Abstract
Acupuncture is becoming more routinely used in clinical practice. Current understanding of the neurophysiologic mechanisms of action has increased its use, while Traditional Chinese Medicine has increased in popularity. While scientific papers are lacking for its use in canine reproduction, its use in humans and research in other animals can guide us in this area of practice.

Keywords: Acupuncture, fertility, lactation, pregnancy, parturition

Introduction
Acupuncture is an ancient technique; fish and bone needles may have first been used in China approximately 3000 years ago. In 650 BCE Bai-le Zhen Jing, considered an expert in equine acupuncture, wrote the Canon of Veterinary Medicine. Traditional Chinese medicine/veterinary medicine (TCM or TCVM), including acupuncture, was based on thousands of years of observation of patterns of illness and wellness. These concepts are quite different from conventional Western understanding of disease and body function. We now understand the neurophysiologic basis for much of how acupuncture affects the body. Acupuncture’s effectiveness is correlated with its effects on the neurologic and hormonal mechanisms of the body. In-depth knowledge of TCVM paradigms is not necessary for the successful use of acupuncture; however it may lead to a deeper or different understanding of complex disease presentations. This author does not consider biomedical acupuncture based on scientific understanding of neuroanatomy-neurophysiology and TCVM acupuncture to be mutually exclusive. We should not ignore the new scientific information that delineates the mechanism of action of acupuncture. We also need not ignore thousands of years of observational information.

Acupuncture typically refers to the use of needles alone (dry needles). Also included in the modality are aquapuncture, the injection of liquid—often B12—into acupoints, and electroacupuncture stimulation (EA). Moxibustion is the use of a burning herb over acupoints or in association with the needles placed in acupoints. The use of acupuncture needles by non-acupuncture trained professionals to provide myofascial trigger point release is commonly referred to as “dry needling” by its practitioners and should be understood as a separate modality from acupuncture.

Physiology of acupuncture
The locations of acupoints in small animals have been transposed from information in humans and other animals (horse, cow), as the use of acupuncture in companion animals is relatively recent. Current research is ongoing to histologically define acupoint locations in the dog. Acupuncture points typically correspond with locations where small nerve bundles penetrate the fascia, are close to nerves, or close to blood vessels which have their own innervation or motor points in muscle. The TCM meridians or channels often follow the propagated sensation along a nerve, and some may follow lymphatic channels.

A review of specific neuroanatomy and physiology is outside the scope of this presentation, but important to understand when selecting acupoints in treatment. In use of acupuncture for reproductive medicine, knowledge of organ association with specific dermatomes is particularly important. Acupuncture modulates the sympathetic nervous system along with the neuroendocrine system. Neuroendocrine effects are achieved via opiate pathways which then influence gonadotropin releasing hormone. While the precise mechanisms by which internal organs and hormonal activation are affected by acupuncture are not as well defined as is acupuncture’s effect on pain, the overall concept is that of segmental association. Each segment is comprised of a dermatome, myotome, sclerotome and viscerotome. While these components may move some distance from each other during embryonic development, they retain a shared innervation. Each part of a segment can and does affect the other parts. In general, the sclerotome is the most cranial of the segmental parts, with the dermatome more
caudal and the viscerotome most caudal. Stimulation of the skin or muscle of a particular dermatome or myotome can influence internal organs that have the same segmental innervation via musculo-visceral and cutaneovisceral reflexes. Visceral pathology is projected to the spinal cord via a number of pathways. In humans these include sympathetic fibers to spinal segments C8-L2, via the phrenic nerve to C3-C5, via the pelvic nerves to S2-S4, and via the vagus nerve to the brainstem and C1-C2.

This segmental association reveals one of the difficulties with acupuncture research. Sham acupuncture is often used as a control in these studies, but it is clear that a needle placed anywhere in the body is capable of stimulating the nervous system, by virtue of neurologic connections in that area. If sham needles are placed in the same dermatome as the studied acupoints, there can be a similar effect from the sham needles. Multiple other physiologic effects of acupuncture have been documented. These include vascular effects and effects on the immune system. With acupoint stimulation there is initial local vasoconstriction that lasts for seconds. This is followed by a prolonged vasodilation phase that may last up to two weeks, increasing perfusion to the area. Acupuncture has been documented to cause enhanced humoral immunity, increased white blood cell count, antibody levels, and phagocytic activity. In some human studies hormonal effects from acupuncture have been documented to last up to three months.

A review of TCVM concepts is outside the scope of this article and is available in other resources. Identifying general concepts is useful as the terminology is shared in all acupuncture in human and veterinary medicine. Acupoints are arranged on particular channels or meridians, although there are also special points outside these channels. The channels have specific names that include those of particular organs (bladder, gall bladder, heart, etc.). These names refer to the TCVM view of the organ, which is not necessarily, completely, or at all connected to the conventional or Western concept of that organ. When working with acupuncture, it is important to divorce that connection in one’s mind and associate the TCVM names with the TCVM meanings as it is truly a different paradigm.

Use of acupuncture in reproduction

Fertility effects-male

Multiple studies in humans have shown acupuncture to increase total functional sperm fraction, percentage of viable spermatozoa, total motile sperm per ejaculate and axonemal integrity. Electroacupuncture, but not dry needles in this study, has been shown to increase testicular blood flow. Rat studies have shown positive responses to acupuncture for a variety of androgenic uses. One showed increased total and free testosterone with EA at BL23 and CV 4 for 15 min daily for eight weeks in rats with experimentally suppressed androgen production. Another showed EA at S-29 attenuated oxidative stress and inflammatory response in experimentally torsed rat testes. Still another showed that EA at GV20, CV4, ST36 and SP6 produced enhanced germ cell proliferation and improvement of Sertoli cell function in rats treated with scrotal heat. One canine study presented as a conference abstract showed improvement in spermatozoal morphology, however this study has issues with timing of evaluation, as well as number of patients. As a cautionary note, one study on rats and rabbits at different developmental stages showed that frequent EA during puberty reduced sperm count and negatively influenced gonadotropin releasing hormone (GnRH) level.

Acupuncture, including EA, may be useful in subfertile or infertile adult dogs and considered as an adjunct therapy or primary therapy if no underlying treatable condition can be found for oligospermia or azoospermia of testicular origin. While points may be selected based on a TCVM examination and assessment, empirical points indicated include BL 23, ST 36, SP6, KID 3, KID 7 and BL 20 and 21. Dry needles, aquapuncture or EA can be used. Herbal epimedium powder is often added for testicular issues, including cryptorchidism and infertility.

Fertility effects-female

Definitive work is lacking, but studies suggest that the neuropeptides released due to acupuncture stimulation may act on GnRH. If, and how much, acupuncture increases success with IVF in women...
is controversial. This is an area where sham acupuncture makes assessment of the studies complicated. Meta-analysis concludes no improvement in conception or live birth when acupuncture is used in IVF, but when each included study is read in total, it is clear that sham acupuncture may be having an effect as well as the chosen acupoints, thus blunting the ability to interpret the results.

Some animal studies are available. A rat study showed that acupuncture at BL 36, SP6 and GB9 increased implantation rates in rat blastocysts. One study evaluated repeat-breeder dairy cattle previously treated with GnRH with a 30% success rate. Cows and heifers that did not respond to GnRH were treated with aquapuncture (5-10 ml of 50% glucose solution) at points BaiHui and Shenpeng and “most” animals showed signs of estrus within fourteen days of treatment. After artificial insemination 77.7% had elevated progesterone and 66.6% were palpated pregnant per rectum, however actual delivery occurred in only 44.4%. A study of anestrous sows compared injection of GnRH with acupuncture at points on the back (treatment points) and sham points on the forelegs. Three of four sows treated with acupuncture at treatment points entered estrus, while only one of four did so out of each of the other two groups. In addition, the sows in the treatment group also developed a rise in progesterone.

In bitches with infertility that has been appropriately evaluated with conventional diagnostics without success, as an adjunct to other treatment, and in older bitches with all other appropriate management, acupuncture may be considered. While most cases will be evaluated with TCVM and treatment based on the particular TCVM pattern, there are empirical points that may be used—ones that will address the nerve supply to ovaries and uterus, as well as empirical points based on TCVM uses. These include BL 23, ST 36, SP6, KID 7, Bai Hui, and GV1. Addition of low frequency EA at BL33 and ST 25, CV4 and CV 19 may be of use in older bitches with limited ovarian reserve.

Acupuncture in pregnancy and parturition

Caution is recommended in the routine use of acupuncture during pregnancy. Needling the caudal abdomen or back and needling of distal points on the legs is particularly contraindicated, due to the risk of possible miscarriage. This introduces the idea of possible use of acupuncture as an adjunctive treatment in medical abortion and pyometra in the bitch-SP6, LI4, and BL 23-25 may be added to routine medical protocols.

Acupuncture at PC 6 has minimized severe morning sickness (hyperemesis gravidarum) in women in a sham acupoint controlled study. This may be of use in treating bitches that have severe anorexia and vomiting at 3-4 weeks of gestation.

Acupuncture has been used to induce cervical ripening and labor in women. Acupoint BL 67 has been used to accelerate cervical dilation with reported 75% success, although details of the study parameters are lacking. Electroacupuncture stimulation of LI 4 and SP6 resulted in increased frequency and duration of uterine contractions in human and rat studies. This author has had success with EA at these and additional points to strengthen uterine contractions during labor in the bitch, equal to or greater than that achieved with oxytocin and calcium administration when observed on a tocodynamometer (unpublished data), although the case numbers are small. The use of EA in this manner is more labor and time intensive than the conventional administration of pharmacologic agents. Use of acupuncture during labor in women reduced the use of meperidine for pain management from 37% to 11%, indicating efficacy in moderating the pain of parturition.

Lactation effects

Acupuncture is reliably effective at inducing lactation. Points used based on effectiveness in human medicine include SI 1 and LI4. Others that can be added include ST 36, SP6, SI 1, BL 17, 20 and 23 or can be chosen based on TCVM examination. The author reports excellent success using SI1 and LI4 alone with dry needles, although EA can be added if needed. Quantitative analysis has demonstrated an increase in the production of prolactin and oxytocin following acupuncture at SI 11 in rats. Other points that have been recommended, depending upon presentation of the patient and TCVM evaluation, include ST 36, SP6, BL 17, 20 and 23.
Neonatal resuscitation

The use of acupoint GV 26 for resuscitation and stimulation is widely practiced. Special training and needles are not required for success, as the point, located midline on the philtrum at the junction of its dorsal and medial third, is readily accessed and a 25 g needle can be utilized. Stimulation is provided in a strong manner, with a pecking motion. Stimulation of GV 26 increases blood pressure and stimulates the brain inspiratory centers.

Summary

In summary, while published scientific data on the efficacy of acupuncture in small animal reproduction are lacking, there is both historical information and scientific data in other species that support its use. Study of this modality in companion animal reproduction is needed and encouraged.

References
