

**Assessing the Integration of Acupuncture in Western Reproductive Medicine – An  
Online Survey of Reproductive Endocrinologists in the United States**

by

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## Approval Signature Page

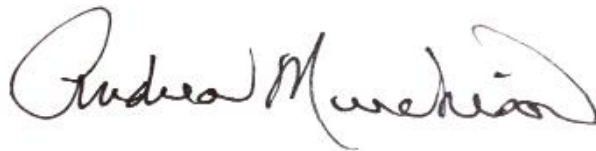
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## **ABSTRACT**

The purpose of this study was to evaluate the integration or “use” of acupuncture in reproductive medicine practices in the US. A web-based survey was e-mailed to reproductive endocrinologists who are members of the Society for Assisted Reproductive Technologies (SART). The physicians were questioned about their current integration of acupuncture into their treatment plans. The results of the study provide insight on the integration of acupuncture in Western reproductive medicine practices. The study highlights the trend to use acupuncture in conjunction with high tech fertility treatments, and also points out that this trend seems to be patient driven.

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## **CHAPTER 1: INTRODUCTION**

Assisted Reproductive Technology (ART) has been utilized in the United States since 1981.



According to the Center of Disease Control and Prevention (CDC) ART includes all fertility treatments in which both eggs and sperm are handled. In general, ART procedures involve surgically removing eggs from a woman's ovaries, combining them with sperm in the laboratory, and returning them to the woman's body, or donating them to another woman. This process is commonly called In Vitro Fertilization. A preliminary report released by the CDC in 2011 on ART success rates shows that 154,417 ART cycles were performed at 443 reporting clinics in the United States during 2010, resulting in 47,102 live births (deliveries of one or more living infants) and 61,561 infants. The use of ART is still relatively rare compared to the potential demand, but it has doubled over the past decade. Today, over 1% of all infants born in the U.S. every year are conceived using ART (CDC, 2011).

Although IVF has helped many couples achieve fertility, the average delivery rate per single cycle using fresh, non-donor eggs was only 33% (CDC, 2008). The majority of IVF cycles do not result in pregnancy, and multiple IVF cycles are usually needed to achieve pregnancy. ART can be a lengthy, expensive, and a highly stressful event for women and their partners. This factor is the reason why new drugs and technologies have been developed to improve success rates. Progress, however, has been limited. Some procedures initiated before the cycle have been shown to improve pregnancy rates in women with poorer prognosis because of specific conditions such as surgical treatment for tubal disease, or long-term treatment with gonadotropin releasing hormone agonists for women with endometriosis. Overall, few adjunct procedures have been shown to be effective for women in general (Mannheimer et al., 2008). Because of the relatively low IVF success rate per cycle, some patients are not successful even after several embryo transfers. The low success rate can place enormous financial and emotional stress on patients and their families. Therefore, it is crucial to maximize the efficiency of the IVF the procedures (Wang, Check, Liss & Choe, 2007). Also, IVF procedures can involve certain risks, like Ovarian Hyper-stimulation Syndrome (OHSS), which can in severe cases lead to serious complications, and increase the likelihood of multiple pregnancies, and lead to preterm birth.

Because of the above reasons, many couples are turning to Complementary Alternative Medicine (CAM) to enhance the success of their IVF treatments (Rosenthal & Anderson, 2007). Among those CAM treatments, acupuncture is frequently used as adjunct therapy. Acupuncture is an alternative medicine methodology that originated in ancient China as part of Traditional Chinese Medicine (TCM). It has been used in China and other Asian countries for centuries to regulate the female reproductive system (Maciocia, 1998).

Even though, there is a good amount of evidence showing the potential benefits of adding acupuncture to Western infertility treatments, which has been demonstrated by numerous research studies (Zheng, Huang, Zhang & Wang, 2012), reproductive endocrinologist still seem to be reluctant to integrate acupuncture into their treatment protocols. According to Magarelli (2007), in a survey of more than 100 members of the American Society for Reproductive Medicine (Philadelphia ASRM, 2004) every physician raised his hand acknowledging that “yes” they do have patients receiving acupuncture, but “no” they do not recommend it. A study conducted by Splies (2011), on practice patterns of acupuncturist in the field of TCM Reproductive Medicine, showed that only about 30% of acupuncturists are working with a reproductive endocrinologist. The trend to use acupuncture in conjunction with high tech fertility treatment seems to be patient driven as research demonstrates improved outcomes, and the results are reported in the media.

The purpose of this study is to assess the level of integration or “use” of acupuncture in Western reproductive medicine offices. Specifically, the researcher would like to investigate if reproductive endocrinologists in the US are currently adding acupuncture to their Western medical treatments. The researchers hypothesis is that less than 50% of reproductive endocrinologists in the US are currently adding acupuncture to their IVF treatment protocols. The study will also examine the possible reasons why reproductive endocrinologists add, or not include acupuncture to their treatment protocols.

So far, there are no specific data available on the general use of acupuncture in Western Reproductive Medicine Offices. There is also little known to date about the benefits or obstacles of collaboration between conventional and CAM providers in the United States. (Nedrow et al., 2007). Hopefully this study will provide a first insight on the level integration of acupuncture in Western reproductive medicine offices in the US, and maybe reveal reasons why reproductive endocrinologists add, or not include acupuncture to their treatment protocols.

### GLOSSARY OF RELEVANT TERMS

<i>Abbreviation</i>	<i>Term</i>	<i>Definition</i>
<i>ABORM</i>	American Board of Oriental Reproductive Medicine	Specialty Board that certifies licensed acupuncturists who specialize in fertility. ( <a href="http://www.aborm.org">www.aborm.org</a> )
Acupuncture		Is an alternative medicine methodology originating in ancient China, that treats patients by inserting thin solid needles into acupuncture points in the skin. ( <a href="http://www.nccam.nih.gov">www.nccam.nih.gov</a> )
Ambidirectional Dominance		Occurs in a situation where multiple genes influence a phenotype, and dominance is in different directions depending on the gene. ( <a href="http://www.en.wikipedia.org">www.en.wikipedia.org</a> )
<i>ART</i>	Assisted Reproductive Technology	Procedure employed by RE's involving techniques and technology that help couples achieve pregnancy such as IVF. ( <a href="http://www.sart.org">www.sart.org</a> )
<i>ASRM</i>	American Society of Reproductive Medicine	An established organization that unites practitioners and researchers in the field of reproductive medicine. ( <a href="http://www.asrm.org">www.asrm.org</a> )
<i>CAM</i>	Complementary and Alternative Medicine	A group of diverse medical and healthcare systems, practices, and products that are not generally considered part of conventional medicine. ( <a href="http://www.nccam.nih.gov">www.nccam.nih.gov</a> )
<i>E2</i>	Estradiol	The predominant sex hormone present in females. (Speroff, 2011)
<i>ET</i>	Embryo Transfer	A procedure of ART, where the in-vitro fertilized embryo is placed via a catheter into the woman's uterus. ( <a href="http://www.sart.org">www.sart.org</a> )
<i>FSH</i>	Follicle Stimulating Hormone	A hormone that in females stimulates the production of eggs. (Speroff, 2011)

<i>GnRH</i>	Gonadotropin Releasing Hormone	A hormone responsible to release FSH and LH from the anterior pituitary gland. (Speroff, 2011)
<i>HPO Axis</i>	Hypothalamus-Pituitary-Ovary Axis	Refers to the effects of the hypothalamus, pituitary gland, and ovary as if these individual endocrine glands were a single entity as a whole. (Speroff, 2011)
<i>Infertility</i>		1 year of unprotected intercourse without conception. <a href="http://www.aborm.org">www.aborm.org</a>
<i>IRB</i>	Institutional Review Board	A committee that has been formally designated to approve, monitor, and review biomedical and behavioral research involving humans. (www.yosan.edu)
<i>IVF</i>	In Vitro Fertilization	A procedure of ART performed by RE's where the sperm is collected from the male, the ovum is collected from the female, and the two gametes are united. The fertilized ovum is then transferred to the womans uterus. (www.sart.org)
<i>LH</i>	Luteinizing Hormone	A hormone that in females triggers ovulation. (Speroff, 2011)
<i>OB/GYN</i>	Obstetrics/Gynecology	The field of medicine specializing in womens health, pregnancy and childbirth. <a href="http://www.medterms.com">www.medterms.com</a>
<i>OHSS</i>	Ovarian Hyperstimulation Syndrome	A complication that is sometimes seen in women who take fertility medicine that stimulate egg production. (Speroff, 2011)
<i>P</i>	Progesterone	A female hormone important for the regulation of ovulation and menstruation. (Speroff, 2011)
<i>RE</i>	Reproductive Endocrinologist	A medical doctor that is an OB/GYN with a further subspecialty in treating fertility and reproductive endocrine disorders. (www.sart.org)
<i>SART</i>	Society for Assisted Reproductive Technologies	A primary organization of professionals dedicated to the practice of ART's. (www.sart.org)

The study will proceed with a literature review in Chapter Two that provides the scholarly foundation for the factors examined in the current research. That chapter is followed by Chapter Three which

details the method engaged. Chapter Four summarizes the findings of this study, and Chapter Five discusses implications, limitations and recommendations for future research.

## CHAPTER 2: LITERATURE REVIEW

### Overview

This chapter will provide the cornerstone and background of the current study. The first part of this review will examine the theory and foundation of acupuncture with a focus on fertility. The second part will look at current studies of the impact of acupuncture on IVF outcome. The final part of this review will investigate the integration of acupuncture into Western reproductive medicine, and the attitudes of physicians towards acupuncture. The chapter will conclude with a literature review integration.

The literature search engine included a web search in the data bases of the US National Library of Medicine National Institutes of Health, The Center of Disease Control and Prevention, the National Center for Complementary and Alternative Medicine, the National Health Interview Survey, the Institute of Medicine, the Natural Institute of Health, and Google Scholar. Key surge words included acupuncture + integrative medicine, acupuncture + western reproductive medicine, CAM + integrative medicine, acupuncture + incorporation+ western medicine, acupuncture + IVF, acupuncture + ART's. Additional surges included text books and dissertation abstracts.

### Acupuncture Theory and Foundation with Focus on Fertility

Traditional Chinese Medicine (TCM) includes a series of medical treatments that originated about 3000 years ago in China. One of those treatments is acupuncture, which involves the insertion of thin, disposable, sterilized needles into designated points in the body. Acupuncture can stimulate the body's self-regulatory ability as characterized by integrity and ambidirectional dominance (Zheng, Huang & Wang, 2012) . TCM is considered a complementary or alternative medical system in Western countries, but is recognized and implemented as a form of primary care in most Asian countries. Acupuncture has been used in China for centuries to regulate the female reproductive system (Maciocia, 1997). The first book devoted solely to gynecology and obstetrics of Chinese Medicine,

*“The Complete Book of Effective Prescriptions of Disease of Women”*, was published in 1237 A.D.

TCM - theory is extremely complex, and originated thousands of years ago through meticulous observation of nature, the cosmos, and the human body. These theories apply the phenomena and laws of nature to the study of the physiological activities and pathological changes in the human body (Zhou & Qu, 2009). Even though, the traditional Chinese medicine understanding of acupuncture is based on ancient medical theory, a modern and scientific neuroendocrine perspective has begun to evolve in the past three decades. Studies have suggested that certain effects of acupuncture are mediated through endogenous opioid peptides in the central nervous system, particular beta-endorphin.

Mayer, Price & Rafil (1977) first reported that acupuncture analgesia was induced through endorphin production and antagonized by naloxone. Other studies conducted suggested that certain effects of acupuncture are mediated through the nervous system, within which beta-endorphin and other neuropeptides have been implicated (Gallinelli,1995; Ku, 998; Petti,1998).

Petti, Bangrazi, Liguori, Reale & Ippoliti (1998) showed that acupuncture caused a significant increase in beta-endorphin levels during treatment, which lasted for up to 24 hours. Beta-endorphin is derived from its precursor protein proopiomelanocortin and is present in abundant amounts in neuronal cell of the arcuate nucleus of the hypothalamus, pituitary, medulla, and in peripheral tissues including intestines and ovaries. Proopiomelanocortin splits to form adrenocorticotrophic hormone and beta-lipoprotein. Further cleavage of beta-lipoprotein yields neuropeptides including beta-endorphin.

Aleem, Eltanin, Omar & Couthren (1987) demonstrated the presence of immuno reactive beta-endorphin in follicular fluids of both normal and polycystic ovaries. The influence on gonadotropin secretion and the menstrual cycle by endogenous opioid peptides is believed to be mediated by their action on gonadotropin releasing hormone (GnRH) secretion (Ferin & Van de Wiele, 1984). The hypothalamic beta-endorphin center and the GnRH pulse generator are both situated within the arcuate nucleus. Quieley, Sheeham, Casper & Yen (1980) first reported an increased opioid inhibition of

luteinizing hormone (LH) secretion in hyperprolactinemic patients with pituitary microadenomas. Ching (1993), and Orstead & Spics (1987), showed that opioid peptides suppress GnRH release in rats and rabbits. The role of these neuropeptides, including beta-endorphin, in the regulation of GnRH secretion in humans have been reviewed by Kalra, Horvath, Naftolin, Xu & Pus (1997), and Pau & Spies (1997). Rossmanith, Mortola & Yen (1988) demonstrated the role of opioid peptides in the initiation of the mid-cycle LH surge in normal cycling women. Meanwhile, measurement of beta-endorphin in ovarian follicular fluid of healthy ovulatory women revealed much higher levels than circulating plasma, and the highest level of beta-endorphin was noted to be in the per-ovulatory follicle.(Petraglia, DiMeo, Storchi, Segre, Faccinetti & Szalay, 1987). Because acupuncture's influence on beta-endorphin levels, which in turn affect GnRH secretion and the menstrual cycle, it is a logical assumption to expect that acupuncture may impact ovulation and fertility. Animal studies have revealed that acupuncture treatments normalize GnRH secretion and affect peripheral gonadotropin levels (Lin, Liu, Chan, Wu, & Pi, 1988; Yang, Yu & He,1994)). Several researchers have shown that in ovulatory or anovulatory women, acupuncture can also influences plasma levels of follicle stimulating hormone (FSH), luteinizing hormone (LH), estradiol (E2), and progesterone (P) (Aso, Motohasi, Murata, Nishimura & Kakizaki, 1976; Yu, Zheng & Ping 1989; Mo, Li, Pu, Xi, Le & Fu, 1993). Acupuncture was successfully used to induce ovulation as a replacement for human chorionic gonadotropin (hCG) by Cai (1997). Chen & Yu (1991) showed that electro-acupuncture normalized the hypothalamic-pituitary-ovarian axis, and in another study reported that 6 of 13 women with anovulatory cycles responded to acupuncture treatment.

In summary, three potential mechanisms of the effects of acupuncture on fertility have been suggested:

- Acupuncture may mediate the release of neurotransmitters, which in turn stimulate the secretion of GnRH, and thereby influences the menstrual cycle, ovulation, and fertility.



- Acupuncture may stimulate blood flow to the uterus by inhibiting uterine central sympathetic nerve activity.
- Acupuncture may reduce the biological stress response by regulating endogenous opioids.

### **Effects of Acupuncture on IVF outcome**

After a first study conducted by Stener-Victorin, Waldenstrom, Nilsson, Wikland & Janson (1999) suggested that acupuncture can increase the clinical pregnancy rate of IVF, the application of acupuncture adjacent to IVF has attracted considerable attention and interest from the international Western medical community. Since then, more than 40 clinical trials evaluating acupuncture in IVF have been performed in recent years. Some studies have suggested a positive impact from adding acupuncture to IVF, but others do not confirm the effect. Seven systematic reviews and meta-analysis of randomized controlled trials have investigated the ability of acupuncture to increase IVF success rates. However, these meta-analyses have led to contradictory conclusions (Zheng et al., 2012).

The first meta-analysis was performed by Mannheimer, Zhang, Udoff, Haramati, Langenberger, Berman & Bouter in February 2008. The main conclusions of the study were, that acupuncture given around the time of embryo transfer, improved the rates of clinical pregnancy, ongoing pregnancy, and live birth in women undergoing IVF. The second analysis was conducted by Ng, So, Gao, Wong & Ho and published in July 2008. The study clearly demonstrated that the IVF pregnancy rate was significantly increased, especially when acupuncture was administered on the day of embryo transfer. The third analysis published by Cheong, Hung, Ng, & Ledger in 2009, concluded that acupuncture performed on the day of embryo transfer increased live birth rates, but did not increase clinical pregnancy rates, or show beneficial effects on pregnancy outcomes when acupuncture was performed around the time of oocyte retrieval. Other meta-analysis published by El-Toukhy, Sunkara, Khairy, Dyer, Khalaf & Coomarasamy in 2008, Cheong, Nardo, Rutherford & Ledger (2010); El-Toukhy & Khalaf (2009); Sunkara, Coomarasamy, Khalaf & El-Toukhy (2009), could not confirm a beneficial

effect from using acupuncture during IVF.

According to Zheng et al. (2012), systematic reviews and meta-analysis are generally regarded to be the most reliable tool for summarizing the existing evidence. However, they often show differences in results and conclusions. The most common reasons for these discrepancies are differences in inclusion criteria and methods of searching literature, data extraction, and data analysis (Stener-Victorin, 2009), though all of these aspects were considered in some way in these reviews. Consequently, Zheng et al. 2012, concluded that a new comprehensive systematic review and overall meta-analysis was indispensable for drawing more reliable conclusions on the ability of acupuncture to improve pregnancy outcomes when used as an adjunct in women undergoing IVF. In their systematic review published in March 2012, the objective was to evaluate the effect of acupuncture on in vitro fertilization outcomes. Twenty-four trials with a total of 5,807 participants were included in the review. The studies selected for the review evaluated the effects of acupuncture, including manual, electrical, and laser acupuncture techniques, on IVF outcomes in women undergoing IVF, with or without intracytoplasmic sperm injection. The control groups consisted of no-, sham-, and placebo acupuncture. Four styles of sham or placebo control were identified. First, superficial needling in true acupuncture points, or in non acupuncture points nearby. Secondly, true needling in non acupuncture points or in acupuncture points thought not to influence fertility. Thirdly, blunt (placebo) needling on the surface of true acupuncture points or non acupuncture points nearby (also called Streitberg placebo acupuncture). Fourth, sham laser acupuncture in which the laser device does not emit light pulses. Retrospective studies, case series, and studies with a cross-over design were excluded in the study. Randomized controlled trials without a clear description of at least one of the IVF outcomes, particular those not describing the exact number of pregnancies and initial setups, were also not considered. The results of the study revealed that the pooled clinical pregnancy rate from all of the acupuncture groups was significantly greater than that from all of the control groups, whereas the live birth rate was not

significantly different between the two groups. The results were different when the type of control using the Steitberger control were ignored. Similarly, if the underlying effects of the Streiberger control were excluded, the live birth rate results tended to be significant when the acupuncture was performed around the time of oocyte aspiration or controlled ovarian hyperstimulation. It was concluded that acupuncture improves the clinical pregnancy rate and live birth rate among women undergoing IVF based on the results of studies that do not include the Streitberger control, because the Streiberger control might not be an inactive control. The researchers also concluded that more positive effects from using acupuncture in IVF can be expected if an appropriate control and more individualized acupuncture treatments are used.

### **Integration of Acupuncture into Western Reproductive Medicine**

According to the National Center for Complementary and Alternative medicine (NCCAM), many Americans use complementary and alternative medicine (CAM) in pursuit of health and well being. The 2007 National Health Interview Survey (NHIS), which included a comprehensive survey of CAM use by Americans, showed that approximately 38% of adults use CAM treatments. A report from the Consensus Development Conference on acupuncture held at the National Institute of Health (NIH) in 1997, stated that acupuncture is being widely practiced by thousands of Physicians, Dentists, Acupuncturists, and other Practitioners, for relief or prevention of pain and for various other health conditions. According to the NHIS, and estimated 3.2 million U.S. Adults and 150, 000 children had used acupuncture in the year 2006. Between 2002 and 2007, acupuncture use among adults increased by approximately 1 million people. These trends provide a compelling rationale for better communication and cooperation between western medical and CAM providers. This need was highlighted in the 2001 Institute of medicine report, *Crossing the Quality Chasm* (IOM, 2001).

In 1998, researchers from the Stanford Center for Research in Disease and Prevention, conducted a survey of the incorporation of complementary and alternative medicine by mainstream

physicians. A comprehensive literature search identified 25 surveys conducted between 1982 and 1995 that examined the practices and beliefs of conventional physicians with regard to five of the more prominent CAM therapies. The survey revealed that acupuncture had the highest rate of physician referral (43%) among the five CAM therapies, followed by chiropractic (40%) and massage (21%). Rates of CAM practice by conventional physicians varied from a low of 9% for homeopathy to a high of 19% for Chiropractic and Massage Therapy. Approximately half of the surveyed physicians believed in the efficacy of acupuncture (51%), Chiropractic (53%), and Massage (48%). The review suggests that large numbers of physicians are either referring to or practicing some of the more prominent and well-known forms of CAM and that many physicians believe that these therapies are useful or efficacious. These data vary considerably across surveys, most likely because of regional differences and sampling methods, suggesting the need of rigorous surveys using national, representative samples.

The researcher could not find any previous studies regarding frequency of integration of acupuncture in Western reproductive medicine, or studies on attitudes of reproductive endocrinologists towards acupuncture, or their knowledge about it. However, in a study conducted by Wahner-Rhoedler, Vincent, Elkin, Loehrer, Cha & Bauer (2006), the researchers evaluated the attitudes of physicians at an academic medical center toward CAM therapies and the physician's knowledge regarding common CAM therapies. A web-based survey was e-mailed to 660 internists at Mayo Clinic in Rochester, MN, USA. Physicians were asked about their attitudes toward CAM in general and their knowledge regarding specific CAM therapies. The level of evidence a physician would require before incorporating such therapies into clinical care was also assessed. Of the 233 physicians responding to the survey, 76% has never referred a patient to a CAM practitioner. Nonetheless, 44 % stated that they would refer a patient if a CAM practitioner was available at their institution. 57% of physicians thought that incorporating CAM therapies would have a positive effect on patient satisfaction and 48% believed that offering CAM would attract more patients. Most physicians agreed that some CAM therapies hold

promise for the treatment of symptoms or diseases, but most of them were not comfortable in counseling their patients about most CAM treatments. Prospective randomized controlled trials were considered the level of evidence required by most physicians to consider incorporating CAM therapy into their practice. The researchers concluded that the study highlights the need for educational intervention and the importance of providing physicians ready access to evidence-based information regarding CAM.

In a study conducted by researchers from the department of Obstetrics and Gynecology of Harvard University (Forlow, Patel, Sen & Liu, 2008), physicians and patients were questioned regarding their attitudes toward complementary and alternative medicine in obstetrics and gynecology. Surveys were obtained from 401 Obstetrician- Gynecologist members of the American Medical Association and 483 patients. The study revealed that physicians appeared to have a more positive attitude towards CAM as compared to patients, which was surprising since according to Barnes, Powell-Griner, McFann & Nahin (2004), one of the largest subgroup of CAM users were reproductive age, educated, employed women. Also, most physicians routinely endorsed, provided, or referred patients for at least one CAM modality. Interestingly, the most commonly used CAM interventions by patients, were different from those rated highest among physicians. Furthermore, most patients did not consult with a healthcare provider prior starting CAM. It was concluded, that although obstetrics/gynecology physicians and patients have a positive attitude towards CAM, physicians and patients' views' of the most effective CAM therapies were incongruent. Researchers suggested that obstetricians/ gynecologists should routinely ask their patients about their use of CAM, with the goal of providing responsible, evidence-based advice to optimize patient care.

According to an article written by Gustav Dobbos and Iven Tao (2011) of the Department of Complementary and Integrative Medicine of the University of Duisburg, Germany; in the Western World, both physicians and patients are dissatisfied with the current practice of Western Medicine

today, with more and more patients apparently gravitating toward complementary medicine. For example, in 2005, a public opinion poll of the German Institute of Demoscopy in Allensbach revealed that only 18% of all German citizens interviewed would exclusively seek conventional medical treatment if they became ill, whereas 61% would prefer to be treated by a combination of Chinese and Western Medicine. Of those who had previously received TCM therapy, e.g. acupuncture, 89% preferred to have a combination of Western medical and acupuncture treatments. Only 7% interviewed wished to be treated exclusively by TCM methods. This study clearly indicates that patients prefer integration of both Western and alternative medicine when it comes to their healthcare.

### **Literature Review Integration**

The literature review concludes that even though the traditional Chinese medicine understanding of acupuncture is based on ancient medical theory, a modern and scientific perspective has evolved in the past three decades. Because acupuncture's impact on beta-endorphin levels, GnRH secretion, and the menstrual cycle, it is logical to assume that acupuncture may influence ovulation and fertility (Chang et al., 2002). Recent studies (Zheng et al., 2012) on the effects of acupuncture on IVF outcome show, that acupuncture can, through different mechanisms, increase the pregnancy and live birth rate in women undergoing IVF procedures. Therefore, it would be beneficial to include acupuncture in Western medical treatment protocols.

At this point, there are no studies on the integration or “use” of acupuncture in Western reproductive medicine, but studies in the field of CAM (Dobbos et al., 2011; NHIS, 2007; IOM, 2001) show that there is a high interest in the general public in receiving alternative medicine treatments, especially acupuncture, in addition to western medical treatments. To fill the gap in the literature, the current study will provide insight on the level of integration of acupuncture into Western reproductive medicine in the US. The study might also reveal reasons why reproductive endocrinologists add, or not include acupuncture to their treatment protocols.

## CHAPTER 3: METHOD

### Research Objective Restatement

The current study had the objective to assess the level of integration or “use” of acupuncture in Western reproductive medicine offices.

### Method Designation

Survey method was used to collect data for this study. Survey methodology involves the sampling of individuals from a population with a view towards making statistical inferences about the population by using a sample. A web-based survey was chosen by the researcher because it is an effective way of collecting opinions, demographics, and feedback of subjects in a straightforward and potentially low-cost manner (Greenlaw & Brown-Weltry, 2009). Because of user friendly survey tools provided by commercial companies like Survey Monkey, Zoomerang, and others, web-based surveys have become highly efficient and cost effective (Greenlaw et al., 2009).

One of the main advantages of conducting surveys on-line is reduced survey processing time needed to record, enter, and review data (Russel, Boggs, Palmer, Rosenberg, 2010). Once an invitation to participate in a survey is posted, researchers can collect the data while working on other aspects of the study. Responses to online surveys can also be available immediately to the researcher via the survey host site, which allows to conduct preliminary analysis on collected data while waiting for the desired number of responses to come in (Llieva, Baron & Healey, 2002). Another major advantage of on-line surveys is cost. Paper surveys tend to be very costly, even when using a relatively small sample size. The use of on-line surveys eliminates this problem, by reducing the need for paper, postage, printing, and data entry (Llieva et al., 2002). Several studies (Russel, Boggs, Palmer & Rosenberg, 2010; Kongsved, Basnov & Holm-Christensen, 2007; Baelter, Baelter & Fondell, 2005) revealed that web-based questionnaires have fewer skipped questions than paper versions because web questionnaires have the ability to remind participants when they have skipped a question, encouraging

a more thorough response. In the current study's questionnaire, skipped questions will trigger a pop-up reminder, but will not require the participant to answer the missed question. Web questionnaires also reduce the likelihood of coding or scanning errors, because the data is collected by the survey site. A study conducted by Greenlaw et al. (2009) showed that the use of web-based survey administration produced higher response rates than a paper survey when administered to an educated population with access to computers. Since the population in this study can be considered highly educated, the researcher expects a good response rate. A disadvantage to the online survey is that it is difficult to generate an email list of participants, because some of the targeted groups have are exceedingly protective of the email addresses of members.

### Survey Instrument

The survey instrument used in the current study was a questionnaire. Since no similar studies were conducted to this point, the researcher designed her own questionnaire. To assess the integration of acupuncture into Western Reproductive Medicine, subjects were asked if they are currently integrating acupuncture into their treatment protocols (Table 1.) Further questions asked for the gender of the subjects, their demographic location, practice setting, number of IVF cycles performed (Table 2.). Subjects were also asked about their belief of the benefits of adding acupuncture to fertility treatments, who in their office performs the acupuncture, conditions they refer to acupuncture, and reasons why respondents are not adding acupuncture to their treatment protocols.

**Table 1: Designation of Type of Research and Type of Data to Be Generated.**

Variable	Qualitative	Quantitative	Nominal	Ordinal	Interval	Ratio
<i>RE's currently integrating acupuncture into treatment protocols</i>	X		X			



**Table 2: Listing of Demographic Variables Explored and the Type of Data Generated by Each.**

Variable	Qualitative	Quantitative	Nominal	Ordinal	Interval	Ratio
<i>Gender</i>	X		X			
<i>Years in practice</i>	X			X		
<i>Location of practice</i>	X					
<i>Practice setting</i>	X					X
<i>IVF cycles performed per year</i>	X			X		
<i>Practice size</i>	X	X				

**Table 3: Listing of Practice Variables Explored and the Type of Data Generated by Each.**

Variable	Qualitative	Quantitative	Nominal	Ordinal	Interval	Ratio
<i>Benefits of acupuncture</i>	X					
<i>Where is acupuncture performed</i>	X					
<i>Who performs acupuncture</i>	X					
<i>Number of patients receiving acupuncture?</i>		X				
<i>Conditions referred to acupuncture</i>	X					
<i>Reason for not including acupuncture</i>	X					

The questionnaire included 13 questions and took about 5-10 minutes to complete. The researcher kept the questionnaire purposely short, to encourage the subjects participate in and complete the survey. Response options were based on the nature of the question (See Appendix A for questionnaire.)

### **Validity of the Survey Instrument**

According to Kaplan and Saccuzzo (2001), validity can be described as the agreement between a test score or measure and the quality it is believed to measure. It measures the gap between what a test actually measures and what it is intending to measure. This gap can be caused by two particular circumstances. First, the design of the test is insufficient for the intended purpose and second, the test is

used in a context or fashion which was not intended in the design. In the current study, the questions in the survey questionnaire were designed for the intended purpose, which is to assess the integration of Acupuncture into Western Reproductive Medicine. The questionnaire was straight forward, and unless the respondents gave false answers, it measured what it was supposed to measure. The target population was composed of highly educated medical professionals with personal integrity, so it was very unlikely for them to respond in a dishonest manner. Since the survey instrument was used in the context in which it was intended in the design, the current survey has face validity.

### **Subjects**

Purposive/Expert sampling was used to identify individuals who met the inclusion criteria.

Purposive sampling is a nonrandom technique that does not need underlying theories or a set number of informants. The researcher decides what needs to be known and sets out to find people who can, and are willing to provide the information by virtue of knowledge or experience (Bernard, 2002).

According to Tongco (2007), purposive sampling is a practical and efficient tool when used properly, and can be just as effective as, and even more efficient than, random sampling.

This sampling method was chosen because in this study, the information to be gained can only be obtained from a set of particular subjects i.e. Reproductive Endocrinologists.

The subjects were Reproductive Endocrinologists who were identified as such by publicly available information retrieved from the website of the Society for Assisted Reproductive Technology (SART). A Reproductive Endocrinologist is defined as an OB/GYN physician certified in both obstetrics and gynecology with the sub-specialty of reproductive endocrinology by the American Board of Obstetrics and Gynecology. The researcher included those Reproductive Endocrinologists in the survey that had an email address listed on the SART website. 112 email addresses were retrieved, but only 91 were valid.

## Survey Administration

This study was approved by the IRB of Yo San University (see Appendix B for approval letter.)

In September of 2012, reproductive endocrinologists were initially contacted by email to confirm the email address listed on the SART website is valid, then an email with an introductory letter and a link to the survey site was sent to the participants. The introductory letter (see Appendix C) included:

1. Information on the purpose of the study.
2. A brief introduction of the researcher, Yo San University's DAOM program, and contact information.
3. Information regarding Survey Monkey, confidentiality and security of the study
4. Instructions on how to proceed.
5. A survey link which, when clicked on will open a window directly to the survey.
6. Statement that the study was reviewed and approved by the IRB of Yo San University.

The informed consent form (see Appendix D) was embedded into the survey as the first question. It gave more details concerning the study, including more details regarding confidentiality and security. A link to Survey Monkey's confidentiality and anonymity policies was also included in the informed consent. Survey participants had the option to click “Agree” or “Disagree” to electronically sign the consent form, and continue with the survey. The survey was already posted on the Survey Monkey website before the introductory emails were sent out. The Survey Monkey link was activated for 60 days, so all participants had the opportunity to respond to the survey. Reminder emails were sent out 3 weeks after the initial survey was sent, to remind participants to complete the survey. To insure confidentiality and anonymity of the subject's survey responses, the investigator disabled the storage of email addresses on the Survey Monkey host site. Data collection procedures were completed solely online. The data were stored automatically by the host Survey Monkey, as part of a survey package purchased by the investigator. The investigator checked the survey site every couple of days to assess

the number of subjects completing the study.

### **Data Analysis**

The data generated from the completed questionnaires were compiled and analyzed using both descriptive and inferential statistics. Descriptive statistics were used to describe demographic factors pertaining to the sample. Inferential statistics included Chi square tests that examined the following factors:

- The number of male and female practitioners adding or not including acupuncture in treatments.
- The number of years in practice of practitioners and adding or not including acupuncture treatments.
- The demographic location of practitioners and adding or not including acupuncture treatments.
- The practice setting of practitioners and adding or not including acupuncture treatments.
- The number of IVF cycles performed per year by practitioners and adding or not including acupuncture in treatments.

## CHAPTER 4: RESULTS

### Chapter overview

The goal of this research study was to collect data pertaining to the integration or “use” of acupuncture in Western reproductive practices. An online survey was sent to 91 reproductive endocrinologists, and 28 responded to the survey. The participants were given the option to skip any question in the survey, therefore the number of respondents varies among the survey questions. The ensuing percentages are based on these figures. The results of the online survey are listed below.

### Survey results

Of the 28 physicians who responded to the survey, 82.1% were males and 17.9% were females (Table 4). Most respondents (42.9%) of the survey were from the Central US, followed by the East Coast (32.1%), and the West Coast (25%). The central region of the US yielded slightly more responses, possibly because more valid email addresses were available from this region, compared to the other areas (Table 5). The vast majority of respondents (89.3%) are in practice for more than 10 years. This outcome was predictable since the survey was addressed to the medical directors of the reproductive medicine offices, who are most likely the physicians with the most years in practice (Table 6).

**Table 4: Gender of Participants**

	RESPONSE PERCENT	RESPONSE COUNT
<i>Male</i>	<b>82.10%</b>	<b>23</b>
<i>Female</i>	17.90%	5

**Table 5: Region of Practice**

	RESPONSE PERCENT	RESPONSE COUNT
<i>East Coast</i>	32.10%	9
<i>Central</i>	<b>42.90%</b>	<b>12</b>
<i>West Coast</i>	25.00%	7

**Table 6: Years of Practice of Respondents**

	RESPONSE PERCENT	RESPONSE COUNT
<i>1-5 years</i>	0.00%	0
<i>6-10 years</i>	10.70%	3
<b><i>More than 10 years</i></b>	<b>89.30%</b>	<b>25</b>

74.1% of the surveyed RE's are in private practice, while 25.9% work in a medical group, and 3.7% each practice in a hospital or a university (Table 7). Most physicians (35.7%) work by themselves, while 25% have two other colleagues beside them in their office, and 14.3 percent have one additional physician in their office (Table 8). A private practice seems to be the most common setting of a reproductive medicine office.

**Table 7: Practice Setting**

	RESPONSE PERCENT	RESPONSE COUNT
<b><i>Private Practice</i></b>	<b>71.10%</b>	<b>20</b>
<i>Medical Group</i>	25.90%	7
<i>Hospital</i>	3.60%	1
<i>University</i>	3.60%	1

**Table 8: Number of Reproductive Endocrinologists Working Besides Respondents**

	RESPONSE PERCENT	RESPONSE COUNT
<b>0</b>	<b>35.70%</b>	<b>10</b>
<i>1</i>	14.30%	4
<i>2</i>	25.00%	7
<i>3</i>	10.70%	3
<i>4</i>	3.60%	1
<i>5</i>	3.60%	1
<i>6</i>	3.60%	1
<i>9</i>	3.60%	1

When asked how many IVF cycles the respondents perform per year, 35.7% answered with 101-250 cycles, followed by 28.6% who perform 50-100 cycles (Table 9).

**Table 9: Number of IVF Cycles Performed Per Year**

	RESPONSE PERCENT	RESPONSE COUNT
< 50	7.10%	2
50-100	28.60%	8
<b>101-250</b>	<b>35.70%</b>	<b>10</b>
250-1000	17.90%	5
> 1000	10.70%	3

When asked about the respondent's opinion about the benefits of adding acupuncture to fertility treatments (Table 10), most physicians believe that acupuncture lowers stress hormones (56%). This response is not surprising, because it has been well documented, that fertility causes stress (Eugster et al., 1999; Schenker et al., 1992), and stress reduction may improve female fertility (Domar et al., 1990). Furthermore, RE's believe that acupuncture can increase blood flow in the uterus, and therefore improve uterine wall thickness, a fact that has been established by research (Stener-Victorin et al., 1996). Only 12% of respondents think that acupuncture has an impact of plasma levels of the fertility hormones, or that acupuncture may increase endorphin production, leading to a regulation of GnRH release. The survey also revealed that 20% of physicians that do not add acupuncture to their treatment protocols, are not aware of the benefits of adding acupuncture to fertility treatments, or do not consider it beneficial to add. The most common condition that RE's refer to acupuncture is for pre-/post embryo transfer (78.8%), followed by pelvic pain (52.5%), and advanced maternal age (42.1%) (Table 11).

**Table 10: Benefits of Adding Acupuncture to Fertility Treatments**

	RESPONSE PERCENT	RESPONSE COUNT
<i>Increased blood flow to the uterus, and therefore improved uterine wall thickness</i>	40.00%	10
<b><i>Lower stress hormones</i></b>	<b>56.00%</b>	<b>14</b>
<i>Increase endorphin production, leading to a regulation of GnRH release</i>	12.00%	3
<i>I don't know</i>	20.00%	5
<i>I don't think it is beneficial to add acupuncture to fertility treatments</i>	20.00%	5

**Table 11: Conditions Reproductive Endocrinologists refer to Acupuncture**

	RESPONSE PERCENT	RESPONSE COUNT
<b><i>Pre-Post Embryo Transfer</i></b>	<b>78.9%%</b>	<b>15</b>
<i>Advanced Maternal Age</i>	42.10%	8
<i>PCOS</i>	15.80%	3
<i>Failure to Ovulate</i>	26.30%	5
<i>Recurrent Pregnancy Loss</i>	26.30%	5
<i>Endometriosis</i>	15.80%	3
<i>Ovarian Hyperstimulation Syndrome</i>	5.30%	1
<i>Fibroids</i>	5.30%	1
<i>Pelvic Pain</i>	52.60%	10
<i>Anxiety/Stress</i>	15.80%	3

The majority of the physicians (67.9%) are currently adding acupuncture to their fertility treatments (Table 12). Interestingly, all practitioners who have patients receiving acupuncture treatments utilize licensed acupuncturists and not other healthcare professionals to perform the acupuncture (Table 13).



**Table 12: Respondents Currently Adding Acupuncture To Treatment Plans**

	RESPONSE PERCENT	RESPONSE COUNT
<i>Yes</i>	<b>67.90%</b>	<b>19</b>
<i>No</i>	32.10%	8

**Table 13: Provider performing Acupuncture for Patients**

	RESPONSE PERCENT	RESPONSE COUNT
<i>Licensed Acupuncturist</i>	<b>100.00%</b>	<b>21</b>
<i>Nurse</i>	0.00%	0
<i>MD</i>	0.00%	0

When asked if acupuncture is performed in the RE's office or referred out, most physicians (90%) refer their patients out, and only 20% have acupuncture treatments performed in their office (Table 14). This question had the option to add a comment, and several respondents wrote that they do not necessarily recommend or refer to acupuncture, but are allowing it when the patient wishes to include it in the treatment protocol. The percentage of patients who are having acupuncture added in their treatment protocols is shown in Table 15.

**Table 14: Acupuncture performed in the Office or Referred Out**

	RESPONSE PERCENT	RESPONSE COUNT
<i>Office</i>	21.10%	4
<i>Referred out</i>	<b>78.90%</b>	<b>15</b>

**Table 15: Percentage of Patients Who Have Acupuncture Included in Their Treatments.**

	RESPONSE PERCENT	RESPONSE COUNT
4% of patients receiving acupuncture	5.60%	1
5% of patients receiving acupuncture	11.10%	2
9% of patients receiving acupuncture	5.60%	1
10% of patients receiving acupuncture	11.10%	2
15% of patients receiving acupuncture	11.10%	2
20% of patients receiving acupuncture	16.70%	3
30% of patients receiving acupuncture	5.60%	1
40% of patients receiving acupuncture	11.10%	2
50% of patients receiving acupuncture	11.10%	2
75% of patients receiving acupuncture	5.60%	1
80% of patients receiving acupuncture	5.60%	1

When asked why respondents do not include acupuncture to their treatment protocols (Table 16) 41.7% answered that they do not believe acupuncture is effective. Another 41.7% do not have enough information of the effects of acupuncture on fertility treatments. It is interesting to note, that none of the physicians do not refer to acupuncture because of cost, or have patients that do not wish to include acupuncture in their treatment protocols. Respondents had the option to a comment to this question. Some answered that patients seek acupuncture on their own rather than being referred by the RE. Other respondents answered, that they do not refer to acupuncture, but rather allow it if patients want to include it in their treatments. Several other physicians conclude that there is a lack of randomized controlled blinded trials when it comes to acupuncture research.

**Table 16: Reasons Why Acupuncture is not Added to Treatment Plans.**

	RESPONSE PERCENT	RESPONSE COUNTS
<i>I don't think acupuncture is effective</i>	41.70%	5
<i>I don't have enough information</i>	41.70%	5
<i>My patients don't want to have acupuncture treatments</i>	0.00%	0
<i>Cost for my patients may be too high to add to their treatments</i>	0.00%	0
<i>I don't know an acupuncturist to refer to</i>	8.30%	1
<i>Patients seek acupuncture on their own.</i>	8.30%	1

### Statistical Analysis

A binomial test was performed on the proportion of reproductive endocrinologists in the sample who currently add acupuncture to their treatment plans. The actual proportion, 67.9% was compared to a hypothetical proportion of 50%. The binomial test yielded a p-value of 0.87, indicating that the proportion of reproductive endocrinologists who currently add acupuncture to their treatment plans was not significantly greater or less than 50%. Although not statistically significant, the percentage shows a trend ( $p < .10$ ) towards adding acupuncture to Western medical treatment protocols in the US.

### Comparisons with the Addition of Acupuncture to the Treatment Protocol

The survey used in this study yielded tallied data regarding a number of factors that were able to be analyzed by the Chi square test. Five Chi square tests were run including the following: Whether or not practitioners added or not included acupuncture in their treatment protocols was compared to the following five factors:

1. Years in practice as reproductive endocrinologist.
2. Region of practice.

3. Practice setting.
4. Number of reproductive endocrinologists working in office beside respondent.
5. Gender of reproductive endocrinologist.

All statistical analysis were generated using IBM SPSS Statistics 20. Two-tailed tests were selected because the factors could potentially range in two directions. Fisher's Exact Tests were used for the analysis involving two by two cross-tabulations rather than Pearsons Chi Square Tests, since the expected cell counts were below 5. As shown in Table 18 the skewness value divided by the standard error of skewness (SK/SE) for the number of reproductive endocrinologists is close to 4.0, which indicates that the variable is skewed. A look at the actual frequency distribution in Table 6 reveals that over one third of the sample practice alone, while another approximate one third practice with one or two other physicians. Therefore this variable was compared to the use of acupuncture variable by creating three categories: alone, with 1-2 others, with more than 2 others. A Linear-by-Linear Association Test was used to make the comparison.

**Table 17: Number of Reproductive Endocrinologists Working in the Office and the Number of IVF Cycles Performed per Year.**

	<b>N</b>	<b>Mean</b>	<b>SD</b>	<b>Of Skewness</b>	<b>SE of Skewness</b>	<b>SK/SE</b>
<i>How many reproductive endocrinologist work in your office beside you?</i>	28	1.82	2.14	1.73	0.44	3.93
<i>How many IVF cycles do you perform per year?</i>	28	2.96	1.11	0.25	0.44	0.57

The five tables below indicate the analyses which were conducted. None of the tests yielded statistically significant results, which may be due to the small sample size.

**Table 18: Use of Acupuncture and Years in Practice**

		How many years have you been a reproductive endocrinologist?		Total	
		6-10 years	More than 10 years		
Are you currently including acupuncture to your treatment plans?	Yes	Count %	1 33.3%	18 72%	19 67.9%
	No	Count %	2 66.7%	7 28%	9 32.1%
Total		Count %	3 100.0%	25 100.0%	28 100.0%

Fisher's Exact Test  $p = .234$

Table 18 compares the years in practice of reproductive endocrinologists that add or not include acupuncture in their treatment plans. The respondents were divided in two groups, those with more than 10 years in practice, and those with 6-10 years. The Fisher's Exact test yielded a  $p$  value of 0.234, which is not statistically significant. Although not statistically significant, by looking at the percentages it seems like reproductive endocrinologists that have been in practice for more than 10 years are more likely (72%) than not (28%) to add acupuncture to their treatment plans, while most (66.7%) of their colleagues with less than 10 years of experience are not adding acupuncture. Of course, the sample size of reproductive endocrinologists with less than 10 years experience was very small.

**Table 19: Use of Acupuncture and Region of Practice**

			In what region do you practice?		Total
			East Coast/Central	West Coast	
Are you currently adding acupuncture to your treatment plans?	Yes	Count %	12 57.1%	7 100.0%	19 67.9%
	No	Count %	9 42.9%	0 .0%	9 32.1%
Total		Count %	21 100.0%	7 100.0%	28 100.0%

Fisher's Exact Test  $p = .062$

Since there were not enough cases to do a Chi square test comparing the three regions in which the reproductive endocrinologists practice, the West coast was compared to the rest of the country, since the East coast and Central US had similar results. When compared to the rest of the country, all (100%) reproductive endocrinologists questioned from the West coast are currently adding acupuncture to their treatment plans, compared to about half (57.1%) of the the rest of the country. However, the Fisher's Exact Test had an associated  $p$ -value of .062, which is not statistically significant. (Table 19).

**Table 20: Use of Acupuncture and Practice Setting**

			In what kind of office do you practice?		Total
			Private Practice	Other setting	
Are you currently adding acupuncture to your treatment plans?	Yes	Count %	15 78.9%	4 44.4%	19 67.9%
	No	Count %	4 21.1%	5 55.6%	9 32.1%
Total		Count %	19 100.0%	9 100.0%	28 100.0%

Fisher's Exact Test  $p = .083$

Table 20 compares the different office settings of RE's that add or not include acupuncture to their treatment plans. One group practices in private practice, the other group in other settings. The Chi square value of the Fisher's Exact Test yielded  $p = .083$ , which is not statistically significant. Looking at the percentage, most of the practitioners in private practice (78.9%) add acupuncture to their treatment plans, while in other settings, more than half (55.6%) do not add acupuncture.

**Table 21: Use of Acupuncture and Number of Additional RE's in the Office**

		How many reproductive endocrinologist work in your office beside you?		
		Alone	With one or two others	With more then two others
Are you currently adding acupuncture to your treatment plans?	Yes Count %	8 80.00%	7 63.6%	4 57.1%
	No Count %	2 20.0%	4 36.4%	3 42.9%
Total	Count %	10 100%	11 100.0%	7 100.0%

Linear-by-Linear Association = 1.02  $p = .312$

Table 21 compares through Linear-by-Linear Association the use of acupuncture with the number of additional reproductive endocrinologists in the respondent's office. The Linear-by-Linear Association Test generated was not statistically significant.(Linear-by-Linear Association = 1.02  $p = .312$ ).

**Table 22: Use of Acupuncture and Gender**

			Gender		Total
			Male	Female	
Are you currently adding acupuncture to your treatment plans?	Yes	Count %	14 60.9%	5 100.0%	19 67.9%
	No	Count %	9 39.1%	0 .0%	9 32.1%
Total		Count %	23 100.0%	5 100.0%	28 100.0%

Fisher's Exact Test  $p = .144$

Table 22 compares the gender of the respondents that add or do not include acupuncture to their treatment protocols. The Fisher's exact test yielded a  $p = 0.144$ , which is not statistically significant. However, looking at the numbers, all females (100%) in the sample are currently including acupuncture in their treatments, where as between half and a third (60.9%) of the men do. A final comparison was made between the current use of acupuncture and the number of IVF cycles performed per year. This comparison was done using a t-test, since the number of IVF cycles was normally distributed (see Table 18).

**Table 23: Comparison of Use of Acupuncture on Number of IVF Cycles Performed Per Year**

<i>Current Use of Acupuncture</i>	<b>N</b>	<b>Mean</b>	<b>SD</b>	<b>t</b>	<b>df</b>	<b>p-value</b>
Yes	19	3.05	1.08	0.61	26	0.55
No	9	2.78	1.2			

As shown in Table 23, the average number of IVF cycles performed per year did not differ significantly between those who reported adding acupuncture to their treatment protocols and those



who did not.

## CHAPTER 5: DISCUSSION

The purpose of this study was to evaluate the integration or “use” of acupuncture in reproductive medicine practices in the US. A link to a web-based survey was e-mailed to 91 reproductive endocrinologists (RE) who are members of the Society for Assisted Reproductive Technologies (SART). The physicians were asked about their current integration of acupuncture into their treatment plans, and their knowledge of acupuncture. The data analysis yielded no statistical significance due to small sample size, but the percentage shows a trend towards adding acupuncture to Western medical treatment protocols in the US.

Of the 28 RE's that responded to the survey, 67.9% are currently adding acupuncture to their treatment plans. The most common condition for which reproductive endocrinologists refer patients to acupuncture is pre/post embryo transfer (78.9%), followed by pelvic pain (62.5%), and advanced maternal age (50%). It seems that the responding physicians may not be aware of the benefits of acupuncture for conditions like PCOS, OHSS, recurrent pregnancy loss, and endometriosis. When asked their opinion about the benefits of adding acupuncture to fertility treatments, most physicians believe that acupuncture lowers stress hormones (56%). This response is not surprising, because it has been well documented that fertility causes stress (Eugster & Vingerhoets, 1999; Schenker, Meirow & Schenker, 1992) and stress reduction may improve female fertility (Domar, Zuttermeister & Friedman 1993). Many (40%) RE's assume that acupuncture can increase blood flow in the uterus, and therefore improve uterine wall thickness, a fact that has been established by research (Stener-Victorin et al., 1999). It is interesting to note that although the majority of reproductive endocrinologists believe that acupuncture lowers stress levels, only few (15.8%) refer patients to acupuncture for this condition.

All RE's that are currently adding acupuncture to their treatment plans are using licensed acupuncturists to perform the acupuncture. This information is positive news for acupuncturists, because in some regions of the country other healthcare providers like nurses, chiropractors, and physical therapist are also allowed to perform acupuncture treatments. Most physicians (78.9%) refer patients out for acupuncture treatment, while only few (21.1%) have it performed in the office. Around half (55.6%) of the respondents who do not add acupuncture to their treatment protocols do not consider it to be effective. Yet, 33.3% of this group do not have enough information about the effects of acupuncture on fertility treatments. It is interesting to note that none of the physicians do not integrate acupuncture because of added cost of treatment, or because patients do not wish to include acupuncture in their treatment plans. Some reproductive endocrinologists commented that there is a lack of randomized controlled blinded trials when it comes to acupuncture research, but high quality research studies do exist and are published by mainstream medical journals in the field of reproductive endocrinology (Wang et al., 2007; Zheng et al., 2012).

### **Implications for Practice**

Even though the majority of responding reproductive endocrinologists seem to currently include acupuncture to their treatment protocols, many commented that they do not necessarily refer to, or recommend acupuncture, but rather allow it when patients wish to include it in their treatments. This outcome confirms the researchers assumption that reproductive endocrinologists are reluctant to integrate acupuncture in their treatment protocols, and the trend to use acupuncture in conjunction with high tech fertility treatments appears to be patient driven. It seems that many RE's do not include acupuncture to their treatment protocols, because either they find it not effective, they do not know the effects of acupuncture on fertility treatments, or they believe there is a lack of randomized, controlled, blinded trials. Hence, it is important to find measures to demonstrate to the Western reproductive community that acupuncture can be an effective and safe adjunct to high tech fertility treatments. This

task could be accomplished by encouraging acupuncturists to participate at grand rounds in hospitals, give lectures to physicians at universities and private offices, and speak at Western reproductive medicine seminars. The researcher also believes that the acupuncture profession has to point out existing weaknesses in current research methods, and be more actively involved in acupuncture research design.

### **Limitations of the Study**

Even though this study collected valuable first data on the integration of acupuncture into Western reproductive medicine, it also has several limitations. First, as with many physicians surveys (Chan & Wong, 2004; Wahner-Rhoedler et al., 2006), the response rate was lower than anticipated. Therefore, the results of the survey need to be interpreted carefully, because physicians with strong feelings toward acupuncture (for or against it) may have been more likely to respond to the survey. Secondly, the survey is limited because only reproductive endocrinologists from one organization (SART) have participate in the survey. There are other organizations such as the American Society of Reproductive Medicine (ASRM) or the Pacific Coast Reproductive Society (PCRS) with a large number of members who could confirm the findings, or provide new insights and attitudes. Unfortunately, the organizations listed above had no publicly available email addresses, and when contacted were not willing to provide those addresses to the researcher.

### **Recommendations for Future Research**

The survey should be repeated on a larger scale to confirm or negate the trends that were revealed in the current study. It would also be useful to investigate if reproductive endocrinologists would be more likely to refer to acupuncturists who have additional training or certification in reproductive medicine. For example, a doctorate in the field of integrated reproductive medicine or a certification by the American Board of Oriental Reproductive Medicine (ABORM).

Lastly, it would be interesting to research the attitudes of RE's towards adding Chinese herbal medicine

to their treatment protocols.

### **Conclusion**

The results of the survey highlight the trend to utilize acupuncture in conjunction with fertility treatments. The majority of reproductive endocrinologists currently add acupuncture to their treatment plans, but most likely because patients wish to do so. Measures need to be taken to demonstrate to the Western reproductive community that acupuncture is an effective and safe adjunct to high tech fertility treatments.

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**APPENDIX A: Survey Instrument**

## Questionnaire

1. How long have you been a Reproductive Endocrinologist?

- less than 1 year
- 1 to 5 years
- 6 to 10 years
- more than 10 years

2. Where in the United States do you practice?

- East Coast
- Central USA
- West Coast

3. In what kind of office do you practice?

- Medical Group
- Hospital
- Private Practice
- Other Please explain: \_\_\_\_\_

4. How many Reproductive Endocrinologist work in your office, beside you?

Please fill in number: \_\_\_\_\_

5. How many IVF cycles do you perform per year?

- < 50
- 50-100
- 101-250
- 251-1000
- > 1000

6. What do you think are the benefits of adding Acupuncture to fertility treatments? Please check all that apply.

- Increased blood flow to the uterus, and therefore improved uterine wall thickness
- Impact on plasma levels of the fertility hormones FSH, LH, E2, P
- Lower stress hormones responsible for fertility
- Increased endorphin production, leading to a regulation of GnRH release
- Other, please explain: \_\_\_\_\_
- I don't know
- I don't think it is beneficial to add Acupuncture to fertility treatments

7. Are you currently adding Acupuncture to your treatment plans, either in your office or elsewhere?

- Yes            If yes, please continue
- No             If no please skip to question 12.

8. If yes, is Acupuncture performed in your office or do you refer out?

- Office
- Refer out
- Other, Please explain: \_\_\_\_\_

9.. If in your office, who performs Acupuncture?

- Licensed Acupuncturist
- Nurse
- MD
- Other
- Please explain: \_\_\_\_\_

10. How many of your patients have Acupuncture included in their treatment plans?

- less than 5% of patients
- 6% to 10% of patients
- 11% to 25% of patients
- 26% to 50% of patients
- 51% to 75% of patients
- 76% to 95% of patients
- more than 95% of patients

11. What are some of the conditions you refer to Acupuncture? Please check all that apply.

- Polycystic Ovarian Syndrome
- Recurrent Pregnancy Loss
- Ovarian Hyperstimulation Syndrome
- Endometriosis
- Fibroids
- Pain
- Advanced Maternal Age
- Premature Ovarian Failure
- Failure to Ovulate
- Pre-/Post Embryo Transfer
- Other Please explain: \_\_\_\_\_

12. If you do NOT add Acupuncture to your treatment protocols, why not? Please check all that not apply.

- I do not think Acupuncture is effective
- I do not have enough information about the effects of Acupuncture
- My patients do not want to include Acupuncture as a treatment option.
- Cost for my patients may be too much to add Acupuncture to their treatments
- I do not know an Acupuncturist to refer to
- Other, Please explain: \_\_\_\_\_

13. What would change your mind to consider integrating Acupuncture into your fertility treatments?

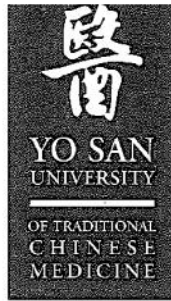
Please explain: \_\_\_\_\_

14. Are you male or female?

- Male
- Female

**APPENDIX B: IRB approval letter**





Sabine Theurer-Barajas  
P.O. Box 766  
Ducor, CA 93218

July 30, 2012

Dear Sabine,

This letter is to officially notify you of the approval of your research project by the YSU Institutional Review Board (IRB).

You are authorized to implement this study as of **July 30, 2012**.

Please keep in mind that all research activities must be conducted in full accordance with all application sections of the IRB Guidelines, and you should notify the IRB immediately of any proposed changes that may affect or alter your approval status. You should also report any unanticipated problems involving risks to participants and others to the IRB.

Please contact me if you have any questions.

Sincerely,

A handwritten signature in black ink, appearing to read 'Lawrence Lau'.

Lawrence Lau, MD, MSOM, L.Ac  
Yo San University of Traditional Chinese Medicine  
On behalf of the YSU IRB Committee

Tel: 310.577.3000 ext 14  
Fax: 310.577.3033  
[lau@yosan.edu](mailto:lau@yosan.edu)

**APPENDIX C: Introduction Letter**

Dear Dr. \_\_\_\_\_,

My name is Sabine Theurer-Barajas, and I am a licensed Acupuncturist in the state of California. I am also currently a doctoral candidate, at Yo San University's Reproductive Medicine DAOM program. This program focuses on the integration of Traditional Chinese Medicine into modern Biomedicine. As part of the program, I am required to conduct original research in the field of TCM and fertility. For my research project, I am conducting a survey to assess the integration of Acupuncture into Western Reproductive Medicine.

You have been selected to participate in this survey, because you are listed on the SART website as a Reproductive Endocrinologist. By participating in this survey, you will be an important component of this research. The data collected in the study might provide a first insight in how widespread the use of Acupuncture is in the field of Western Reproductive Medicine in the USA. The outcome of this survey will be presented at the annual conference of the Pacific Coast Reproductive Society in Palm Springs, California, in April of 2013.

The survey will be very brief, and will not take more than 5 minutes to complete. The survey will be conducted on the online survey website Survey Monkey. There you will find an online informed consent form, as well as a questionnaire. To ensure confidentiality and anonymity, no personal information such as name, address, SSN, or income level will be asked in the survey. Also, the researcher will disable the storage of email address and disable IP address collection on the host site Survey Monkey, so they will be collected anonymous, and cannot be retrieved or linked to responses.

This study has been reviewed, and approved by the IRB of Yo San University.

If you agree to participate, please read the steps below and proceed as follow:

Read the electronic informed consent form by clicking the link below.  
 Proceed to the questionnaire. If you feel uncomfortable with any question, feel free to skip the question.  
 Submit the completed survey, by clicking the submit button.

<https://www.surveymonkey.com/s/3DGCJFH>

Thank you very much for participating in this survey. Your time and opinion are very appreciated.  
 Please feel free to contact me, if you have questions or concerns.

Sincerely,

Sabine Theurer-Barajas, MSOM, L.Ac.  
 (661) 472-0367

[sktheurer@yahoo.com](mailto:sktheurer@yahoo.com)

Sabine Theurer-Barajas  
 P.O. Box 766  
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Carola Gehrke  
 13315 West Washington Blvd.  
 Los Angeles, CA 90066

**APPENDIX D: Informed Consent**

## **Informed Consent**

### **Purpose of the study**

The purpose of the study is to assess the level of integration of acupuncture into Western Reproductive Medicine. This study is being conducted by Sabine Theurer-Barajas, L.Ac., a Doctoral student of Yosan University of Traditional Chinese Medicine in Los Angeles. The advisor is Carola Gehrke, PhD, Director of the Doctoral Program.

### **Procedure**

You are being asked to complete a survey, which will take about 5 minutes to complete. The survey includes questions about your medical practice and acupuncture.

### **Risk or discomforts**

No risks or discomforts are anticipated from taking this survey. If you feel uncomfortable with a question, you can skip that question, or withdraw from the survey altogether.

### **Confidentiality**

The study will be conducted online utilizing Survey Monkey, it will not contain information that will personally identify you. The principal investigator will disable the storage of email addresses, and disable the collection of IP addresses on the survey monkey website, to ensure your anonymity. For more information on Survey Monkey please go to <http://help.surveymonkey.com/app/answers/detail/a-id/3950/kw/>. Only the principal investigator will have access to the summary of the responses on survey monkey, to view and evaluate the progress of the data collection. All data is stored in a password protected electronic format.

### **Decision to quit at any time**

Your participation is voluntary. You are free to withdraw your participation from this study at any time. If you don't want to continue, you can simply leave the website. If you do not click on the submit button at the end of the survey, your answer and participation will not be recorded. You also may choose to skip any questions that you do not wish to answer.

### **How the findings will be used**

The results of the study will be used for scholarly purposes only. Findings might be presented in educational settings and at professional conferences, and might be published in a professional journal in the field of acupuncture.

**Contact information**

If you have questions or concerns about this study, please contact Sabine Theurer-Barajas at [sktheurer@yahoo.com](mailto:sktheurer@yahoo.com) or 661-472-0367 or Carola Gehrke, PhD., Director of Doctoral Program at Yo San University, Los Angeles. 310-577-3000 email: [cgehrke@yosan.edu](mailto:cgehrke@yosan.edu). This study has been reviewed, and approved by the IRB of Yo San University.

**By beginning the survey, you acknowledge that you have read this information and agree to participate in this research, with the knowledge that you are free to withdraw your participation at any time without penalty.**