

# The Acupuncture Treatment of Female Infertility with Particular Reference to Egg Quality and Endometrial Receptiveness

## Abstract

Patients undergoing fertility treatment often believe that all that matters when trying to conceive is the number of eggs they have. However, it is actually the quality of these eggs that determines whether an embryo is able to reach the blastocyst stage, implant and continue to develop into a healthy baby. Egg quality is affected by ovarian function and the state of the reproductive environment - for instance the harmonious functioning of the hypothalamus-pituitary-ovarian axis - as well as lifestyle factors and the age of the patient. Tubal or immune factors may further impair a women's chance to conceive. From the Chinese medical perspective the primary gynaecological functions are governed by the Kidney jing, Liver and Spleen. This paper describes the underlying mechanisms of female fertility from a Western as well as a Chinese medicine perspective, and gives acupuncture treatment protocols that can be modified to the patient's individual Chinese medicine diagnosis, to enhance the reproductive environment to create optimal conditions for fertilisation, maternal endometrial receptivity and a subsequent healthy pregnancy.

## Introduction

Many female patients undergoing fertility treatment believe that all that matters when trying to conceive is the number of eggs they have. However, arguably more important than this is the quality of these eggs, and whether they are able to develop into embryos once fertilised. When helping a couple to conceive with acupuncture it is essential to understand how to support a woman's eggs to develop to their best possible quality, so that once fertilised by healthy sperm they develop into healthy embryos. In order for an egg to develop properly the incidence of chromosomal abnormalities needs to be reduced as much as possible. Only when egg quality is good will the embryo be able to develop to the blastocyst stage, implant in the uterus and develop into a healthy baby. Egg quality is affected by ovarian function, lifestyle, ageing and the general state of the reproductive environment.

The age-related decline of female fertility varies between women and is thought to be determined by several genes interacting with environmental factors, though a mean age of 40 to 41 years at which female fertility comes to an end and sterility starts has been found to be universal (te Velde & Pearson, 2002). This age-related decline involves two components: a decreased probability of conception and an increased probability that a pregnancy will terminate (te Velde et al., 2002). Thus it is not just whether an embryo can properly implant that makes a pregnancy successful

but also its continuing ability to grow and divide. If the underlying mechanisms of these processes are understood from both Western and Chinese medical perspectives, imbalances that prevent healthy conception can be regulated and couples helped to achieve a pregnancy even in their early- to mid-forties.

## Basic theory

In Chinese medicine we refer to the quality and vitality of the ovarian follicles and oocytes in terms of Kidney jing (essence). The Kidney is the reservoir of prenatal or inherited jing and yuan (original) qi, the quality of which determines our basic constitution or genetic predisposition, and contributes to our fertility. Kidney jing is regarded as the source of tian gui, which is present from birth but only manifests with sexual maturity. According to the first chapter of the *Huang Di Nei Jing Su Wen (Yellow Emperor's Inner Classic Simple Questions)*, when a girl reaches puberty her tian gui ripens, filling the Penetrating vessel (chong mai) with blood and the Conception vessel (ren mai) with qi so that her periods start and she will be able to conceive until the age of 49. Tian gui (and hence Kidney jing) is thus responsible for regulating sexual function and governs the menstrual cycle, conception, pregnancy and menopause.

From a Chinese medical perspective the female reproductive processes are primarily governed by the Kidney, Liver and Spleen. Kidney jing is the foundation for both Kidney yin and yang, and Kidney yin is the basis for jing shui (menstrual

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water), which is produced with the assistance of the Liver, Spleen and Heart. Hence menstrual blood is not produced in the same way as regular blood, but from prenatal jing stored in the Kidney, and therefore the quality of Kidney yin is reflected in the monthly secretion of menstrual blood. When Kidney yin is deficient women typically have a thin and poorly-nourished endometrium in which an embryo is unlikely to thrive. Kidney yin can be compared to the effects of the hormones that stimulate follicular development, and its deficiency is associated with low ovarian reserve, slow follicle development, insufficient oestrogen production, fluctuating FSH levels and low anti-müllerian hormone levels. In contrast, Kidney yang provides warmth within the womb during the post-ovulation phase, which can be compared with the effects of progesterone produced by the corpus luteum. Kidney yang also provides movement that regulates fluid metabolism, including the flow of secretions in the fallopian tubes. Deficiency of Kidney yang can cause fluids to build up, leading to blockage of the fallopian tubes from damp-phlegm accumulation. Kidney yang also ensures transportation and nourishment of the egg within the tubes and the subsequent 'holding' of the embryo within the uterus after implantation.

The Liver is closely associated with the menstrual cycle and with emotional and hormonal responses. The harmonious movement of Liver qi is essential for menstruation, especially in terms of moving the blood that is discharged during menstruation. Women's physiology is said to be determined by blood, and the state of a woman's fertility can be judged by assessing her monthly menstruation. The Liver stores blood and ensures that the Penetrating vessel and uterus are filled with blood in preparation for fertilisation of the egg and implantation. During ovulation Liver qi facilitates the movement of the egg from the ovary down the fallopian tube to the uterus. Should fertilisation not occur the Penetrating vessel is emptied (during the period) and then refilled again ready for the next cycle. If Liver qi is stagnant it can lead to delayed ovulation and the egg being over-ripe by the time it is released. In such cases if the egg is fertilised there is an increased risk of chromosomal abnormality and miscarriage.

The Spleen is the origin of postnatal jing, which is transformed from ingested food and then utilised by the Kidney. If the Spleen qi is strong the Kidney

jing will be protected, but if it is weak prenatal jing will be excessively consumed. The Spleen also produces the blood that is subsequently stored in the Liver, and prevents excessive loss of blood through menstruation and prolapse of the internal organs (such as the uterus).

In the *Huang Di Nei Jing Su Wen* the uterus is referred to as *nu zi bao* ('woman's protective cover'). Anatomically speaking, the uterus corresponds to the *dan tian* - that is, the area of the body that is closely related to the fundamental vital processes in the body and the place where the Conception vessel, Penetrating vessel and Governing vessel (*du mai*) begin. Physiologically the uterus is regarded as one of the six extraordinary organs because it fulfils yin functions (blood storage and nourishing the embryo) as well as yang functions (menstruation and childbirth). The uterus is linked to the Kidney via the *bao luo* (uterine network vessel), through which Kidney jing initiates the monthly flow of blood. Kidney qi in turn regulates the closing of the uterus after menstruation or fertilisation. Weak Kidney qi can therefore cause miscarriages, inter-menstrual bleeding and post-menstrual spotting.

We should remember that the body is an organic whole, and therefore all of the internal organs have a role to play in conception. The Heart is connected to the uterus via the *bao mai* (uterine vessel) and influences the downward flow of menstrual blood, a process that is particularly influenced by emotional factors. The Heart also opens the uterus during ovulation and sexual intercourse. Any stagnation in the Heart - usually caused by emotional stress - can prevent the egg or sperm from entering the uterus. The Lung produces qi from the air we breathe and supplies the Kidney with qi. Therefore we should not only assess the function of the Liver, Spleen and Kidney during infertility treatment, but also the patient's general state of health to see if there are any underlying problems that may indirectly cause malfunction of the reproductive system.

From a Western medical perspective, it is during embryonic development of the female that a lifetime stock of oocytes and ovarian follicles is formed (similar to the idea that prenatal jing is inherited from our parents and fixed at birth). It is understood that most follicles from this lifetime stock of primordial follicles that progress to the antral stage undergo atresia (a hormonally-controlled process of cell death). A small number of antral follicles are influenced by follicle-stimulating hormone (FSH) to continue their growth. Normally one antral follicle develops into a Graafian follicle during the follicular phase of each menstrual cycle in preparation for ovulation and the release of the mature oocyte. After its rupture

the follicle undergoes transformation to become the corpus luteum (McGee & Hsueh, 2000). This process of egg maturation is heavily influenced by endocrine factors, and it is the hormonal feedback between the dominant follicle and the hypothalamus and pituitary glands that maintains the regular pattern of the adult menstrual cycle (O'Connor et al., 2001).

Hormonal secretion and follicular maturation can be positively or negatively influenced by factors such as diet, exercise, stress and depression. For example, a diet rich in soya protein has been found to suppress FSH levels in premenopausal women (Cassidy et al., 1994), and unstable blood sugar levels at the time of ovulation and conception can increase the risk of chromosomal or developmental abnormalities in the embryos of pregnant diabetic women (Moley et al., 1998). Disturbances in hormone levels affect fertility, and so the harmonious interplay of the hypothalamus-pituitary-ovarian axis is vital for good egg quality and optimum fertility. For example, an increase in serum FSH and a decrease in circulating inhibins can cause an accelerated rate of loss of follicles and a subsequent reduction in time until the onset of menopause (McGee et al., 2000).

### Implantation

Embryo implantation is a complex process and remains little-understood. It involves a series of phases in which the embryo develops to the blastocyst stage, orientates towards the uterine epithelium, emerges from the zona pellucida (hatches) and finally attaches and invades the epithelial lining. During this process the blastocyst and maternal cells engage in a complex molecular dialogue involving various cytokines, growth factors and cell adhesion proteins, until the embryo becomes completely embedded in the maternal endometrium at around eight days after ovulation. Exactly how implantation is regulated and brought about remains unknown, although responsibility for failed implantation is likely to be shared between both embryo and endometrium (Bischof & Campana 1996; Carson et al., 2000)

It is understood that failure of the embryo to successfully implant is usually caused by genetic abnormalities in the embryo. Chromosomal abnormalities have been found in more than 20 per cent of couples experiencing recurrent miscarriage (Rubio et al., 2003). More recent evidence suggests that the energy required for an egg to divide and implant after fertilisation is provided by oocyte mitochondria, which also carry a small DNA strand - separate from nuclear DNA - that is passed on from mother to child. Older women's eggs have more mitochondrial DNA mutations, which can be responsible for the poor implantation and chromosomal abnormalities

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that occur more often in this group (Bartmann et al., 2004; Wilding et al., 2005). In their study involving 2057 patients undergoing IVF/ICSI cycles, Abdalla et al. (2004) found that fertilisation rates were affected neither by increased basal FSH levels nor increased age of the women. They did, however, find that miscarriage rates were affected by increased age which, they point out, may be associated with age-related changes in the oocyte chromosomes. From a Chinese medicine perspective the function of oocyte mitochondria described above might be compared to the role of Kidney or yuán qì. Acupuncture points which invigorate Kidney yáng can therefore be used to protect cells from damage and maintain the function of their mitochondria. That acupuncture can affect mitochondria has been demonstrated by Gao et al., (2005) in their study on the effects of acupuncture on the mitochondria of skeletal muscle cells.

Implantation problems may also result from poor blood circulation, which may be caused by trauma, recurrent miscarriages,<sup>1</sup> increased natural killer cells, mechanical obstruction of the reproductive system<sup>2</sup> or abnormal blood clot formation. Blood-clotting disorders can be a result of smoking, plaque inside the arteries (atherosclerosis) and even pregnancy.<sup>3</sup> Although women with a genetic or immune clotting disorder - such as factor V Leiden or prothrombin mutations - can have normal pregnancies, they are particularly prone to recurrent miscarriages, and have an increased risk of pregnancy complications such as placental abruption, pregnancy-induced high blood pressure and slow foetal growth.

### Tubal problems

Sometimes a woman may be unable to conceive because the route between the ovary and the uterus is obstructed. The ovary may be covered with adhesions and/or scar tissue that blocks mature eggs from entering the pelvic cavity, or the fallopian tube may be narrowed or otherwise obstructed. Normally the inner lining of the fallopian tubes is coated with small projections called cilia, which help to transport the egg from the ovary into the uterus. If these cilia are damaged transportation of the egg becomes disrupted. This may cause a fertilised egg to implant within the partially-obstructed fallopian tube, resulting in an ectopic pregnancy, or may prevent the passage of the egg to the uterus causing infertility. Blockages such as these may be caused by congenital defects, but are more commonly a result of scarring from past inflammation or infections such as pelvic

inflammatory disease (PID), bladder infections, or surgical procedures such as abortion or caesarean-section. PID is a serious disease that can destroy a woman's fertility without warning. It is usually the result of a bacterial infection that enters the body through the vagina and cervix and spreads throughout the pelvic cavity, affecting the ovaries, fallopian tubes, uterus and cervix. These bacteria are commonly sexually-transmitted (such as chlamydia), but may also result from using an inter-uterine device (IUD), complications from earlier pregnancy or infection following surgery of the reproductive tract. The presence of bacterial vaginosis in early pregnancy has been associated with late miscarriage and pre-term delivery (Hay et al., 1994). The fallopian tubes can also be attacked by opportunistic bacteria coming from the uterus that generate either inflammation (salpingitis), fluid accumulation (hydrosalpinx) or pus (pyosalpinx) that block the passage of the egg to the uterus. In such cases a woman's hormone levels may be normal. Western medical treatment of this condition usually involves surgery or IVF treatment. In Chinese medicine terms such infections usually involve damp-heat with underlying blood stasis.

### Immune factors

Maternal anti-sperm antibodies can inhibit sperm from reaching the egg and thereby prevent fertilisation, whilst other immune markers are associated with an immune reaction to an implanting embryo. Immunological fertility problems can manifest as premature menopause, raised natural killer cells and raised lupus anticoagulant or other clotting factors. In Chinese medical terms the main local pathology in cases of immune infertility usually involves damp-heat and blood stasis, whilst the main systemic mechanism usually involves Liver and Kidney yin deficiency generating toxic heat, which burns the jing and interferes with the Penetrating and Conception vessel functions of regulating qi and blood. Such pathology may not only affect the functioning of the ovaries, but is also likely to impair implantation. Chinese medicine treatment in such cases would focus on clearing heat and relieving stasis to restore normal conditions for implantation to occur.

### Pattern differentiation

The following Chinese medicine patterns should be considered in cases of infertility:

#### Excess patterns

##### *Blood stasis*

Blood stasis is a very common cause of infertility and is commonly seen in patients who have a history of previous surgical procedures, endometriosis, polycystic ovaries, ovarian cysts, amenorrhoea, tubal problems, miscarriage and ectopic pregnancy. Blood stasis impedes

conception because it obstructs the normal flow of blood in the reproductive system, and particularly the uterus. This affects the normal functioning of the Conception and Penetrating vessel. Because blood flow is inhibited, menstruation may become scanty, delayed, irregular (with spotting), or else stop altogether (amenorrhoea). Menstrual bleeding may also become profuse and irregular, as the blood can no longer be contained in the blocked channels. Blood stasis causes the blood to thicken and therefore the menstrual blood will be dark and clotted. The pain is experienced as localised stabbing and is typically worse with pressure but relieved after discharge of clots. Blood stasis is a particularly important consideration as ovulation approaches, because the Penetrating vessel must be full of blood for conception to occur. If a temperature chart is used the BBT will not show a drop on day one of the cycle but instead will remain elevated. The tongue will be dark-red with purplish spots, and the sublingual veins will be prominent and purple-bluish - the result of poor blood circulation leaving the blood cells less oxygenated. The pulse is typically choppy. In severe cases blood stasis may manifest as lumps or masses in the abdomen, which may be associated with a feeling of heat. Blood stasis can be caused by stagnation of qi, deficiency of qi and blood, blood heat, or may be a result of trauma such as surgery.

##### *Damp-heat*

Patients with damp-heat often present with a history of PID, chlamydia, recurrent cystitis or urinary tract infections, endometriosis, tubal infertility, miscarriage or ectopic pregnancy. As described above damp-heat often develops as a result of infection, inflammation or trauma. However, damp-heat can also be caused by an unhealthy diet that includes heavy alcohol intake, too much spicy food or too many iced drinks. If Stomach qi and fluids are adversely affected by these factors transformation and transportation is impaired, digestion slows down and excess fluids overload the lower part of body causing it to feel heavy. This dampness combines with heat and obstructs the lower abdomen, and may generate blood stasis manifesting as painful periods, and abdominal pain. There may be and unpleasant-smelling, yellow, sticky vaginal discharge that may be accompanied by itching. There may also be low-grade greasy-yellow sweating throughout the day which stains the clothes. The tongue will have a yellow, greasy coating and the pulse will be slippery and rapid.

##### *Liver qi stagnation*

Liver qi stagnation is a prevalent cause of infertility in modern society and is commonly associated with cases of unexplained infertility, hormonal imbalance and irregular menstruation. When qi stagnation is prolonged blood flow becomes restricted, leading to endometriosis, ovarian cysts, tubal problems, miscarriage and ectopic pregnancy.

It is characterised by a feeling of oppression in the chest or hypochondriac region - a result of the blocked qi flow - and is most commonly caused by long-term emotional strain. Sighing typically helps to release stagnant qi from the chest. Because Liver qi is responsible for the free flow of qi and blood, it has an important influence on menstruation, especially during the pre-menstrual phase. If Liver qi is stagnant it causes pre-menstrual tension, breast distension, irregular menstruation, small blood clots and there may be headaches that appear in relation to the menstrual cycle. The cycle becomes irregular because Liver qi stagnation obstructs the free flow of qi and blood, thus delaying menstruation; with the onset of the period the stagnation is eased, but because qi stagnation tends to generate heat, the period often arrives early during the next cycle. Ovulation is very dependent on free qi flow because it involves movement and change, and such irregularities indicate that ovarian function has been compromised. The temperature chart in such cases often shows a BBT above 36.6 degrees Celsius during the follicular phase and a saw tooth pattern throughout. The tongue may be normal or slightly red (if qi stagnation has generated heat), and the pulse will be characteristically wiry.

#### *Phlegm-dampness*

Phlegm-dampness tends to be associated with conditions such as polycystic ovaries, endometriosis, tubal problems and miscarriage. Because dampness is heavy in nature it tends to seep downwards, causing symptoms in the lower body. Phlegm-dampness is sticky and turbid and is often reflected in a 'muddy' vaginal discharge. Obstruction by dampness can cause menstrual symptoms such as delayed menstruation, amenorrhoea, vaginal discharge or tissue in the menstrual blood (as phlegm-dampness obstructs blood flow and causes it to thicken). Dampness also interferes with fluid absorption and stool formation in the intestines causing loose sticky stools accompanied by mucous, whilst in the bladder it causes urinary difficulty and cloudy urine. The heavy nature of dampness causes a sensation of being weighed down. Patients with this pattern often find it difficult to get up in the morning and generally feel tired, but may feel better and have more energy as the day goes on. In contrast, phlegm shows up as obstruction in the middle and upper aspects of the body, for example a feeling of obstruction in the throat, a dazed mind or a heavy head. Phlegm-dampness causes a feeling of nausea because it obstructs the digestive system, preventing Stomach qi from descending. When the phlegm-dampness accumulates in the skin or muscles it gives rise to oily skin, swelling, oedema, obesity or the formation of cysts. The tongue will have a characteristically greasy coating and the pulse will be slippery or soggy.

#### *Cold in the uterus*

Cold in the uterus can cause difficulty conceiving or complications during pregnancy. It is mostly associated with a history of miscarriage, stillbirth or polycystic ovaries. Cold invades, constricts and slows down blood flow causing blood stasis in the channels and uterus. The menstrual flow will not be smooth and the blood may be dark and clotted, accompanied by a feeling of cold. Menstrual pain is typically relieved by warmth because warmth temporarily aids the flow of blood. External cold often combines with dampness to exacerbate blood stasis. After a prolonged period the cold will damage yang, inducing a deficient cold pattern (discussed below). The clinical manifestations in both patterns are similar, although with excess cold the signs and symptoms have an acute onset, the pain will be more severe, the pulse will be full and tight and the tongue will have a thick white coating.

#### *Blood heat*

Heat in the blood typically appears in patients who present with peri-menopausal signs accompanied by short menstrual cycles and raised FSH levels, and who have a poor response to IVF stimulation drugs. Symptoms and signs depend on the organs involved. If the Heart blood has heat it will agitate the mind causing anxiety and mental restlessness. When Liver blood has heat there will be red and itchy skin rashes. Blood heat affecting the uterus and Penetrating vessel causes 'overflow' of blood from the vessel, manifesting as heavy premature bleeding and a feeling of heat in the genital region during menstruation. Blood heat is not conducive to the development of good quality eggs or endometrium, and thus hampers fertilisation and implantation. Because heat in the blood accelerates the flow of blood and dries fluids, the pulse will be rapid or fine.

### **Deficient patterns**

#### *Kidney yin deficiency*

Kidney yin deficiency is associated with low ovarian reserve, slow follicle development, sluggish oestrogen production, fluctuating FSH levels, overactive thyroid and low anti-müllerian hormone levels. This is commonly seen in patients who present with signs and symptoms of peri-menopause, early menopause, premature ovarian failure, fluctuating hormone levels, amenorrhoea, delayed ovulation / long cycles and miscarriages caused by uncontrolled diabetes. Because the Kidney is the 'lower source of water', Kidney yin deficiency typically manifests with signs and symptoms of dryness such as dry skin and mucous membranes, lack of tongue coating, dry throat, thirst, constipation and scanty and dark urination. Yin is substantial and nourishes the body, and therefore yin deficiency often involves low body weight. Deficient

Kidney yin often results in delayed periods, because the follicle requires a longer period of time to receive sufficient nourishment to reach maturity. The BBT chart will reflect this with an extended follicular phase that lasts longer than the normal 14 days. Menstrual bleeding is typically light, bright-red and infrequent. There may also be amenorrhoea, as yin is the precursor to blood. Hence women with yin deficiency typically have a thin and poorly-nourished endometrium that does not enable an embryo to thrive. An endometrial lining that has not developed properly may also cause mid-cycle bleeding.

Severe Kidney yin deficiency will give rise to deficient heat, which may further dry up yin fluids. The lack of yin can no longer root yang, which rises upwards causing sensations of heat and flushing of the cheekbones. This heat typically interferes with the functioning of the ovaries, causing disturbed follicle maturation and raised FSH levels. Such patients may also present with a BBT above 36.6 degrees Celsius during the follicular phase. If fertilisation occurs, the deficient heat may cause miscarriage during the early stages of pregnancy, as it dries the endometrium and forces blood from the uterine blood vessels. Many cases of premature menopause fall into this category. Patients typically present with night sweats because yin dominates at night and the deficient heat generates evaporation of yin fluids. Yin essence is lost in the sweat which further aggravates the yin deficiency. There may also be restlessness or insomnia characterised by waking in the early hours of the morning, because the heat disturbs the mind.

If Kidney jing is deficient it will not produce enough yin to fill the marrow and nourish the brain, causing slight dizziness and low-pitched tinnitus. Kidney jing supports the creation of bone marrow and protein in the blood. Hence when Kidney essence is deficient neither the bones nor the hair are nourished, causing lower back ache, weak knees, loss of teeth and thinning or loss of hair. Kidney jing also controls the pelvic floor, urinary tract and reproductive organs (because Kidney qi emerges from jing). When weakened, there may be night-time incontinence or spermatorrhoea. When jing fails to nourish the blood menstruation will be scant, light-coloured and delayed, or there may even be amenorrhoea. Jing deficiency can lead to ovarian insufficiency and a reduced likelihood that eggs will mature properly. Kidney jing deficiency is also a congenital cause of primary amenorrhoea (in which case the tian gui is deemed to have never arrived).

### **Kidney yang deficiency**

Patients with Kidney yang deficiency commonly present with functional tube blockage, low progesterone levels, hypothyroidism and decreased oocyte quality.<sup>4</sup> Kidney yin and yang are intimately connected, so that deficiency of one will ultimately weaken the other. If Kidney yang deficiency is predominant there will be internal cold

symptoms that are typically relieved by the application of heat. This is because Kidney fire is too weak to warm the body, which causes aversion to cold and a feeling of cold especially in the lower jiao, feet, knees and lower back. As Kidney yang is involved in fluid metabolism, its deficiency will lead to fluid accumulation, manifesting as puffiness and oedema, especially in the legs. There may also be watery vaginal discharge and frequent clear urination. Deficiency of yang can lead to the fallopian tubes being blocked by fluids. Transportation and nourishment of the egg within the tubes may also be compromised, because yang is too weak to provide movement. This lack of movement is often at the root of a reduction in growth of the dominant follicle and a longer follicular phase. Moreover Kidney yang is important to maintain warmth within the womb during the post-ovulatory phase and hold the embryo firmly within the uterus. If deficient Kidney yang fails to warm the jing there will be lack of libido and premature greying of the hair. If yang deficiency leads to deficient cold there will be dull menstrual pain accompanied by cold sensations and weak blood flow with dark clots, because the deficient yang is too weak to move the blood. Characteristically the BBT values will be low, especially during the luteal phase. If this pattern is involved in early menopause, the hot flushes will only be mild but instead there will be lack of libido and feeling cold. The tongue will be pale, swollen and wet, and the pulse deep and slow.

### **Blood and qi deficiency**

Women's physiology is said to be governed by blood. Blood is the source of female fertility and is clearly visible during menstruation. Women with blood deficiency may present with amenorrhoea, low oestradiol levels or a history of miscarriages. The function of blood in Chinese medicine is to nourish and moisten the body. Blood deficiency does not mean an actual lack of blood but a lack of nourishment that affects all aspects of the body, leading to signs and symptoms such as dry skin, brittle nails, lustreless dull hair, pale complexion, pale tongue and weak pulse. Blood deficiency can also cause insufficient nourishment of the endometrium. Hence the endometrium will be thin and not conducive to effective implantation or healthy pregnancy. If there is also pronounced qi deficiency the foetus may not thrive and the uterus may not be strong enough to hold the foetus, which can cause problems such as miscarriage after about 14 to 15 weeks of pregnancy. Blood also nourishes and stabilises the mind. When blood and qi are deficient there can be uneasiness, anxiety or disturbed sleep. If insufficient blood is produced to fill the Penetrating vessel the menstrual period may be delayed, starting after 32 days or later. Periods will be light, with pale pink or watery and brownish blood. Because blood holds qi, a deficiency of one can affect the other and both tend to become more deficient during and menstruation,

leading to tiredness and dull. Dizziness and light headaches may also be aggravated at this time.

## Acupuncture treatment

Numerous studies show that acupuncture can successfully stimulate ovulation and normalise dysfunction of the hypothalamus-pituitary-ovarian axis in patients with anovulation disorder, as well as optimising endometrial receptivity by increasing uterine and ovarian blood flow, and treating endocrine dysfunctional infertility (Chen, 1997; Ying & Jin, 1990, Mo et al., 1993, Stener-Victorin & Humaidan, 2006). The underlying mechanisms of how or why acupuncture exerts its effects on the reproductive system are unknown. Hypotheses include regulating the function of the hypothalamus-pituitary-ovarian axis via the central nervous system (Ying & Jin, 1990) and thereby normalising endocrine disturbances (Chen, 1997; Mo et al., 1993), as well as benefitting uterine and ovarian blood flow (Stener-Victorin et al., 2006). Scientists at Cornell Medical Centre report that the fertility-boosting effects of acupuncture may be a result of increased blood flow to the uterus (causing increased endometrial thickness), increased endorphin production, lower stress hormones and normalisation of the hypothalamic-pituitary-ovarian axis (Robinson & Hickenbottom, 2003). From a Chinese medical point of view acupuncture is effective for infertility because it corrects imbalance between yin and yang, clears obstruction and increases the circulation of qi and blood within the abdominal environment thus enhancing uterine receptivity and the mother-foetus relationship. Whether acupuncture increases the quality of the ovum or the endometrium is unknown, but studies have shown that acupuncture applied at the time of egg retrieval and embryo transfer during IVF result in significantly higher pregnancy rates (Paulus et al., 2002; Stener-Victorin et al., 1999).

The primary principles of fertility treatment with acupuncture are to harmonise the function of the internal organs, clear obstructions and improve the qi and blood supply within the abdominal environment in order to improve egg quality and the receptiveness of the endometrium. The time it takes for acupuncture to have an effect will vary depending on the constitution of the individual and any associated pathology. It must be remembered, however, that the development of an oocyte from primordial follicle to mature egg takes at least eight menstrual cycles (McGee et al., 2000). This needs to be considered and explained to any patient who is considering treatment for infertility. The treatment protocol given here is based on the different phases of the menstrual cycle, and emphasises three stages: menstruation and follicular development, ovulation, and implantation and endometrial receptiveness. This protocol should be modified according to the patient's individual constitution and Chinese medicine diagnosis. Lifestyle,

diet and environmental factors should also be considered in order to ascertain the primary cause of infertility and support treatment. At the Zhai clinic we have found that the following points are effective, with treatment given every two weeks with the needles stimulated with an electro-acupuncture machine (unless contraindicated for a particular patient):

## Menstruation and follicular development

The back-shu points are needled between day one and day 10 of the menstrual cycle, based on the traditional belief that yang channels should be selected when treating the yin.

Main acupuncture points

- Ganshu BL-18 to regulate and nourish the Liver.
- Shenshu BL-23 to regulate and nourish the Kidney; if there is Kidney yang deficiency include moxa.

Modifications:

- Damp-Heat: Dachangshu BL-25 to eliminate dampness and clear heat from the lower jiao and activate blood movement.
- Damp due to Spleen deficiency: Pishu BL-20.
- Blood heat: Geshu BL-17.
- Cold in the uterus: Ciliao BL-32 and/or Zhongliao BL-33 with moxa to dispel cold, eliminate blood stasis, and warm the uterus.
- Yin deficiency and/or yin deficient heat: Taixi KID-3 and Zhaohai KID-6.

Additional distal points:

- Sanyinjiao SP-6 to regulate the uterus and the menstrual cycle.
- Yinlingquan SP-9 to eliminate dampness and resolve obstruction in the lower *jiao*.

## Ovulation

The ovulation period is typically between day 12 to 15 of the cycle, although this may need to be changed if an individual patient ovulates later than this.

Main acupuncture points

- Guanyuan REN-4, Zhongji REN-3 and Dahe KID-12 to connect and harmonise the lower dan tian, Kidney channel and uterine network vessels and stimulate ovulation.

Modifications

- Blood stasis and/or blood heat: Xuehai SP-10 to activate blood circulation, remove blood stasis, clear heat and cool blood, and regulate menstruation.
- Liver qi stagnation: Taichong LIV-3.
- Damp, damp-heat or fluid obstruction: Yinlingquan SP-9 to resolve dampness and regulate the lower jiao.

- Phlegm-dampness: Fenglong ST-40.

#### Additional distal points

- Zusanli ST-36 to support qi, nourish blood and harmonise the Spleen and Stomach.
- Sanyinjiao SP-6 to invigorate blood, harmonise the Liver and strengthen the Kidney.

#### Implantation and endometrial receptiveness

The time of implantation has been found to be between eight to ten days after ovulation in the majority of successful pregnancies (Wilcox et al., 1999). Therefore after ovulation treatment should focus on enhancing endometrial receptiveness.

#### Main acupuncture points:

- Guanyuan REN-4 and Qihai REN-6 to connect and harmonise the lower dan tian, Conception vessel, Spleen, Liver and Kidney channels. These points support original qi, benefit jing, nourish blood and Kidney yin, fortify Kidney yang (with moxa) and regulate the uterus.

#### Modifications:

- Obstruction due to qi, blood or cold stagnation manifesting with a long cycle: Shuidao ST-28 [also referred to as Baomen ('Uterus Gate') and Zihu ('Child Door')] to clear stasis of qi and blood in the uterus.
- Yin deficient heat: Zhaohai KID-6 to nourish yin, clear heat and regulate the uterus.
- Agitation of the Heart and insomnia: Shenmen HE-7 to calm and regulate the mind and the heart.

#### Additional distal acupuncture points:

- Zusanli ST-36 to support qi, nourish blood and harmonise the Spleen and Stomach.
- Taixi KID-3 to nourish Kidney yin.
- Taichong LIV-3 to nourish Liver-blood and nourish the endometrium for effective implantation.

NB: Points contraindicated in pregnancy should not be needled from day 24 of the cycle onwards. Although commonly used for fertility treatment, Sanyinjiao SP-6 should not be used during this time.

#### Conclusion

Chinese medicine can return the body to a state of balance and create the optimal conditions for fertilisation, maternal endometrial receptivity and a harmonious mother-foetus relationship. As discussed throughout this article, although egg quantity is fixed at birth, egg quality in the majority of women can be positively influenced through specific lifestyle management and proper treatment using Chinese medicine and acupuncture. ■

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- also mechanical obstruction. Thus even if fertilisation occurs there may be later problems with implantation.
- 3 During pregnancy more clotting factors are present in a woman's blood, so that a pregnant woman is much more likely to develop blood clots. In addition, because the growing foetus in the uterus compresses the inferior vena cava on the right side of the body, blood flow slows down thus further increasing the likelihood of blood clot formation.
- 4 As seen in polycystic ovary syndrome and endometriosis – see Pal et al., 1998.

## Endnotes

- 1 From a Chinese medicine perspective miscarriages exhaust qi and blood. The deficient qi and blood are subsequently unable to move properly and thus manifest as stagnation.
- 2 For example as a result of scar tissue generated by bacterial infection. In Chinese medicine bacterial or viral infections are thought to generate toxic heat, which not only cause chromosomal abnormalities in the oocytes but

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