

How to Optimise and Preserve Fertility: Current Research, Lifestyle Choices and Chinese Medicine

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Abstract

Chinese medicine has a long history of helping infertile couples to conceive and documenting health preservation practices. In addition to providing treatment to couples and individuals wishing to conceive, modern Chinese medicine practitioners typically provide lifestyle advice in order to improve health and optimise fertility. Despite many improvements in living conditions, modern couples are exposed to numerous challenging factors that can potentially reduce their fertility. This article highlights current research in this area and combines it with traditional Chinese medicine knowledge to provide a resource that practitioners can use to advise couples and individuals wishing to conceive. Lifestyle changes can bring great benefits, especially when based on Chinese medicine differential diagnosis. However, excessively rigid advice can also be divisive and burdensome in the context of the difficult situation experienced by infertile couples, and should therefore be given with sensitivity and awareness.

Introduction

This article aims to provide an up-to-date resource for practitioners of acupuncture and Chinese medicine wanting to best advise and support couples and individuals who wish to have children. The first half of the article reviews current relevant literature on the influence of lifestyle factors on fertility. These are the factors that patients have some control over, and for which the practitioner can offer advice and recommendations based on the patient's individual Chinese medicine diagnosis. The second half of the article explores factors that also affect fertility but over which the patient and practitioner have no direct control (such as hereditary factors and irreversible trauma or injury). It is important for practitioners to take account of these factors, since they influence prognosis and treatment planning, and help the practitioner to realistically assess the patient's fertility potential. Fertility assessment and case history taking are also discussed, since the case history reveals key information regarding current fertility status and potential. Finally, the author discusses the research findings, and provides recommendations for practitioners on how to incorporate them into clinical practice.

Infertility: facts and figures

Infertility is defined as the inability of a couple to get pregnant despite having regular unprotected sex over a period of two years (NICE, 2013). It is estimated that one in seven UK couples has difficulty conceiving (HFEA, 2006). About 40 per cent of infertility is due to male factor, 40 per cent due to female factor, and 20 per cent from complications affecting both partners (World Health Organisation, 2013). In women under 40, more than eight out of 10 couples will conceive within one

year if they are having regular intercourse, and nine out of 10 will be pregnant within two years (NICE, 2013). Eighty two to 92 per cent of couples will conceive within 12 menstrual cycles and 90 to 98 per cent will conceive within 24 menstrual cycles (Dunson, 2004).

Chinese medicine, health preservation and fertility

Chinese medicine has a rich tradition of health preservation practices, which involve '... nourishing post-heaven essence and avoiding dissipation of essence by overwork, stress and worry, and by the avoidance of excessive sex ... delaying ageing' (Deadman, 2005). Traditionally, Chinese medicine recognises a human fertility 'life span', but also acknowledges that both women and men can prolong their fertility given the right conditions:

'... these individuals inherited an unusual abundance of jing and also realised how to lead their lives properly and protect their vitality. At sixty-four and forty-nine, for males and females respectively, these individuals still have excess kidney energy as well as qi and blood, so they still have the capacity to procreate. However, men past sixty four and women past forty nine normally have lost this ability.'

Su Wen (Basic Questions, 221 BCE)
translated by Ni (1995).

Modern practitioners of Chinese medicine frequently see well-informed patients who are seeking to optimise and prolong their fertility. Modern life easily damages the vitality of the mind and body: inappropriate diet, irregular eating patterns, lack of sleep, overwork, exposure to external pathogenic

factors and constitutional factors can all adversely affect fertility. In addition, because couples increasingly leave starting a family until later in life, their qi and jing-essence are often not optimal for conception. Furthermore, the emotional stress experienced by such couples can cause additional damage to health and fertility. For such couples the diagnostic insight of Chinese medicine can be employed to aid patients' decision-making and bring great benefits to health, well-being and fertility.

Lifestyle and environmental factors

Lifestyle factors that impact on fertility include the age at which couples decide to start a family, sexual behaviour, alcohol consumption, smoking, stress, diet, caffeine, weight, exercise and smoking (Homan, 2007). Environmental factors include social, cultural, economic, temperature, genetic and toxic influences (Population Reference Bureau, 2011).

Ageing and fertility preservation

The age at which couples decide to start trying for a family is currently rising year on year, with one in 25 babies now being born to women over 40 (Office of National Statistics, 2012). In 2013 nearly half (49 per cent) of all babies were born to women over 30, and 65 per cent to men aged 30 or over. The average age of first time mothers has risen to 29.8 compared with 26.4 in 1973 (Office of National Statistics, 2012). Fertility declines with age. Female fertility peaks in a woman's twenties and begins to decline more rapidly from around age 35 (RCOG, 2009). At 30, the chance of conceiving each month is 20 per cent, and at 40 this reduces to just five per cent (Center for Disease Control, 2008). Women are born with all the oocytes (eggs) they will have in their lifetime, and this number declines with age. Furthermore the quality of the eggs also declines with age (Jones & Lopez, 2006). A natural history study in the 1950's of a population where contraception was forbidden found that 11 per cent of women were infertile by age 34, 33 per cent by age 40 and 87 per cent by age 45 (Tietze, 1957). Amongst practitioners of Chinese medicine there is much debate regarding the possibility of improving egg quality (Maxwell, 2012), with some advocating treatment to improve Kidney jing-essence in order to help women achieve pregnancy into their 40s (e.g. Maughan, 2012). Age-related decline in fertility also affects men, who experience alterations in sperm quality and quantity (Ford et al., 2000), which can be associated with conception failure, miscarriage and poor in vitro fertilization (IVF) outcomes (Sakkas, 2012). In addition, age-related declines in testosterone levels can lead to reduced libido and problems with sexual function (Harris et al., 2011).

Sexual behaviour

Sexuality and fertility are connected: sexual problems can be involved in an inability to conceive, and vice-versa (Gianotten, 2005). Increased frequency of sex has been found to improve the chances of conception. In a regular 28-day cycle sexual

intercourse every one to three days has been found to be optimal (ASRM, 2008). In addition, regular sex during IVF cycles may also improve pregnancy rates, since exposure to semen has been shown to promote embryo development and implantation in animals (Tremellen et al., 2000).

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Erectile dysfunction in men, and low libido in both men and women can impact on the amount of sex each month, thus reducing the chances of conception (Rosen et al., 2005). The use of vaginal lubricants and other substances such as oil and saliva to aid dryness and pain can be detrimental to sperm, causing damage and problems with motility (Agarwal et al., 2008). Historically Chinese medicine texts advocated limiting sexual activity, particularly ejaculation in men, in order to preserve jing-essence and benefit health. However, the findings of modern research suggest such practices may adversely affect fertility. In one study of 6008 men with male factor infertility it was found that sperm degraded in quality after only two days of abstinence, and therefore the authors advise that men should not abstain from sex for more than ten days (Levitas, 2005).

It is not clear whether female orgasm aids conception, but the oxytocin released during orgasm, which strengthens tubal contractions, helps sperm move through the fallopian tubes (ESHRE, 2010; Odent, 2009). It is therefore likely that 'good' sex may improve the chances of conception. However, advising couples not only to have more sex, but to ensure it is 'good' sex, is likely to increase anxiety and actually have the opposite effect on sexual performance. It can be wise to caution women not to overly involve their partners in the exact timing of ovulation in order to prevent expectation and tension from negatively impacting male performance. Although charting the menstrual cycle can be helpful in order to identify the time of ovulation, over-focusing on such timing can cause anxiety in both partners. I have observed in a clinical audit that couples who routinely use ovulation predictor kits have less intercourse and experience more sexual performance-related anxiety than couples who do not use them (Cannon, 2013). Sexual activity and libido has been found to be reduced in couples who are stressed, and couples undergoing IVF report that their sex life diminishes (Rosen et al., 2005). Acupuncture treatment can be helpful to offset the effects of stress in both sexes by smoothing flow of Liver qi, especially through the abdomen and sexual organs, and particularly around the time of ovulation. To identify sexual problems, the practitioner of Chinese medicine should thoroughly and sensitively assess the timing and frequency of sex in relation to the menstrual cycle and ovulation.

Alcohol

Excessive alcohol consumption has been found to be associated with infertility (Eggert, 2004). A Finnish study that looked at the effect of health and lifestyle on fertility concluded: 'Since both infertility and unhealthy use of alcohol are an increasing public health issue in western societies, more attention should be paid toward lifestyle, especially alcohol use of infertile women' (Revonta et al., 2010). The negative effects of excessive alcohol consumption on fertility include increased time to conception (Eggert et al., 2004; Mutsaerts et al., 2012), anovulation, luteal phase dysfunction, poor or abnormal embryo development and even early menopause (Gill, 2000). Evidence regarding 'safe' levels of alcohol intake in terms of fertility is not conclusive. A literature review (Sharma et al., 2013) highlights that the 'amount of alcohol consumption does matter'. The evidence for occasional alcohol consumption is less clear than that for excessive consumption: a Danish study found that women who drank alcohol moderately (two glasses per week) conceived quicker than women who drank no alcohol (Juhl et al., 2001). A study looking at 7760 women found no significant effects of alcohol on fertility in younger women, although in the same study women over 30 who consumed more than seven alcoholic drinks per week were more likely to experience infertility than women who drank less than one per week (Tolstrup, 2003). In addition, women who drink more than four units of alcohol per week during IVF treatment may reduce their chances of live birth by 16 per cent (Rossi, 2011). Hakim (1998) found that a combination of high alcohol and caffeine intake is more detrimental to fertility than high alcohol intake alone. Women suffering hangovers have been shown to be less fertile (Revonta et al., 2010).

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In men, heavy alcohol consumption negatively impacts on libido, sperm morphology and motility (Gaur et al., 2010), time to conception (Hassan et al., 2004) and oxidative stress levels (Koch et al., 2004), thus potentially affecting male fertility (Krishner, 2012). Alcohol can become a bone of contention between couples, creating resentment if one partner abstains while the other does not. Based on current research a moderate approach is advisable, unless there is good reason for complete abstinence. The National Institute for Clinical Excellence (NICE) recommends that women trying to conceive should drink no more than two units per week, and men no more than four (NICE, 2013).

Chinese medical diagnosis is useful with regards to advising couples about alcohol, as it enables practitioners to identify patients who are most likely to be negatively affected by its consumption. Those who present with Liver patterns - particularly Liver heat or damp-heat - are

best advised to avoid alcohol entirely; those who present patterns of blood or yin deficiency should also carefully limit their alcohol intake. Because of the heating nature of alcohol in most of its forms, it is better tolerated by those who have a cold constitution. A small amount of alcohol can help to move stagnation and calm the mind in such people. Beer tends to be damp-forming in nature and thus should be avoided by men and women for whom dampness is a problem.

Smoking

Research consistently demonstrates that smoking negatively impacts both male and female fertility (Dechanet, 2011). A review on the effects of smoking found that it increases the risks of miscarriage and ectopic pregnancy, adversely impacts semen quality and sperm count, and reduces the chances of IVF success (ASRM, 2008). Other research shows an association between smoking and increase in compromised fallopian tubal function and poor endometrial receptivity (Howe et al., 1985; Hassan et al., 2004; Soares et al., 2007; Vine, 1994). Women whose mothers smoked during pregnancy had an antral follicle count 11 per cent lower than those whose mothers refrained from smoking (Bentzen et al., 2013). A meta-analysis of 21 papers found that women who smoked during assisted reproductive treatment (ART) were less likely to become pregnant or have a live birth, and were more likely to have an ectopic pregnancy or miscarry (Waylen, 2009).

From a Chinese medicine point of view, individuals with a history of smoking are likely to have depleted their yin. In my experience women who are yin deficient with empty heat already struggle to produce good quality embryos (Cannon, 2013) - smoking will make this situation even worse. Chinese medicine practitioners are well placed to support patients wishing to stop smoking (He et al., 2001). Advising patients not to smoke, along with supporting cessation, can help optimise fertility and extend the fertile window.

Caffeine

Studies suggest that there is an increase in average time to conception of 9.5 months in women who drink caffeinated beverages (Bolumar et al., 1997; Hassan & Killick, 2004). Women who consume seven or more cups of tea or coffee daily may be 1.5 times more likely to be subfertile (Hassan & Killick, 2004). One study showed that women who drank four to seven cups of coffee per day had up to an 80 per cent increase in the risk of a baby being still-born (Wisborn, 2003), whilst another showed that women who drink more than 100 milligrams of caffeine per day are more likely to miscarry (Stefanidou, 2011). The Food Standards Agency (2008) advises women to reduce their caffeine consumption to less than 200 milligrams a day. The Royal College of Obstetricians & Gynaecologists (2011) currently states that 'pregnant women should limit their consumption of

caffeine to 300 milligrams a day'. Whilst there are no specific guidelines for those trying to conceive, similar limitations are advisable. However, an accurate daily limit may be difficult to achieve, as research has found that caffeine levels in a single cup of espresso coffee from high street shops range from 50 to 300 milligrams (Thomas et al., 2012). Furthermore, when tea, cola and energy drinks containing caffeine are also consumed the recommended limits are easily exceeded. From a Chinese medicine perspective yin and blood deficient patients need to be very careful with coffee, as although a small amount of coffee has a warming effect, large quantities will create cold (Leggett, 1999).

Diet and supplements

Fertility can be adversely affected in both women and men by excess intake of protein, fat, carbohydrate and dairy (Chavarro et al., 2007). High carbohydrate intake and glycaemic load is associated with an increased risk of infertility (Chavarro et al., 2007). The Nurses' Health Study (2007) found that women who ate foods with a high glycaemic load were 92 per cent more likely to experience ovulatory infertility, whilst a decreased risk of ovulatory infertility has been found in women who eat carbohydrates with a low glycaemic load (Chavarro et al., 2007).

In terms of fat consumption, high intake of low-fat dairy foods is positively associated with anovulatory infertility, whereas whole-fat dairy foods may have the opposite affect (Chavarro et al., 2007). One study has found that infertile women tend to consume more polyunsaturated fats and less saturated fats compared to fertile women (Revonta et al., 2010). Trans-fats, at amounts as low as four grams per day, have been strongly associated with an increased risk of ovulatory infertility (Chavarro, 2007).

Oxidative stress can adversely affect sperm quality and function, but may also be implicated in reproductive diseases such as endometriosis, polycystic ovarian syndrome (PCOS) and unexplained infertility (Agarwal et al., 2012). Lifestyle factors linked to elevated oxidative stress include: obesity, drug use, smoking, alcohol, heat exposure, excessive exercise; other factors include age, genito-urinary tract infections, prostatitis, varicocele, vasectomy reversal, chronic disease, chemical pollutants, occupational hazards, radiation and ultra-violet light (Agarwal et al., 2011; Aitken et al., 2014). A change of lifestyle and a diet rich in foods high in antioxidants - ideally including fruit, vegetables, grass-fed meats and offal, nuts, seeds and seafood - may protect against oxidative stress and thus improve both sperm motility and morphology (Zareba et al., 2013). The majority of clinical trials investigating antioxidant supplementation for reproductive disorders found male fertility and pregnancy rates improved, while oxidative stress and resulting DNA damage decreased (Wright et al., 2014).

Heavy metals (e.g. lead, mercury and cadmium) are present in the environment, and enter the human body through contamination from food packaging, dental

amalgams and consumption of larger fish such as tuna. Research suggests that high levels of heavy metals in blood can reduce fertility (Choy et al., 2002) and mercury found in contaminated fish sources may affect both sperm and foetal development (Chalupka et al., 2010). However, Omega 3 oil present in oily fish may play an important positive role in fertility by delaying ovarian ageing and improving egg quality (Nehra et al., 2012). According to Golding et al. (2013) the health benefits of eating oily fish outweigh the danger of exposure to mercury. Practitioners should therefore be specific when discouraging patients from eating fish in order to avoid heavy metal contamination.

Supplementation of dehydroepiandrosterone (DHEA) has been proposed to benefit women with diminished ovarian reserve by increasing egg quality and availability. Studies suggest that it increases spontaneous pregnancy rates (Fusi et al., 2013) and improves IVF outcomes in poor responders with a history of failed IVF cycles (Hyman et al., 2013). However, other studies have suggested that DHEA supplementation does not enhance pregnancy outcomes in women with poor ovarian reserve (Kara et al., 2014) and that evidence-based recommendations for its use are lacking (Fouany & Sharara, 2013).

Coenzyme Q10 (ubiquinol) levels naturally decline with age, possibly contributing to loss of female fertility (Bentov & Casper, 2013). Evidence suggests that coenzyme Q10 may benefit male fertility by improving sperm morphology, density and motility (Safarinejad et al., 2012). Vitamin D deficiency may adversely affect a woman's chances of getting pregnant through IVF (Paffoni et al., 2014). Women at risk of low vitamin D levels, for example those who cover up for cultural reasons or who work long hours indoors, should assess their vitamin D status.

Improving nutritional status in preparation for conception is important, and dietary changes are a worthwhile addition to fertility programmes. However, substantial dietary changes require commitment and will-power from the patient. Dietary advice based on Chinese medicine differential diagnosis can help practitioners best advise patients on how to make changes to address their specific pathologies. For example, women who are blood deficient can be advised to eat meat, bone-broths and other blood-nourishing foods. Patients with damp conditions are advised to avoid dairy, sugar and fatty foods. Where heat predominates, heating foods such as spices should be avoided, whereas if cold predominates cold foods should be avoided in favour of warming foods. Educating the patient on how to improve the function of their Spleen is vital, since it is not always the diet but the digestion that is at fault (Leggett, 1998). Therefore, advising patients not only on what to eat, but on how and when to eat can bring great benefits (McCracken, 2012). Furthermore, helping patients to understand the emotional issues associated with eating (or not eating) is sometimes necessary to optimise fertility.

Body-weight and Body Mass Index (BMI)

Women with a BMI of 19 or less are likely to experience amenorrhoea and are more likely to miscarry or give birth pre-term (Han et al., 2011; Hassan et al., 2004), while the chances of miscarriage are increased and the risk of stillbirth doubled in women with a BMI of over 30 (Luke et al., 2011). Eating disorders such as anorexia nervosa can affect menstruation, fertility and the health of the foetus (Stewart et al., 1987). In couples undergoing fertility treatment, increased paternal BMI is associated with decreased clinical pregnancy rates (Bakos et al., 2011) and high maternal BMI may lead to poor follicular growth, reduced oocyte numbers, lower implantation rates and fewer live births (Bellver et al., 2010). Underweight men have lower sperm concentrations (Chavarro et al., 2010), whilst obesity is linked to erectile dysfunction, poor semen quality and quantity (Sallmen et al., 2006), and alterations in both the physical and molecular structure of germ cells in the testes, which may impair embryo health and development (Palmer et al., 2012).

It is important to educate women and men that both ends of the BMI spectrum can impact negatively on fertility. Chinese medicine practitioners are well-placed to support those who need to either gain or lose weight, including those patients where emotional imbalance is causing eating disorders. Auricular acupuncture is relatively simple and inexpensive to administer and may be effective in reducing BMI (Yeo et al., 2013).

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Exercise

Most practitioners will be aware that women and men of child-bearing age often follow modern exercise trends, which include 'boot-camp' style workouts, Bikram ('hot') yoga and triathlons. However, research shows that the body may not have enough energy to support both intense physical training and pregnancy (Gudmundsdottir et al., 2009). For example, more than three hours of aerobic exercise a day is associated with reduced pregnancy rates in IVF patients (Wise et al., 2011), and female athletes often present a long history of amenorrhoea due to extreme training (Dooley, 2013). However, regular and moderate exercise has been shown to improve blood flow and reduce oxidative stress, which may improve fertility (Ignarro et al., 2007). Women who have a high BMI see improvements in their fertility with moderate exercise (Wise et al., 2012). However, prolonged vigorous cycling (more than five hours in one session) has been shown to adversely affect sperm, although it is not clear whether this is due to the intensity of the exercise or the build-up in testicular heat (Wise et al., 2011). That said, men who exercise for more than 15 hours per week see

improvements in their sperm parameters compared to men who exercise less than five hours per week (Gaskins, 2012). From a Chinese medicine perspective, vigorous exercise can deplete the vital substances - the qi, blood and ultimately the jing-essence. Conversely, when practised appropriately, mindful exercises such as yoga, meditation, taiji and qigong cultivate qi and therefore tend to benefit fertility. Moderate exercise moves qi and calms the emotions. Chinese medicine diagnosis can help to tailor exercise regimes to particular patients. For example, yin deficient patients who practise 'hot' yoga are likely to compromise their fertility by further depleting their yin and blood. On the other hand, patients manifesting patterns of dampness and stagnation are likely to benefit from vigorous exercise and the associated fluid loss and improved circulation.

Recreational drugs

The use of recreational drugs is associated with subfertility in both men and women (Anderson et al., 2010). Female marijuana users are more likely to experience primary infertility than non-users (Mueller et al., 1990), and marijuana may delay ovulation and negatively impact on embryo development (Smith, 1983). In men, marijuana has a negative impact on spermatogenesis and motility, and may prevent sperm from being able to fertilise an egg (Battista et al., 2008). Although short-term cocaine use can increase libido, long-term users report a decrease in sexual function, including difficulties in maintaining an erection and ejaculating (Gold, 1997). Patients with a history of drug use often stop in their bid to conceive. As with any substance misuse, the harm done will depend on individual constitution and the type and extent of drugs used. Those with a background of recreational drug use frequently present with patterns of yin deficiency, Liver heat, Liver qi stagnation, jing-essence deficiency and shen disturbance (Lyttleton, 2004).

Climate and temperature

Chinese medicine theory describes how climatic factors can adversely influence the internal function of the body. Historically, Chinese medicine has placed a strong emphasis on keeping the body warm in order to optimise fertility, particularly during menstruation. Kidney yang influences fertility potential by activating and warming the jing-essence, and patients should therefore keep the lower abdomen and feet warm, avoid cold foods and avoid swimming during menstruation (Lyttleton, 2004). Conditions involving blood stagnation in the uterus due to invasion of cold are relatively common in women who work in sedentary jobs or who are exposed to external cold (Maciocia, 1998). With many modern Western women's diets consisting of a high percentage of raw food, juices and 'smoothies' that are consumed in order to 'detox', advice about the benefits of avoiding such foods, particularly during winter, can be helpful (Cannon, 2010).

Heat is a significant problem for sperm. Male chefs, for example, have a high incidence of infertility since their testicles are exposed to a constant heat source (Paul et al., 2008). Keeping the testicles cool by wearing loose-fitting boxer shorts to avoid over-heating is prudent advice (Jensen et al., 2006). Tiemessen et al. (1996) found that tight-fitting underwear created a 50 per cent reduction in semen parameters, although this effect was reversible. It is important to question men regarding their choice of underwear and any other source of heat near the testicles that could potentially damage sperm. Men who cycle long distances may damage their fertility due to heat build-up and local trauma (see above). Men should also be advised to avoid carrying mobile phones near their testicles, which have been shown to decrease sperm motility (Kilgallon & Simmons, 2005; Agarwal et al., 2008). Using laptops connected wirelessly to the internet directly on the lap may also decrease male fertility (Avendano, 2011).

Stress and overwork

The likelihood of natural conception is reduced when stress levels are high (Louis et al., 2011). A recent American study of 501 couples over 12 months found a 29 per cent reduction in fertility and a two-fold increase in risk of infertility in couples demonstrating high levels of stress (Lynch et al., 2014). In those undergoing IVF treatment, fewer oocytes were collected from women who had experienced stressful life events in the 12 months prior to retrieval (Clarke et al., 1999, Sanders et al., 1997). Timing IVF treatment when stress levels are minimal is therefore advisable. Patients obsessed with their infertility tend to be less happy, engage less socially and have reduced libido (Cannon, 2010; Wasser et al., 1993), and the longer it takes couples to conceive the higher their levels of stress rise (Campagne, 2006). Although lowering stress levels may benefit couples trying to conceive (Louis et al., 2011), and teaching patients that managing their emotions is beneficial to health and fertility is an important aspect of the acupuncturist's role, realistic advice on stress reduction (such as through exercise or meditation) is important. This involves entirely individual negotiations between practitioner and patient as to what is achievable. Any such advice should be weighed up against the stress it may introduce into a relationship (Louis et al., 2011). Acupuncture treatment is very useful to help couples manage stress.

Overwork is a growing problem in society and will likely continue to impact both male and female health and fertility. The effects of overwork on fertility are not well covered by current research, although for the practitioner of Chinese medicine the depleting impact of overwork on qi, Kidney yin, blood and jing-essence are obvious. That said, sleep deprivation and shift work have been found to clearly impact on female fertility (Lawson et al., 2011).

Assessing fertility

Careful analysis of a patient's previous medical history

can provide critical diagnostic information for the Chinese medicine fertility specialist. By taking an in-depth case history, the practitioner is able to direct patients along specific pathways of testing, assisted reproductive treatment (ART) and/or Chinese medicine treatment in order to improve or preserve fertility. Previous operations, sexually transmitted diseases, surgery, previous pregnancies, miscarriage, neonatal complications, stillbirth, post-natal recovery and terminations are all informative when assessing female fertility (Dooley, 2013), whilst a history of cancer, vasectomy, mumps, measles, chickenpox and recent high fever are important considerations when taking a male history (Dooley, 2013). It is important for the practitioner to accept that in long-standing or serious medical conditions, even the best advice and treatment may not result in successful conception.

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Trauma

Previous trauma can adversely affect male and female fertility. Men with varicocele have increased levels of DNA damage, while semen abnormalities are common in those with a history of undescended testicles (Ramadan et al., 2003). Asherman's syndrome is a frequently under-diagnosed condition involving scarring of the uterus due to miscarriage or curettage (Tam, 2002). Clinically addressing Asherman's syndrome prior to any ART procedures is important, as women with the condition are frequently referred for IVF when the actual issue is implantation and quality of the endometrium. In my experience, Asherman's syndrome responds well to acupuncture, which may be due to acupuncture's capacity to increase blood flow to the reproductive organs (Robinson et al., 2003).

Maternal history

The age that a woman's mother reached menopause may predict her own fertility. The Bentzen et al. study (2013) showed that ovarian function declines faster in daughters of mothers who reached menopause before the age of 45, compared to those whose mothers experienced late menopause. Generally speaking, women in their late 20s and early 30s should be advised not to delay pregnancy for too long, and in addition to test their AMH and FSH levels and undertake an antral follicle count scan in order to determine their fertility status.

Oral contraceptive pill

A complete understanding of the contraceptive history of the patient is essential. Women using the oral contraceptive pill (OCP) are less likely to use sheath forms of contraception

and may expose themselves to chlamydia infection, a major cause of tubal infertility (Kavanagh et al., 2013, Sherman et al., 1987). Sexually transmitted diseases (STDs) are the most common cause of tubal disorders, which constitute about 20 per cent of female infertility (Yen, 1999). Young women are often prescribed the OCP early in life to 'correct' specific gynaecological conditions, but a Danish study (2013) cautions against its prescription to females under the age of 16, as it may cause subsequent irregular menstrual cycles (Mikkelsen et al., 2013). In some adolescents the combined OCP may aggravate metabolic disorders seen in PCOS (Faqua et al., 2012). Lyttleton (2004) cautions that prescribing the OCP to young women with PCOS may only mask the disease and thus, 'an opportunity is lost to inform the young women that lifestyle and weight management is crucial'. Correcting conditions early in life may in the long-term preserve fertility. The OCP can also impact negatively on cervical fluid, making it difficult for sperm to pass through the cervix (Lyttleton, 2004), and long-term use (five years or longer) may affect optimal endometrial growth (Tallukdar et al., 2012). An interesting finding was that women who used the OCP were attracted to men who are not genetically compatible (Roberts et al., 2008). However, some studies suggest the OCP may actually benefit and preserve fertility in the long-term (Lessey, 2000, Meresman et al., 2002; Sharma et al., 2013; Revonta et al., 2010). From a Chinese medicine perspective, the OCP particularly affects the Liver qi as it interrupts the natural rhythms of the body and the menstrual cycle. Long-term use often results in Liver qi stagnation and Liver blood deficiency, which are frequently seen in women who suffer from post-pill amenorrhoea.

Understanding the nature of ART drugs allows Chinese medicine practitioners to advise, support and treat patients appropriately.

Assisted reproductive treatment

A patient's ART history can reveal vital information regarding the state of their fertility. Although invasive, IVF offers the practitioner a great deal of diagnostic material, such as how many eggs were produced, whether the sperm were able to fertilise the egg and how well the subsequent embryos progressed. Information from a thorough ART history may be used to determine the most advantageous route for a couple and whether ART is worth pursuing any further. Since ART is both costly and invasive, this can be valuable information. The drug Clomid is heating and drying from a Chinese medicine perspective, and easily has detrimental effects on women who present as blood or yin deficient. In such women it tends to dry the fertile mucus, particularly if used for more than three menstrual cycles, although patients who are cold and damp may benefit from its heating nature. The drugs Gonal-F and Puregon used in IVF easily cause

Liver qi stagnation, whilst Metformin depletes Spleen qi (Lyttleton, 2008). Understanding the nature of ART drugs allows Chinese medicine practitioners to advise, support and treat patients appropriately.

Environmental toxins

Exposure to environmental toxins can come from various sources, and has been shown to have a negative impact on both male and female fertility. Bisphenol A (BPA) for example, found in plastic and food packaging, is an endocrine disruptor shown to decrease both sperm quality and sexual function, as well as being associated with chromosomally abnormal oocytes and recurrent miscarriage (Sharma et al., 2013). While oocytes are developing within the ovary they must withstand the impact of these substances in order to become competent and functional (Krishner, 2012). Air pollution, particularly nitrogen dioxide, has been implicated in reduced pregnancy rates and live births among women undergoing IVF (Legro et al., 2010). Studies from the Czech Republic (2000) have demonstrated that men living in areas with high air pollution have a larger percentage of sperm that are morphologically abnormal with decreased motility and DNA fragmentation (Selevan et al., 2000, Rubes et al., 2005). The Rubes study (2005) is especially concerning, as it shows that DNA alone can be affected, while other sperm parameters remain normal; since few men are offered a DNA fragmentation test, this aspect of their fertility is often overlooked, with the result that their partners may be needlessly subjected to invasive treatments that are likely to fail.

Conclusion

Fertility is precious and needs preserving. As practitioners of Chinese medicine we are well placed to provide up-to-date and individualised lifestyle advice alongside our treatment in order to optimise and/or preserve patients' fertility. There are factors in life that we are unable to change, for example our inherited constitution, accidents and some illnesses. Lifestyle is, however, an area where those wishing to conceive can exert control in order to improve their fertility. This paper is limited, in that many of the areas of lifestyle covered merit a paper to themselves (diet is perhaps the best example of this). In addition, overwork, stress and exhaustion are given scant attention in scientific research, yet are areas of growing concern in the modern world (and Chinese medicine excels at treating their consequences). It is unlikely that the current trend towards delaying pregnancy until later in life will reverse. Some women will turn to oocyte vitrification and oocyte donation, but many will suffer with subfertility and infertility. In order to maximise the chances of healthy conception, pregnancy and birth, practitioners can use the following summary of patient recommendations:

1. Where possible and appropriate, attempt conception prior to 30 years of age (and men prior to 35).

2. Reduce alcohol consumption, especially prior to and during IVF, but allow for the occasional drink.
3. Give up smoking.
4. Eat a plant-based diet high in 'good' fats and antioxidants (the 'Mediterranean' diet is ideal). Avoid low-fat dairy foods in favour of the full-fat variety. Spend time outside to increase Vitamin D levels. Supplement with folic acid (women) and a good multivitamin.
5. Exercise moderately and not the point of exhaustion.
6. Men should keep mobile phones and laptops away from their testicles and try to keep their testicles cool by wearing loose fitting cotton underwear.
7. Reduce stress levels by introducing simple and enjoyable activities that are effective and easily achievable. Meditation, yoga and qigong are ideal.
8. Avoid overwork and take regular holidays.
9. Reduce exposure to soft plastics, pesticides, hormones and fertilisers by choosing organic food and avoiding processed and packaged foods. Use less toxic cleaning products. Change plastic food containers to glass or BPA-free.
10. Check BMI - being under- or over-weight adversely affects both male and female fertility (the optimum BMI for fertility is 20-25).

Of course, all of the above advice should be informed by an individualised Chinese medicine diagnosis and given out with sensitivity and common-sense. Try not to contradict the patient's other healthcare providers and work to establish good working relationships with them. Also, whilst many couples struggling to conceive are often willing to overhaul their entire lives in order to conceive, in the words of Oscar Wilde, 'everything in moderation, including moderation'. Avoid prescribing overtly restrictive lifestyle changes, as setting our patients up for failure by promoting impossibly joyless and rigid lifestyles will ultimately not serve them.

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