated not only to support the clinical relevance and effectiveness of acupuncture, but also to provide insights into the basic mechanisms of actions of acupuncture and validate Traditional Chinese Medicine (TCM) theories.<sup>5,6</sup> For example, in TCM theory, acupuncture points are associated with specific internal organs and bodily functions. Recent studies using functional magnetic resonance imaging (fMRI) and positron emission tomography (PET) have demonstrated the direct relationship between acupuncture point stimulation and activation of specific brain areas related to specific functions, as described by TCM theories. A recent study utilized magnetic resonance imaging (MRI) of the body to evaluate the TCM theory that specific acupoints on the Bladder Channel were connected to specific organs.<sup>6</sup> An MRI contrast agent was injected into BL-18, BL-20 and BL-23 and the migration of the contrast agent was followed with MRI. The final distribution of the contrast agent was found in the area of the internal organ associated with each of these points described in TCM theory. Further studies are needed to verify these preliminary findings, but this study illustrates how advances in imaging technology are enabling scientific validation of ancient TCM theories. Some of the scientific research on acupuncture for pain and disorders of body systems, in both humans and animals, is summarized below.

### **Scientific Evidence for Acupuncture Treatment of Pain**

Pain relief has long been an important focus of acupuncture research.<sup>5</sup> Numerous studies in humans and animals have consistently documented that both dry-needle acupuncture and electro-acupuncture (EA) relieve pain with minimal cardiorespiratory effects, for example in horses with experimentally-induced rectal colic and rats with chronic visceral hypersensitivity.<sup>7,8</sup> These effects have been found to be comparable to those of commonly used pharmaceuticals as in one study, the efficacy of EA for pain relief was statistically equal to that of butorphanol.<sup>7</sup>

Some studies have found that EA can provide sufficient analgesia for surgical procedures. For example in cattle, a controlled study using 28 animals found that a level of surgical analgesia graded as “excellent” was produced in 87.5% of cattle treated with EA at dorsal acupuncture points.<sup>9</sup> Consciousness was maintained and the cattle remained standing, with analgesia in an area appropriate for an abdominal surgical approach. Pain was still present in all cattle in the control group, which received EA at non-acupuncture points. This supports the findings of an earlier case series, which compared EA-induced analgesia to that produced by a paramedian nerve block suitable for laparotomy and found similar effects from these two methods of analgesia.<sup>10</sup>

A review of the research on the analgesic effects

of acupuncture in humans concluded that for conditions where there was enough research to allow meta-analysis or systematic evaluation, there is “consistent, good-quality patient-oriented evidence” that acupuncture can be beneficial for low back pain, neck pain, chronic idiopathic headache and migraine.<sup>11</sup> This review also concluded that acupuncture was safe and well-tolerated.

Although the mechanisms through which the analgesic effects of acupuncture are mediated have not yet been completely elucidated, signaling molecules including opioid peptides (at mu, delta and kappa receptors), glutamate (at N-methyl D-aspartate [NMDA] and Alpha-amino-3-hydroxyl-5-methyl-4-isoxazole-propionate/kainate [AMPA/KA] receptors), 5-hydroxytryptamine and cholecystokinin octapeptide are involved.<sup>12</sup> The precise mechanism is affected by inherited genetic factors and differs between normal and hyperalgesic animals.<sup>12,13</sup>

Scientific research is now not only establishing acupuncture's mechanisms of action and clinical effects in pain relief, but also developing clinical protocols to achieve the greatest therapeutic effect. In one study, EA treatments using high frequencies (80-120 Hz) induced a stronger local analgesic effect than EA treatments using low frequencies (20 Hz).<sup>14</sup> However, EA treatments with lower frequencies induced analgesia that, although milder in its effect, persisted longer.<sup>14</sup> This study not only proved that EA has clinically useful analgesic effects, but also demonstrated how EA can be best applied in clinical practice, adding to the validity of acupuncture as a clinical veterinary treatment.

Treatment of pain associated with musculoskeletal disorders is a common use of acupuncture, especially in performance horses.<sup>15-17</sup> Musculoskeletal pain is perhaps the most important cause of decreased performance and loss of training and competition time in equine athletes and may be difficult to successfully resolve using a conventional veterinary approach. Many researchers have proved the efficacy of acupuncture in both human and veterinary musculoskeletal disorders, using a variety of parameters to assess the level of pain. For example, the hoof withdrawal reflex latency is a measurement to assess the degree of pain in a lame horse. In one study, EA significantly increased the hoof withdrawal reflex latency and reduced the horse's lameness score, simultaneously increasing the plasma  $\beta$ -endorphin concentration.<sup>15</sup> Based on this finding, release of  $\beta$ -endorphin may be one of the pathways through which acupuncture relieves pain.<sup>15</sup>

Many clinical trials have been conducted using EA to treat performance horses suffering from chronic back pain.<sup>16,17</sup> Results provide clear, scientifically-based evidence that three sessions of EA treatment can successfully relieve signs of back pain in horses and the analgesic effect can last at least two weeks. In contrast, medicating with oral phenylbutazone alone did not effectively relieve pain.<sup>16</sup> Chronic, painful

musculoskeletal conditions such as osteoarthritis are an important challenge in human medicine. Large-scale, randomized, controlled studies have documented the effectiveness of acupuncture to decrease joint pain and improve mobility in human osteoarthritis patients.<sup>18,19</sup>

### **Scientific Evidence for Acupuncture Treatment of Wounds**

In addition to its analgesic effects, acupuncture also has anti-inflammatory effects. An example where this is clinically useful is in treatment of exuberant granulation tissue (“proud flesh”) in horses. Equine lower limb wounds often heal poorly and it can be difficult to reduce granulation tissue formation and achieve a cosmetic result. Implantation of gold beads at acupuncture points has been used to treat wounds on the cranial hock and cannon bone region.<sup>20</sup> This study found that a single implantation effectively controlled excessive granulation tissue formation, reducing or eliminating the need for bandaging and eliminating surgical resection in thirty-five horses. The wounds healed with a cosmetically acceptable and functional result. Long-term follow-up for eighteen or more months demonstrated that the wounds had completely healed, with reduced fibrosis compared to horses not treated with acupoint gold bead implantation. Although this was a preliminary study, gold bead implantation produced significant results without adverse effects on the horses and this application of acupuncture is worthy of further clinical investigation.

### **Scientific Evidence for Acupuncture Treatment of Neurological Disorders**

A variety of research studies have confirmed the efficacy of acupuncture for neurological disorders in veterinary medicine.<sup>5</sup> Intervertebral disc disease (IVDD) has been the primary focus of research because of the prevalence of the disease in dogs.<sup>21-23</sup> In one study, 50 dogs with thoracolumbar IVDD were classified using a scale of specific neurological deficits from Grades 1-5 (Grade 1 = pain only, no neurological deficits and Grade 5 = paraplegia with no deep pain) and then randomly allocated to one of two treatment groups.<sup>21</sup> Dogs in one group received EA and dry needle acupuncture (DN) combined with standard conventional medical treatment and those in the second group received only standard conventional medical treatment. The time (mean  $\pm$  standard deviation) to recover ambulation in dogs with Grade 3 or 4 dysfunction (non-ambulatory) in the group receiving EA/DN was significantly less (10.10  $\pm$  6.49 days) than in the group not receiving EA/DN (20.83  $\pm$  11.99 days). The success rate, defined as the ability to walk without assistance for dogs with Grade 3 or 4 dysfunction (non-ambulatory), was significantly higher (10/10 dogs) in the group that received EA/DN than similarly affected dogs not receiving EA/DN (6/9 dogs). The overall success rate (all dysfunction grades) for dogs receiving EA/DN was significantly higher (23/26; 88.5%) than for those receiving only conventional

medication (14/24; 58.3%). The conclusion of the study was that EA/DN combined with standard conventional medical treatment was more effective than conventional medication alone and resulted in a shorter time to recover ambulation in dogs with thoracolumbar IVDD.<sup>21</sup>

In another study comparing surgery and EA/DN for dogs with IVDD, 40 dogs, whose neurological deficits were graded using the same Grade 1-5 scale described above, were divided into three treatment groups: 1) Prednisone and decompressive spinal surgery alone (10 dogs), 2) Prednisone and EA/DN alone (19 dogs) and 3) Prednisone, decompressive spinal surgery and EA/DN (11 dogs).<sup>22</sup> Treatment was considered a “clinical success” when a dog initially classified as Grade 4 or 5 (paraplegic with or without deep pain respectively) became a Grade 1 (no neurological deficits) or Grade 2 (ambulatory) within 6 months of initiating treatment. The researchers found that “clinical success” was significantly higher for dogs that received EA/DN alone (15/19) or EA/DN and surgery (8/11) than for dogs that had surgery alone (4/10). Thus, they concluded that EA/DN was more effective than surgery alone for recovery of ambulation and improvement in neurologic deficits in dogs with long-standing severe deficits attributable to thoracolumbar IVDD.<sup>22</sup>

The outcomes of 80 dogs with paraplegia and intact deep pain from intervertebral disk disease treated with or without EA/DN were compared in a retrospective study.<sup>23</sup> Thirty-seven dogs were treated with prednisone alone and forty-three dogs were treated with prednisone plus EA/DN. Acupoints GV-7 and GV-2 were treated with EA at 0.5-2.5 millivolts and mixed frequencies of 2 and 15 Hz for 30 minutes. Acupoints on the Bladder Channel near the lesion and bilaterally at GB-30, GB-34 and ST-36 were treated with DN for 30 minutes. The combination of EA/DN with prednisone was more effective than prednisone treatment alone to recover ambulation, relieve back pain and decrease relapse.<sup>23</sup>

The effects of acupuncture for epilepsy have also been studied extensively in experimental human clinical trials.<sup>5</sup> The implantation of gold beads at acupuncture points improved seizure control in fifteen dogs with canine idiopathic epilepsy.<sup>24</sup> Fifteen weeks after implantation, 9 (60%) had at least a 50% reduction in seizure frequency compared to the control period before implantation.<sup>24</sup> Although only an uncontrolled case series, the results of the study suggest further studies of acupuncture for canine epilepsy are warranted.

Human clinical trials have demonstrated acupuncture's efficacy in other neurological disorders and further studies for the treatment of these neurological disorders in animals is warranted.<sup>5,25,26</sup> A multicenter, randomized, controlled study found that acupuncture with moxibustion was more effective than prednisolone and dibazol with B vitamins for treatment of idiopathic facial paralysis (Bell's palsy) in humans.<sup>25</sup> A systematic review of human clinical randomized trials evaluating acupuncture treatment for facial nerve

paralysis reported significantly positive effects with EA and recommended a standardized treatment regime.<sup>26</sup> Another systematic review of several human clinical randomized, controlled trials of acupuncture for idiopathic facial nerve paralysis concluded that although preliminary positive results had been reported, higher quality studies with larger numbers of patients were still needed before recommendations regarding acupuncture for facial nerve paralysis (Bell's palsy) for humans could be made.<sup>27</sup>

Human case reports and clinical randomized controlled trials report successful treatment of acute idiopathic vestibular syndrome (Ménière's disease) with acupuncture.<sup>5,28</sup> After a recent systematic review of human clinical randomized, controlled trials evaluating acupuncture for Ménière's disease (idiopathic vestibular syndrome), it was concluded that acupuncture was beneficial, but further human clinical trials were needed to clarify questions around the appropriate frequency and number of acupuncture treatments required.<sup>28</sup> In animal models for brain ischemia, EA has been shown to protect the brain from the effects of ischemia, and stimulate stem cell proliferation and improve neurological deficits after cerebral ischemia.<sup>29,30</sup> This is relevant for potential treatment of traumatic brain injury and stroke disorders.

#### **Scientific Evidence for Acupuncture Treatment of Ophthalmological Disorders**

Acupuncture has long been anecdotally known to have beneficial effects on vision, but these effects are now being documented through scientific research.<sup>5,31,32,33</sup> Visual evoked potential (VEP) is a physiological parameter used to objectively measure visual function, and reflects optic nerve functioning.<sup>31</sup> Research has shown that in human subjects with prolonged VEP latency, acupuncture decreased the latency and these subjects reported that they could then see more easily and clearly.<sup>31</sup> Other studies have demonstrated that acupuncture can enhance choroidal blood flow to improve optic function.<sup>32</sup>

Scientific studies have also begun to document the efficacy of acupuncture in clinical ophthalmological disorders, such as glaucoma. For example, one study used EA to treat Rhesus monkeys with glaucoma.<sup>33</sup> After one hour of EA treatment, the intraocular pressure decreased to less than half the baseline pressure (41.1±8.3 versus 20.9±3.3 mmHg,  $p<0.05$ ). The intraocular pressure remained considerably decreased at 24 hours (26.6±9.3 mmHg) and 48 hours (27.9±3.8 mmHg), but was not significantly different at 72 hours (32.6±7.1 mmHg) after treatment. The intraocular pressure in the control group did not differ from baseline values.

#### **Scientific Evidence for Acupuncture Treatment of Cardiorespiratory Disorders**

Arterial hypertension is an important risk factor in development of cardiovascular disease in humans, so

has been the focus of much scientific research.<sup>5</sup> Acupuncture has been shown to significantly reduce both systolic and diastolic blood pressure in many studies, possibly through enhanced arterial nitric oxide synthase expression and increased plasma nitric oxide concentration.<sup>34,35</sup> After a period of myocardial ischemia, there is a high risk of development of potentially lethal cardiac arrhythmias.<sup>36</sup> A controlled study in rats showed that EA at points PC-5 and PC-6 significantly reduced the incidence of ventricular tachyarrhythmias caused by experimentally-induced occlusion and reperfusion of the left coronary artery, by reducing myocardial metabolic demand.<sup>36</sup> The incidence of tachyarrhythmia was 25% in the EA group and 100% in the control group, which received no treatment. These acupuncture points are known in TCM theory to regulate the heart and relieve cardiac pain. There is also evidence that acupuncture can successfully convert cardiac arrhythmias.<sup>37</sup> A review of eight studies using acupuncture to treat cardiac arrhythmia in humans found that 87-100% of patients converted to a normal sinus rhythm after acupuncture.<sup>36</sup> While recognizing that there were methodological limitations to these studies and that better-controlled trials are needed, this review concluded that "acupuncture seems to be effective in treating several cardiac arrhythmias."

Respiratory depression and apnea during anesthesia are common in veterinary practice. A study of 69 cats and dogs showed that acupuncture at acupoint GV-26 restored respiration to normal or near normal rates in 100% of animals, if there was no concurrent cardiac arrest.<sup>38</sup> When cardiac arrest occurred and vital signs were absent, the revival rate was 43%. This point is known in TCM theory to restore consciousness.

#### **Scientific Evidence for Acupuncture Treatment of Gastrointestinal Disorders**

Due to the high prevalence of functional gastrointestinal disorders in the human population (estimated at up to 70%), there is a large body of research into the efficacy and mechanisms of acupuncture in a variety of human gastrointestinal conditions.<sup>5,39,40</sup> A systematic review of human clinical trials of acupuncture found that in studies with a rigorous methodological design, acupuncture had significantly beneficial effects in Crohn's disease and colitis in humans.<sup>40</sup>

The acupuncture point ST-36 is suggested in TCM theory to affect the stomach. PET scans have shown that when ST-36 is stimulated with an acupuncture needle, there is increased activity in the regions of the human brain associated with gastric function, thus supporting TCM theory that specific acupuncture points are related to specific organs.<sup>41</sup> Several other studies of ST-36 utilizing PET scans and fMRI have also supported the TCM theory.<sup>6</sup> One study using an electro-gastrogram to monitor stomach muscle activity in rabbits demonstrated that EA at ST-36 has a

bi-directional, modulatory effect on gastric muscle electrical activity, possibly through M-cholinoceptors and  $\alpha$ -adrenoceptors.<sup>42</sup>

Other acupuncture points that have been demonstrated to affect gastrointestinal motility in animals include BL-27, BL-21, and SP-6.<sup>43-45</sup> These are all points known in TCM theory to affect the gastrointestinal tract. Stimulation of the acupuncture point PC-6 is known in TCM to control nausea and vomiting. Evaluation of fMRI during PC-6 stimulation showed activation of brain regions affecting gastric myoelectrical activity, vagal modulation and cerebellar and vestibular activity, all of which are involved in nausea and vomiting.<sup>46</sup> This supports the TCM theory that specific acupuncture points have specific actions and that PC-6 is directly related to nausea and vomiting. These studies show that acupuncture has significant and clearly described effects on the human and animal gastrointestinal tract, which are applicable to the treatment of a variety of human and animal gastrointestinal disorders. This has great clinical relevance, given the lack of effective conventional treatments for disorders such as irritable and inflammatory bowel diseases in both humans and animals, especially because no studies found adverse effects from acupuncture treatment.<sup>40</sup>

### **Scientific Evidence for Acupuncture Treatment of Reproductive Disorders**

Acupuncture is increasingly used in management of equine reproduction. Research supports the use of acupuncture in equine disorders including anestrus, urine pooling, infertility and poor libido in stallions.<sup>47</sup> These therapeutic effects are mediated through hormonal regulation, altered smooth muscle motility, and general stress and/or pain relief from musculoskeletal or environmental conditions.<sup>47</sup>

### **ORGANIZATIONS THAT SUPPORT THE USE AND FURTHER STUDY OF ACUPUNCTURE**

Acceptance of acupuncture has increased in international and national health organizations, the American Veterinary Medical Association, US Colleges of Veterinary Medicine and among veterinary practitioners.

### **International and National Health and Professional Organizations**

In 1997, the National Institutes of Health (NIH) published a consensus paper on acupuncture that was the result of several days of expert scientific presentations and discussions by an independent group of professionals.<sup>48</sup> They concluded, "Acupuncture, as a therapeutic intervention, is widely practiced in the United States. While there have been many studies of its potential usefulness, many of these studies provide equivocal results because of design, sample size, and other factors. The issue is further complicated by

inherent difficulties in the use of appropriate controls, such as placebos and sham acupuncture groups. However, promising results have emerged, for example, showing efficacy of acupuncture in adult postoperative and chemotherapy nausea and vomiting and in postoperative dental pain. There are other situations such as addiction, stroke rehabilitation, headache, menstrual cramps, tennis elbow, fibromyalgia, myofascial pain, osteoarthritis, low back pain, carpal tunnel syndrome and asthma, in which acupuncture may be useful as an adjunct treatment or an acceptable alternative or be included in a comprehensive management program. Further research is likely to uncover additional areas where acupuncture interventions will be useful."<sup>48</sup> Between 1997 when the NIH statement was issued and 2011, there have been approximately 8,000 more references on acupuncture added to the US Library of Medicine.<sup>5</sup> The evidence for the efficacy of acupuncture treatment for many medical conditions has increased exponentially since that time and the consensus statement has not been updated; therefore, the NIH refers readers to MedlinePlus, which has an updated overview of the use of acupuncture for human disease. It indicates further "promising results" from research funded by National Center for Complementary and Alternative Medicine (NCCAM) on acupuncture for relief of pain in several conditions, conducted since the 1997 Consensus Statement.<sup>49</sup>

In 2003, the World Health Organization (WHO) published a review of the scientific evidence for acupuncture treatment of various medical conditions.<sup>50</sup> After analysis of the clinical trials of acupuncture, the WHO concluded that acupuncture has significant therapeutic effects for a large number of human medical disorders. The WHO report listed 28 symptoms, diseases and conditions for which acupuncture has "been proved through controlled trials to be an effective treatment," including but not limited to numerous types of pain, allergic rhinitis, nausea and vomiting and elevated and decreased blood pressure.<sup>50</sup> The review also listed an additional 63 conditions for which, "The therapeutic effect of acupuncture has been shown, but for which further proof is needed."

The NIH and WHO are not the only professional, independent medical experts that have analyzed acupuncture and concluded that it is an effective and valid treatment for specific disorders. In 2007, the American Pain Society and the American College of Physicians issued joint clinical practice guidelines for diagnosis and treatment of low back pain.<sup>51</sup> These stated that, "For patients who do not improve with self-care options, clinicians should consider the addition of non-pharmacologic therapy with proven benefits," and went on to recommend acupuncture for low back pain, especially when pain is subacute or chronic.

In 1996, the AVMA stated in their guidelines on alternative therapies that, "Veterinary acupuncture and acuthery are now considered an integral part of

veterinary medicine” and the annual AVMA conventions often include lectures on acupuncture.<sup>52</sup> The latest AVMA Guidelines for Complementary and Alternative Veterinary Medicine (approved in 2001, revised in 2007) simply states that, “Recommendations for effective and safe care should be based on available scientific knowledge,” and that, “Veterinarians should ensure that they have the requisite skills and knowledge for any treatment modality they may consider using.”<sup>53</sup>

Funding for acupuncture research has also increased over the past decade.<sup>54-58</sup> The NCCAM is one of the 27 institutes and centers that make up the NIH. The NCCAM received approximately \$31 million from the American Recovery and Reinvestment Act (“Recovery Act”) to fund complementary and alternative medicine research in fiscal years 2009 and 2010.<sup>54</sup> As of September 30, 2009, NCCAM had awarded \$16.8 million to fund 45 new and pending grant applications. Of this amount, \$2.48 million was allocated to projects specifically dedicated to the study of the mechanisms of action of acupuncture and the efficacy of acupuncture treatment in a variety of medical disorders. In addition, the NIH Office of the Director funded four grants for a total of \$1.4 million that NCCAM will administer. Studies on chronic pain, one of the main targets of Recovery Act funding, are “a vital component of NCCAM's research portfolio,” and acupuncture's actions and efficacy are a key part of chronic pain research.<sup>54</sup> National veterinary funding sources currently supporting acupuncture research include the Morris Animal Foundation, the American Association of Equine Practitioners, the American Association of Traditional Chinese Veterinary Medicine (AATCVM) and the American Academy of Veterinary Acupuncture (AAVA).<sup>55-58</sup> Support for the use and research of acupuncture by these well respected, international and national medical and professional organizations is a testament to the increased interest in the integration of acupuncture into standard medical care over the past 15 years.

### **Colleges of Veterinary Medicine**

Acupuncture is part of the curriculum of the DVM programs at numerous AVMA-accredited veterinary schools, both within the US and abroad, and interest in acupuncture is increasing in veterinary students and faculty.<sup>1-3</sup> Veterinary medical schools that are AVMA-accredited and teach some aspect of acupuncture include the University of California, Davis; the University of Florida; the University of Minnesota; Murdoch University; Oklahoma State University; the University of Tennessee and Washington State University.<sup>1</sup> For example, an elective two-week Acupuncture Clinical Rotation has been offered annually at the University of Florida, College of Veterinary Medicine (UFCVM) since 2001. Since 2004, nine interns have completed the Acupuncture Internship Program at UFCVM.

Other AVMA-accredited veterinary schools, although not directly teaching acupuncture to veterinary students, offer acupuncture as a treatment option for clients.<sup>59-61</sup> North Carolina State University includes acupuncture in its Integrated Pain Management Service.<sup>59</sup> The University of Pennsylvania includes acupuncture in its Equine Sports Medicine and Imaging Service (stating that “Acupuncture in horses is particularly useful for the treatment of chronic back pain”) and offers a referral acupuncture service for small animal patients.<sup>60,61</sup> From a review of veterinary school websites, it was found that at least 17 of the 31 AVMA-accredited veterinary schools in the US (54%) have veterinarians certified in or with an interest in acupuncture as faculty members, or offer acupuncture to their clients through referral.<sup>3,62</sup>

### **Veterinary Practitioners**

Although the AVMA Board of Veterinary Specialties does not yet recognize specialization in veterinary acupuncture, training and certification in veterinary acupuncture are available to veterinarians through three continuing education programs in the United States and interest in veterinary acupuncture continues to grow.<sup>3,63-65</sup> The typical acupuncture training program requires 130-140 hours of lectures and laboratories, with rigorous written and oral examinations, 30-40 hours of internship training with a certified acupuncturist and written case reports in order to receive a certified veterinary acupuncturist (CVA) certificate. Many of the lecturers and instructors for these courses are themselves involved in scientific acupuncture research at veterinary schools across the US and the scientific basis of acupuncture is emphasized in these courses, where veterinarians are taught therapeutic practices that are supported by evidence-based research.<sup>63-65</sup>

Providers of CVA programs in the US are the Chi Institute of Chinese Medicine, the International Veterinary Acupuncture Society (IVAS) and the Colorado Veterinary Medical Association.<sup>63-65</sup> The number of veterinarians who have taken a CVA course from one of these three programs has been conservatively estimated to be 4,300, or approximately 6% of all practicing veterinarians.<sup>1</sup> CVA veterinarians are well trained and highly qualified to practice veterinary acupuncture and practitioner listings can be found on the websites of several organizations.<sup>57,58,63-65</sup> The American Academy of Veterinary Acupuncture, American Holistic Veterinary Medical Association, Chi Institute and IVAS also provide annual continuing education credits for CVA practitioners to maintain their certification, continue to develop their skills and keep informed of current scientific research and the best, most up-to-date clinical practices based on evidence-based studies.<sup>58,63,64,66</sup>

### **A Peer-Reviewed Journal to Validate Veterinary**

## Acupuncture

The American Journal of Traditional Chinese Veterinary Medicine (AJTCVM) was launched in 2006, to promote the generation and publication of evidence-based research on the mechanisms of action, efficacy and optimum techniques for acupuncture and other forms of Chinese medicine in veterinary practice and is the official publication of the AATCVM and the AAVA.<sup>57,58,67</sup> The AJTCVM is a peer-reviewed journal with high editorial and scientific standards and has already published numerous original basic scientific research studies that provide further evidence for the validity, efficacy and scientific basis of acupuncture. The growing success of the AJTCVM reflects the strong desire of veterinarians in the developing field of acupuncture to promote evidence-based research and define the optimum clinical practices in order to provide their patients the highest standard of care, based on scientifically determined treatment protocols.

In addition to the AJTCVM, acupuncture research has been published in many other peer-reviewed, respected veterinary journals, such as the Journal of the American Veterinary Medical Association and the Journal of Equine Veterinary Science, reflecting both the growing interest in and acceptance of acupuncture and the volume and quality of scientifically based research in this field.

## CONCLUSION

The dictionary definition of “valid” is: “Well-grounded or justifiable: being at once relevant and meaningful,” and “appropriate to the end in view: effective.”<sup>68</sup> A valid treatment in veterinary medicine should have scientifically-proven efficacy and also be safe and cost-effective. The scientific research studies described in this review demonstrate that acupuncture has significant efficacy in a wide variety of diseases, including those conditions for which there is no effective conventional treatment. Acupuncture has been proven to be a safe therapy, with an extremely low incidence of side effects and adverse events, especially when administered by a veterinarian with specialized acupuncture training.<sup>69</sup> A review of 12 prospective human studies, including over a million treatments, estimated the risk of a serious adverse event from acupuncture at 0.05 times/10,000 treatments.<sup>69</sup> As the NIH Consensus Statement states, “One of the advantages of acupuncture is that the incidence of adverse effects is substantially lower than that of many drugs or other accepted procedures for the same conditions.”<sup>48</sup> The NIH statement specifically points out that for some conditions, “Medical interventions have a potential for deleterious side effects, but are still widely used and are considered acceptable treatments. The evidence supporting these therapies is no better than that for acupuncture.”<sup>48</sup> With the low cost and minimal amount of equipment needed for acupuncture, compared to treatment using many of the current medical advances,

acupuncture is also a cost-effective option. All these factors together support acupuncture as a valid treatment in veterinary medicine.

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