We begin our discussion of integrated Chinese-Western gynecology with an overview of female anatomy and physiology from the point of view of modern biomedicine. This is because this is the dominant conceptual system in the world today, and all professional health care practitioners must be conversant with this model.

**Female Reproductive Anatomy**

The uterus consists of the cervix and uterine corpus or body and is joined by the isthmus. The isthmus is a transitional area where cervical epithelium gradually turns into endometrial lining. The uterus is an inverted pear-shaped muscular organ that lies under the bladder and above the rectum. Generally speaking, the size and weight of the uterus depends on previous pregnancies. The endometrial lining normally ranges from 2-10 millimeters in thickness depending on the stage of the menstrual cycle. The uterus of a woman who has never carried a fetus to full term is approximately eight centimeters long, five centimeters wide, 2.5 centimeters thick, and weighs 40-50 grams. After a woman has had a baby, each measurement is about 1.2 centimeters larger and the uterus is 20-30 grams heavier. The uterus at full-term pregnancy can be 10-20 times its normal weight. Other factors can increase the size and weight of the uterus, such as uterine fibroids or leiomyomas. Fibroids begin as small seedlings that spread throughout the muscular walls of the uterus. They can be so tiny that one needs a microscope to see them. However, they can also grow very large. They may fill the entire uterus and may weigh several pounds. Although it is possible for just one fibroid to develop, usually there is more than one.

The fallopian tubes are 10-14 centimeters in length and about one centimeter in diameter as measured from the exterior. They are light grey to pearly white in color and are lined internally with ciliated epithelium that is folded. The cilia are impor-
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tant for helping the egg or zygote traverse the length of the tube to the uterus. The tubes extend outward from the superolateral part of the uterus and surround each ovary in a funnel-shape fashion without actually touching the ovaries. The end of the tube has finger-shaped projections called fimbria that assist the capture of the egg into the tube at the time of ovulation.

The ovaries are oval in shape and measure about three centimeters by 1.5 centimeters by 1.5 centimeters. During reproductive years, they can be a little larger than that, sometimes reaching five centimeters in length. Enlargement beyond five centimeters is considered abnormal. The ovaries contain 1-2 million oocytes (immature ova) at the time of birth. During a women’s reproductive lifetime, about 8,000 follicles are recruited for development, but only about 300 eggs are eventually released. If an ovarian follicle fails to rupture in the course of follicular development and ovulation, a cyst may develop. A cyst may also develop if the corpus luteum fails to respond to ovulatory signals to be reabsorbed promptly. Typically, these cysts are called “functional cysts” and may be three centimeters or larger. As menopause sets in, it is normal for the ovaries to atrophy to a size where they cannot be easily palpated during a pelvic exam.

The Menstrual Cycle

A woman’s reproductive years begin when she enters puberty. On average, this occurs at 10 years of age. The first signs that a girl is entering puberty occur when secondary sex characteristics begin to develop, such as the development of breasts (breast budding), broadening of the hips, and growth of pubic and underarm hair. The time interval from breast budding to the first menstrual period (menarche) is usually about two years. During this time, a girl’s body will go through a growth spurt and her percentage of body fat will increase. Once menstruation arrives, usually between 11-13 years of age, the growth spurt slows dramatically. By 14-16 years of age, a woman is usually mature in the reproductive sense and will continue menstruating until menopause sets in.

The menstrual cycle is regulated by the continuous interaction of the hormones estrogen and progesterone which are released from the ovaries. Follicle-stimulating hormone (FSH) and luteinizing hormone (LH) are released by the pituitary gland in response to gonadotropin-releasing hormone (GnRH) from the hypothalamus. There are three phases of the menstrual cycle: the follicular phase, the ovulatory phase (more of an event than a phase), and the luteal or secretory phase. The follicular phase begins on the first day of the menses, which is also counted as day one of the menstrual cycle.
The hormones involved:
- Estrogen
- Progesterone
- Follicle-stimulating hormone (FSH)
- Luteinizing hormone (LH)
- Gonadotropin-releasing hormone (GnRH)
- Human chorionic gonadotropin hormone (HCG)

The main organs involved:
- Hypothalamus
- Pituitary gland
- Ovaries

The cycle length is counted from the first day of one period to the first day of the next. The average length of the menstrual cycle is 28 days, but each woman is different and what may be normal for one woman may be abnormal for another. A “normal” cycle can vary from anywhere between 21-35 days. It is important that the number of days between menses stays about the same. If there is variation of more than eight days, then there may be concern that the periods are becoming irregular. In an average cycle, most women experience their LH surge around day 12, with ovulation occurring anywhere between day 13-14. A woman is most likely to get pregnant the three days before and the day of ovulation. Typically, once ovulation occurs and fertilization does not occur, it will be another 14 days before menses begins. Again, this number can vary among women but should remain about the same each month for each individual.

The follicular phase

Day one of the menstrual cycle starts on the first day of the menstrual flow or shedding of the endometrial lining. It usually lasts from 3-7 days. The average blood loss during menstruation is 35 milliliters, with 10-80 milliliters considered normal. Released from the influence of high progesterone levels, the hypothalamus secretes gonadotropin-releasing hormone (GnRH) to the pituitary gland, stimulating the secretion of follicle-stimulating hormone (FSH). FSH causes the ovaries to recruit 3-20 candidate follicles for maturation. Under the influence of several hormones, all but one of these follicles will undergo atresia, while one (sometimes two) dominant follicles will continue on to maturity. The maturing follicle secretes estrogen in increasing amounts which stimulates the uterine lining to thicken. The estrogen also stimulates the production of fertile cervical mucus.
The ovulatory phase

As the follicle reaches maturity, it secretes enough estradiol (a form of estrogen) to trigger a spike in the levels of luteinizing hormone (LH) and follicle-stimulating hormone (FSH) from the pituitary gland. It is this spike in LH and FSH that stimulates the follicle to release the egg. The release of LH helps to weaken the wall of the follicle and release the mature egg. Ovulation typically occurs 16 to 44 hours after the onset of the LH surge. The egg is swept into the fallopian tube by the fimbria (defined on page 3) that surround the opening of the fallopian tube. It is the movement of the fimbria that pulls the egg into the fallopian tube. After ovulation, the ruptured follicle closes. The egg moves down the fallopian tube to the uterus. If fertilization occurs, it will usually happen within the fallopian tube. Increasing levels of estrogen right before ovulation also change the consistency of the cervical mucus, making it more fluid and stretchy to help ease the sperm into the uterus.

The luteal phase

After ovulation, the ruptured follicle turns into the corpus luteum under the influence of LH. During the luteal phase, the levels of FSH drop and the corpus luteum secretes increasing amounts of progesterone. Along with estrogen, progesterone prepares the lining of the uterus for implantation of the fertilized egg, an embryo. Estrogen thickens the endometrial lining whereas progesterone makes the lining rich with glycogen, mucus, and other substances that will support the embryo during the initial stages of implantation. Progesterone will also increase the body temperature by 0.25-0.5°C (0.5-1.0°F). If fertilization does occur, the embryo will travel from the fallopian tube to the uterine cavity and will usually implant itself 6-12 days after ovulation. Once implantation has occurred, the embryo signals the corpus luteum that pregnancy has occurred by secreting the hormone human chorionic gonadotropin (HCG). This causes the corpus luteum to continue to secrete progesterone to maintain the pregnancy. If fertilization does not occur, there will be no HCG secretion and the corpus luteum will start to disintegrate. As the corpus luteum disintegrates, it no longer produces the same levels of estrogen and progesterone. As the levels of both of these hormones start to decline, the uterine lining is no longer supported and nourished and it begins to shed. This shedding is the menses and marks the beginning of another menstrual cycle. Once estrogen drops below a certain level, it signals the hypothalamus to release gonadotropin-releasing-hormone (GnRH), which then causes the pituitary gland to release more FSH to mature a new ovum for the next cycle.
Pregnancy

The length of a pregnancy is officially dated from the first day of the last menstrual period. Since conception cannot occur until a woman ovulates, which is typically about two weeks after the menstrual period begins, the age of the embryo is usually about two weeks younger than the length of the pregnancy. On average, a pregnancy lasts about 38 weeks from the time of conception or 40 weeks from the first day of the last menstrual period. Most women give birth within one or sometimes two weeks of the calculated delivery date. Pregnancy is usually divided into three trimesters. The first trimester is week one through week 12; the second trimester is week 13 to week 25; and the third trimester is week 25 to delivery.

Conception

Pregnancy begins at the moment of conception when the sperm fertilizes the egg. Fertilization usually occurs within the fallopian tube and then the zygote (or fertilized egg) continues to divide as it moves down the fallopian tube to the uterus. It usually takes 3-5 days for the zygote to reach the uterus, at which time the zygote becomes a blastocyst. A blastocyst is a hollow ball of dividing cells that is only one cell thick except for one area that is 3-4 cells thick.

Implantation

Implantation of the blastocyst into the uterine wall usually begins 5-12 days after fertilization. The blastocyst should implant near the top of the uterus. The thin outer part of the blastocyst that implants into the wall of the uterus will develop into the placenta, while the thicker inner part of the blastocyst develops into the embryo. The developing placenta forms tiny projections into the uterine wall that make intricate branches to increase the surface area of contact between the mother and embryo. This allows nutrients, oxygen, and waste to be exchanged easily. It is also responsible for producing the hormones essential for maintaining pregnancy. However, the major source of progesterone is still the ovary until the sixth or seventh week of pregnancy. Thereafter, the placenta begins to produce progesterone. The process of implantation is usually complete 9-10 days after fertilization, but the placenta continues to form until about 18 weeks after fertilization.

The first trimester

The cells of the blastocyst begin to differentiate by day eight following fertilization. At day 10, the amniotic cavity forms with the yolk sac, placenta, and growing embryo inside. The yolk sac helps to nourish the embryo as the placenta is forming. By day 16 or 17, the brain and spinal cord have started to form and the heart and
major blood vessels take shape. The cardiovascular system is the first system to function in the embryo. Usually by day 20, the cardiac cells begin to beat for the first time. The pharangeal arches begin to form which will become the future face, neck, mouth, and nose. During the next three weeks, the development of all organ systems occurs, so that by week 12 all of the anatomic organs are fully developed except for the brain and lungs. The embryonic period is very important because this is the time when all internal and external structures develop in the embryo. During this critical period, the exposure of an embryo to certain agents may cause major congenital malformations. By the end of the first trimester, the fetus is about three inches long.

The second trimester

During the second trimester, the pregnancy begins to show and the chance of miscarriage decreases drastically. The baby continues to grow rapidly so that, by the end of week 25, the baby will weigh approximately two and a half to three pounds and be about 11 inches long. The mother will be able to feel the baby moving around inside of her at this time. The brain continues to develop rapidly, especially in the frontal cortex where all of the higher brain functioning occurs. About halfway through the second trimester, the doctor may be able to determine the sex of the baby through an ultrasound. Four to six ounces of amniotic fluid surrounds the fetus at this time. This allows the doctor to do an amniocentesis if needed. Many of the early symptoms from the first trimester, such as nausea, begin to decrease as hormone levels even out. The mother should also experience an increase of energy during this time.

The third trimester

The last stage of pregnancy is the third trimester. Things start to get very crowded for the baby (and mother) and the baby will take on the typical fetal position. It is a time for organ finalization and for the baby to grow strong enough to survive on its own after birth. By the middle of the third trimester the lungs become fully formed, although the baby will not need them until the moment of birth. The brain is still developing in complexity, and each section of the brain becomes more differentiated and specialized. The eyes actually open during this time too. Near the middle of the ninth month, the baby will move into the position it will take during delivery. Commonly this is where the head moves down into the pelvic area and is facing the mother’s back. When the head moves down into the mother’s pelvis, the mother will be able to breathe much easier but may have more difficulty with sitting or walking. In the days before labor begins, there can be tightening of the uterus which may cause discomfort. Labor begins when the mother begins to feel
uterine contractions at regular intervals. The contractions increase in frequency and intensity as labor progresses. When the baby finally enters the world, he or she will weigh, on average, 6-9 pounds and measure 17-22 inches.

The Physiological Changes of Pregnancy

All of the body’s hormones and organ systems are affected by pregnancy. The placenta itself produces hormones to help maintain the pregnancy, namely HCG. Its role is to prevent the disintegration of the corpus luteum thereby maintaining the progesterone production that is critical for pregnancy. The high levels of progesterone prevent the maturation of a new egg, while LH and HCG stimulate the ovaries to produce higher levels of estrogen and progesterone to continue to maintain the pregnancy. The placenta also produces a hormone that increases adrenal hormone levels, such as aldosterone and cortisol, which, along with progesterone, contribute to edema. This increase in adrenal hormones can cause insulin resistance and an increased need for insulin. This is one reason why diabetics need to be especially careful during pregnancy and also why doctors look out for gestational diabetes. In addition, the placenta also produces a hormone that causes the thyroid gland to become more active which can lead to mood swings, increased sweating, heart palpitations, and, sometimes, an enlarged thyroid.

The digestive system is also another area of the body that undergoes a lot of change. Constipation is very common as the pregnancy progresses as the growing uterus puts pressure on the rectum and the lower part of the intestine. In addition, the higher levels of progesterone cause the muscular contractions of the intestinal wall to slow down so food moves more slowly through the intestines. This also causes food to remain in the stomach a little longer, increasing belching and heartburn. The heartburn is not due to an increase in stomach acid, as stomach acid production tends to decrease during pregnancy, but is instead due to relaxing of the sphincter between the stomach and esophagus.

During pregnancy, the heart needs to work much harder to meet the demands of the growing fetus. The heart rate increases from the normal 70 beats per minute to 80-90 beats per minute. The amount of blood pumped per minute (cardiac output) also increases by 30-50%. The volume of blood and the number of red blood cells also increase during pregnancy. This increases the requirements for iron by the mother which can be met by iron supplements. By week eight, the uterus is receiving one-fifth of the entire blood supply of the mother. This increase in the volume of blood required by pregnancy increases the demand on the kidneys to filter that blood. Urination becomes more frequent and urgent as the uterus grows and presses on the bladder and the kidneys filter more blood.
As the fetus grows, the enlarging uterus will change how the lungs expand and raise the resting position of the diaphragm. This decreases the functional residual air capacity of the lungs. Oxygen consumption needs to increase by about 15-20% to meet the metabolic needs of the growing fetus as well as to meet the increased cardiac and renal work. The respiratory rate does not increase to meet these needs. Rather the tidal volume increases (the volume of air inspired and expired with each breath). Also, increased progesterone levels signal to the brain that carbon dioxide (CO₂) levels in the blood need to decrease. This is done by increasing cardiac output and alveolar ventilation to a level that supercedes oxygen requirements by the body, thereby decreasing the total partial pressure of CO₂ within the blood.

**Labor and delivery**

The exact trigger which leads to labor is unclear to doctors. It is believed to be caused by the release of oxytocin from the pituitary gland which then causes the uterus to contract. The length of time labor lasts can vary among women and depends on whether or not they have had a baby before. Usually, labor lasts anywhere from 6-14 hours.

There are three stages that occur during labor: early labor, active labor, and transition.

During early labor, the cervix dilates 3-4 centimeters and contractions occur lasting 30-60 seconds and come at regular but increasing intervals. There may also be a backache or cramps. The mother’s water will break as a gush or a trickle, and there will be a discharge that is bloody or brown called the “bloody show.”

During active labor, the cervix will dilate to seven centimeters, and the contractions become stronger, more frequent, and longer in duration. Pain usually becomes intense at this point, and pain medication is often given. The mother is usually encouraged not to push until she is fully dilated. Pushing too soon may cause the cervix to tear.

The last phase of labor is the transition phase. This is when the cervix dilates from 7-10 centimeters leading up to the delivery. Here the contractions reach peak intensity, last longer, and become so frequent that there may not be much time in between to breathe. Once fully dilated, it is time to push.

There are many different positions the mother can take while pushing. The most common is lying in a semi-upright position in the birthing bed. Squatting or sitting can also work well for some. When about two inches of the head appears, the mid-
wife or doctor will try to manually control the delivery of the baby’s head. Once the head and then the shoulders emerge, the baby’s airway is cleared by the midwife or doctor of all mucus and fluid and the rest of the body follows quickly.

Delivery of the placenta comes shortly after the baby is born. Usually the placenta detaches following the first or second contraction after delivery, but the doctor or midwife may help it along by massaging the abdominal area. The mother is usually asked to push one more time once the placenta has detached and a gush of blood will come out with the placenta. The doctor will examine the placenta to make sure that it is intact, and, if it is not, the remaining pieces must be removed. As soon as the placenta is delivered, the doctor may stitch any tears to the cervix or vagina, and the mother is given oxytocin to help the uterus to contract and stop any excessive bleeding from where the placenta was attached. The next 3-4 hours are a very special time where the mother and baby get to bond and the baby will nurse for the first time.

**Breastfeeding**

Breast milk is the ideal food for the newborn baby. The pituitary, ovarian, and placental hormones prepare the breasts for feeding. After the baby has been delivered, the breasts begin to secrete colostrum for the first five days. Colostrum is a translucent, yellow-colored liquid that contains more minerals and protein and less sugar and fat than the mother’s mature milk. Over the next few days as the mother continues to breastfeed, the colostrum matures into normal human breast milk. Breast milk and colostrum both contain white blood cells and antigens that protect the baby against pathogens. It also changes the pH of the baby’s stool and promotes healthy intestinal flora to prevent bacterial infections in the intestinal tract. Breast milk also contains the ideal ratio of nutrients to support proper growth and development for the new baby.

At first, milk production may seem insufficient and the process of having the newborn “latch on” to the breast may seem awkward and uncomfortable. Over time with continued feeding, milk production increases and both the mother and baby become more comfortable with the whole process. Typically, a mother breastfeeds during the first six months of the baby’s life and continues to do so as the baby explores solid foods.

Ovulation is usually suppressed while the mother is breastfeeding frequently. This is because the hormone prolactin is released with suckling, thus suppressing ovula-
tion. As the mother begins to decrease her breastfeeding sessions, she is more likely to ovulate. On average, most women who do breastfeed can expect their menses to return within 36 weeks of delivery. Even with regular and frequent breastfeeding, it is still possible for ovulation to occur. If the mother chooses to not breastfeed, ovulation typically returns 2-3 weeks after delivery.

**Menopause**

Menopause is the permanent cessation of menstruation caused by the failure of ovarian follicular development and estradiol production in the presence of elevated gonadotropin levels, namely FSH. Menopause literally refers to the date of the last menstrual period. The exact time of menopause is usually made in hindsight, namely one year without menses in women who are not pregnant or lactating and still have a uterus. It is a natural process where the cyclic function of the ovaries stops and the menstrual cycle ceases. A woman’s ovaries become unresponsive to FSH and do not recruit and mature a dominant follicle in the ovary for ovulation. It is the follicle that is responsible for the production of estradiol and progesterone, and, in the absence of such follicles, estrogen and progesterone levels drop. This triggers the pituitary gland to release more FSH to mature a new follicle. Nevertheless, the ovaries remain unresponsive, and a woman’s cycles become more erratic and unpredictable, leading eventually to menopause.

On average in the West menopause occurs at 51 years of age, but it is normal for it to occur in women as young as 40. If menopause occurs before the age of 40, this is called premature ovarian failure or premature menopause and, unlike menopause, it is a disorder. Perimenopause is the time between the onset of irregular menses and permanent cessation of menstruation. It can start anywhere from 35-50 years of age and can last from 2-10 years. The average duration is four years. The stage preceding menopause is characterized by hormonal fluctuations which lead to a whole range of typical menopausal symptoms. The follicles that are in the ovaries of a perimenopausal woman are less sensitive to the stimulation of FSH. Therefore, there will be fewer cycles where a follicle fully matures, leading to a decrease in the amount of estrogen produced. When levels of estrogen remain low, FSH levels remain high in an attempt to mature the follicle. Low estrogen levels may also fail to trigger the LH surge needed to rupture a follicle for ovulation to occur. Progesterone also declines during this period, and the decrease in both progesterone and estrogen results in a shorter time between menstrual cycles. These shortened or irregular cycles are sometimes one of the first signs that perimenopause has begun.
Typical symptoms of perimenopause and menopause include:

- Hot flashes, night sweats
- Insomnia, sleep disturbances
- Mood swings, irritability
- Memory lapses, poor concentration
- Vaginal dryness and atrophy, changes in libido
- Low bone mass and the risk of osteoporosis
- Joint pain, muscle pain, back pain
- Headaches
- Weight gain
- Changes in hair quality, aging skin
- Lack of energy
- Depression and/or anxiety
- Palpitations
- Irregular menses, anovulation

Hot flashes are the sensations of heat in the upper part of the body that are often accompanied by excessive sweating. They can last anywhere from 30 seconds to five minutes. Hot flashes usually last for more than a year and, in some women, may continue more than five years.

Osteoporosis is a big concern for women in menopause and steps need to be taken to prevent the thinning of the bones. Women who smoke, drink excessive amounts of alcohol, do not exercise, and eat a poor diet lacking in nutrients, especially calcium and magnesium, are at the highest risk of osteoporosis. Most bone loss occurs during the first five years of menopause, where a woman can lose up to three percent of her bone mass per year. Bone loss continues for the rest of a woman’s life at a rate up to 1-2% per year. Drinking caffeine can also increase the rate of bone loss. Estrogen replacement therapy (ERT) may help to prevent the loss of bone, but eating well, exercising, and not smoking or drinking caffeine and alcohol excessively, go a long way in keeping bones strong and healthy.

As estrogen levels decrease, atherosclerosis can also become a health concern in menopausal women. Estrogen has a positive effect on keeping cholesterol levels in check. When the estrogen levels decrease, the “bad” cholesterol (low-density lipoprotein, LDL) tends to increase and the “good” cholesterol (high-density lipoprotein, HDL) tends to decrease. This can lead to atherosclerosis and coronary artery disease (CAD).

As of this writing, the main Western medical treatment for women going through
menopause is hormone replacement therapy (HRT) using estrogen with progestin. While this therapy has the benefits of decreasing the chances of osteoporosis, it can increase the chance of endometrial cancer, breast cancer, stroke, and gallbladder disease. Giving progestin with estrogen decreases the risk of endometrial cancer. There is also a class of drugs called selective estrogen receptor modulators (SERMs) which can be used in place of estrogen/progestin HRT. Selective estrogen receptor modulators are a class of medication that acts on the estrogen receptor. A characteristic that distinguishes these substances from pure receptor agonists and antagonists is that their action is different in various tissues, thereby allowing the possibility to selectively inhibit or stimulate estrogen-like action in specific tissues. The SERM most helpful for menopausal symptoms, especially hot flashes and loss of bone density, is Fosomax®.