



New Hope Fertility Center

REPRODUCTIVE HEALTH OVERVIEW

FROM EGG TO EMBRYO YOUR GUIDE TO IVF
A PATIENT HANDBOOK

Introduction Getting Started

Dear Patient,

New Hope Fertility Center is a global leader in gentle, assisted reproductive methods that reduce stress on mothers and increase the chances of a healthy birth.

We emphasize personalized care and offer a full range of assisted reproduction services. Our practice combines cutting-edge technology with a commitment to low-drug methods of assisted conception. This approach offers a high level of success without the trauma and stress of heavy-dose hormone therapy integral to Conventional IVF treatment.

When you enter our facility, you will be greeted by a world-class team that uses the most advanced, yet gentle, treatments available. As you begin your treatment, we encourage you to keep a journal of your thoughts and note questions to ask during your appointments. Our team is here to provide support and ensure your experience is simple, successful, and stress-free.

We have designed this IVF Handbook to serve as a step-by- step treatment guide and a resource for information. We invite you to review the materials and contact our fertility team with any questions. This journey will be one of the most important and rewarding experiences of your life and we are here to support you every step of the way.

Warmly,



Dr. John Zhang,
MD, MSc, PhD, HCLD
Founder & Director
New Hope Fertility Center

About us

Patients Come first at New Hope Fertility Center.

We understand that the journey to parenthood can be challenging. That's why our staff is dedicated to supporting you through every stage of the journey. We are truly honored that you are considering New Hope Fertility Center and consider it our duty to provide you with the absolute best fertility care possible.

At New Hope Fertility Center, we custom-design our fertility treatments to each individual. Each person's unique fertility plan is designed to ensure that they are receiving the comprehensive care that is right for their body. Each person's unique protocol is specially designed to ensure the patient is receiving the highest quality care at the most optimal times for their body. We achieve this through blood testing and constant monitoring.

Our treatments at New Hope offer minimal stimulation and result in a gentler and more physiologically supportive experience. With a Conventional IVF cycle, numerous shots and medications simultaneously shut down the body's naturally occurring fertility system and create an artificial one, forcing the ovaries to create many eggs. Our Mini-IVF™ and Natural Cycle IVF protocols allow us to learn about your body so that we can help you augment and enhance your own, naturally occurring

fertility. New Hope diligently monitors and adjusts treatment protocols to nurture your body's highest quality eggs, allowing for high IVF success rates with Single Embryo Transfer. Our advanced technique for cryopreservation (vitrification) has over 90% thaw-survival-rate, providing you the option to freeze additional embryos.

Patients from around the world and of all ages, ethnicities, and sexual orientation are seen 365 days a year. Schedule a consultation today to get started with your customized fertility plan.

Whether you are exploring IVF options or looking to preserve your fertility, New Hope can assist you with your family planning. We are ready to provide you with a full range of both male and female assisted reproduction services.

Chapter 1

Reproductive Health Overview

The Female Reproductive System

The female reproductive system is a complex system of several organs that produces egg cells and nourishes and protects the developing embryo. Using Figure 1.1a as a guide, familiarize yourself with the main parts of the female reproductive system.

- **The vagina is a musculomembranous canal that is the female sexual organ.** It extends from the cervix of the uterus to the exterior of the body. The cervix is the narrow opening of the uterus.

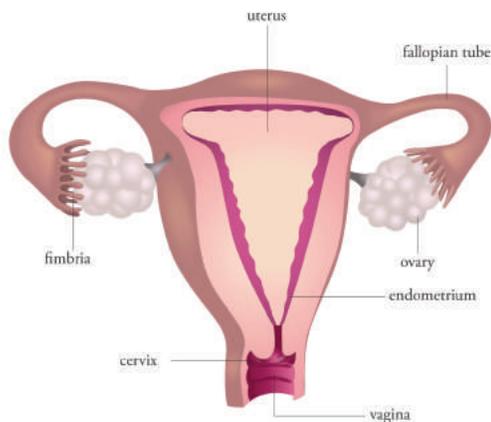


Figure 1.1a The Female Reproductive System

- **The uterus is a muscular, hollow pear-shaped organ in the lower pelvis. It is home to the embryo as it develops into a fetus during pregnancy.**

Upon fertilization, the egg develops into an embryo. It attaches to and is nourished by the lining of the uterus, the endometrium. The endometrium is composed of mucous membrane influenced by estrogen and progesterone hormones. It becomes thick each month in order to support a pregnancy. If pregnancy does not occur, the thickened lining is shed during a process called menstruation.

- **The fallopian tubes are 3-4 inch tubes extending from the upper sides of the uterus to just above the ovaries.** The tubes form a passageway between the uterus and the ovaries. Here, the egg and sperm meet and fertilization can occur. Extending from each tube, just above the ovary, are fingerlike projections called the fimbriae, which catch the egg released by the ovary so that it can be drawn up into the tube.

- **The ovaries are home to a woman's life time reserve of eggs. By the time a female begins her menstrual cycle; her egg reserve has decreased from several million at birth to about 400,000.** As a woman ages, her egg reserve continues to diminish until menopause, when her reserve is depleted. During each cycle, several eggs mature in the ovaries in fluid-filled sacs called follicles. Each month, one "dominant follicle" develops and then ruptures, releasing a single egg, which is drawn into a fallopian tube for possible fertilization (see Figure 1.1b).

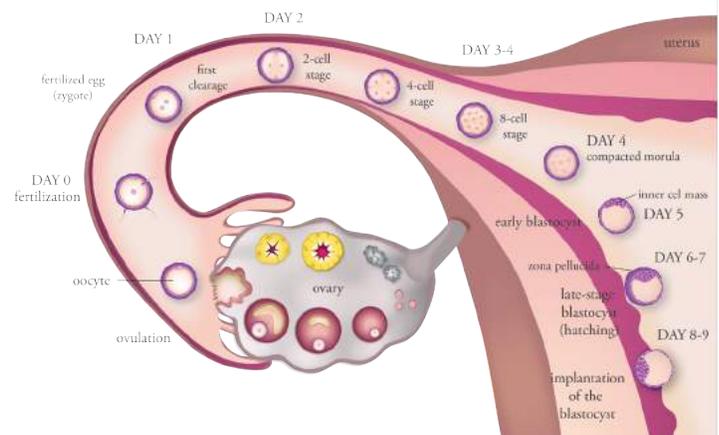


Figure 1.1b Fertilization Process

The Menstrual Cycle

The menstrual cycle is the monthly pattern of preparing for a possible pregnancy. The average menstrual cycle is 28 days, though some women may experience shorter or longer cycles. During a menstrual cycle one of the ovaries releases an egg and the uterus grows a new endometrium. If the egg is not fertilized by sperm, the endometrium sheds from the uterus in form of a menstrual period through the cervix and vagina. The menstrual cycle is controlled by the hypothalamus, the pituitary, the ovary and the uterus. Many systems communicate by hormones – substances that carry the information from one cell to another. The hormonal system is chiefly regulated by the pituitary gland, the brain and the ovaries.

Follicular Phase

During the follicular phase, the pituitary gland releases follicle stimulating hormone (FSH) which stimulates the growth and development of follicles in the ovaries. As the follicles mature, estrogen levels start to rise sending feedback information to the brain that signals the pituitary gland to inhibit FSH production and begin the production of luteinizing hormone (LH). In addition to reducing FSH production, estrogen also causes the endometrium to thicken and later be ready of embryo implantation. The spike of LH triggers ovulation, which occurs mid-cycle. This feedback loop is shown below in Figure 1.2a.

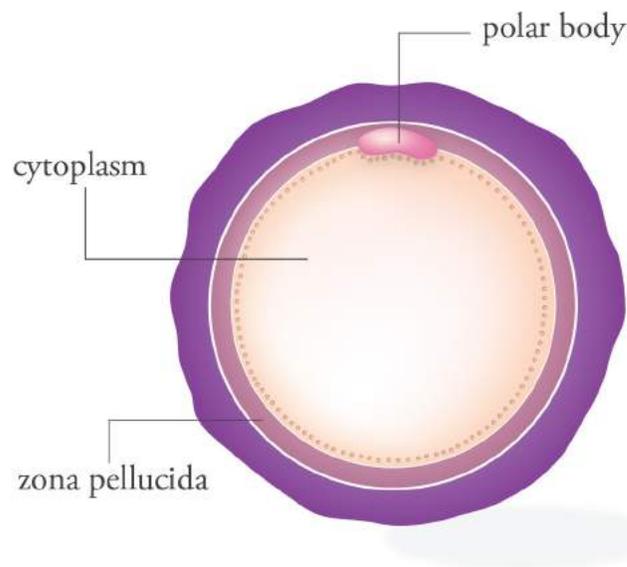
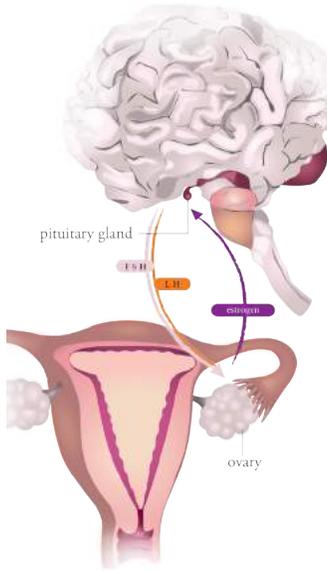


Figure 1.2a Structure of the egg



Luteal Phase

As LH and FSH spike, the “dominant follicle” ruptures and releases a single, mature egg known as an oocyte. The egg leaves behind the ruptured follicle that shortly thereafter gets filled with blood and forms another functional structure called corpus luteum. The corpus luteum secretes progesterone, which encourages the transformation of the endometrium in preparation for implantation.

Meanwhile, the egg travels in one of the fallopian tubes toward the uterus. While in the fallopian tube, the egg may be fertilized by sperm, if sexual intercourse occurred and an adequate amount of sperm is available in the vagina. Once the egg is fertilized, it will continue moving toward the uterus in the form of an embryo and eventually may attach to the endometrium.

Figure 1.2b Luteal Phase.

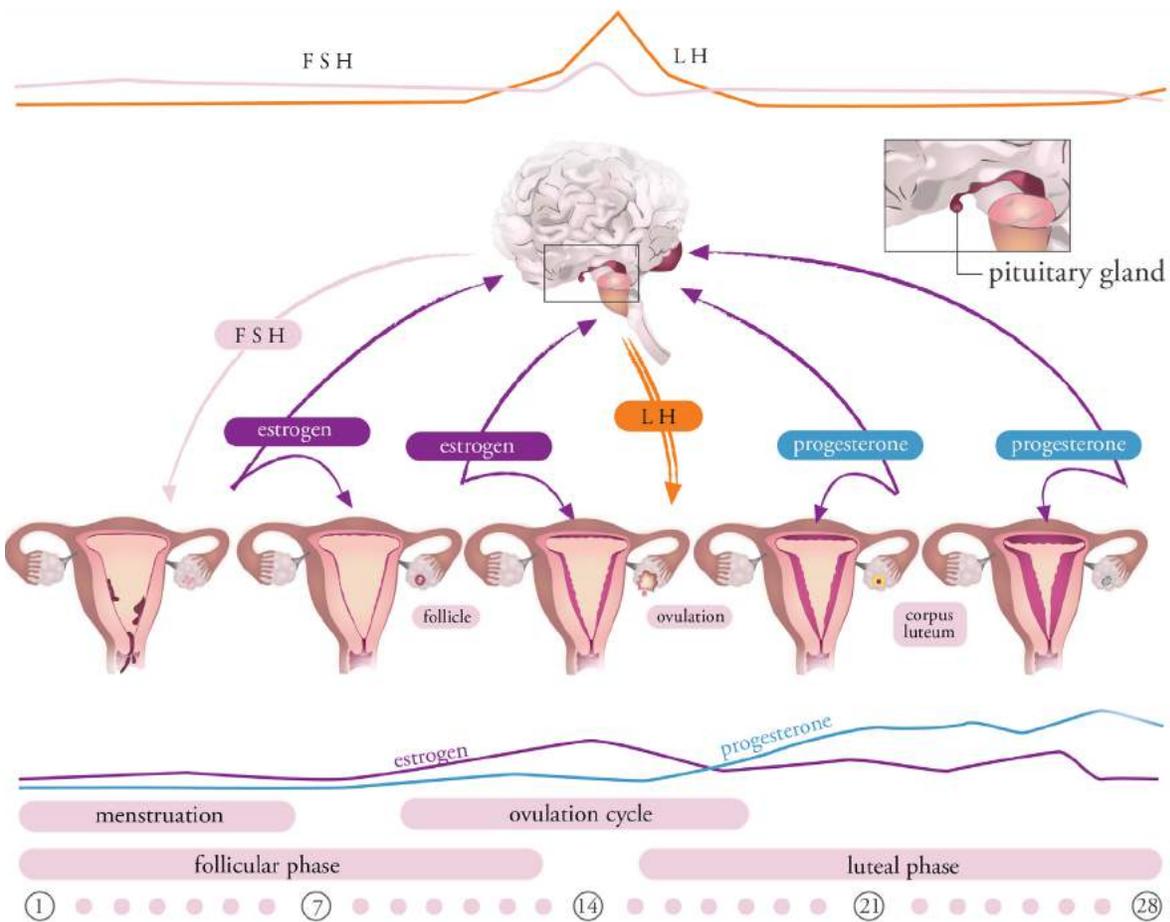
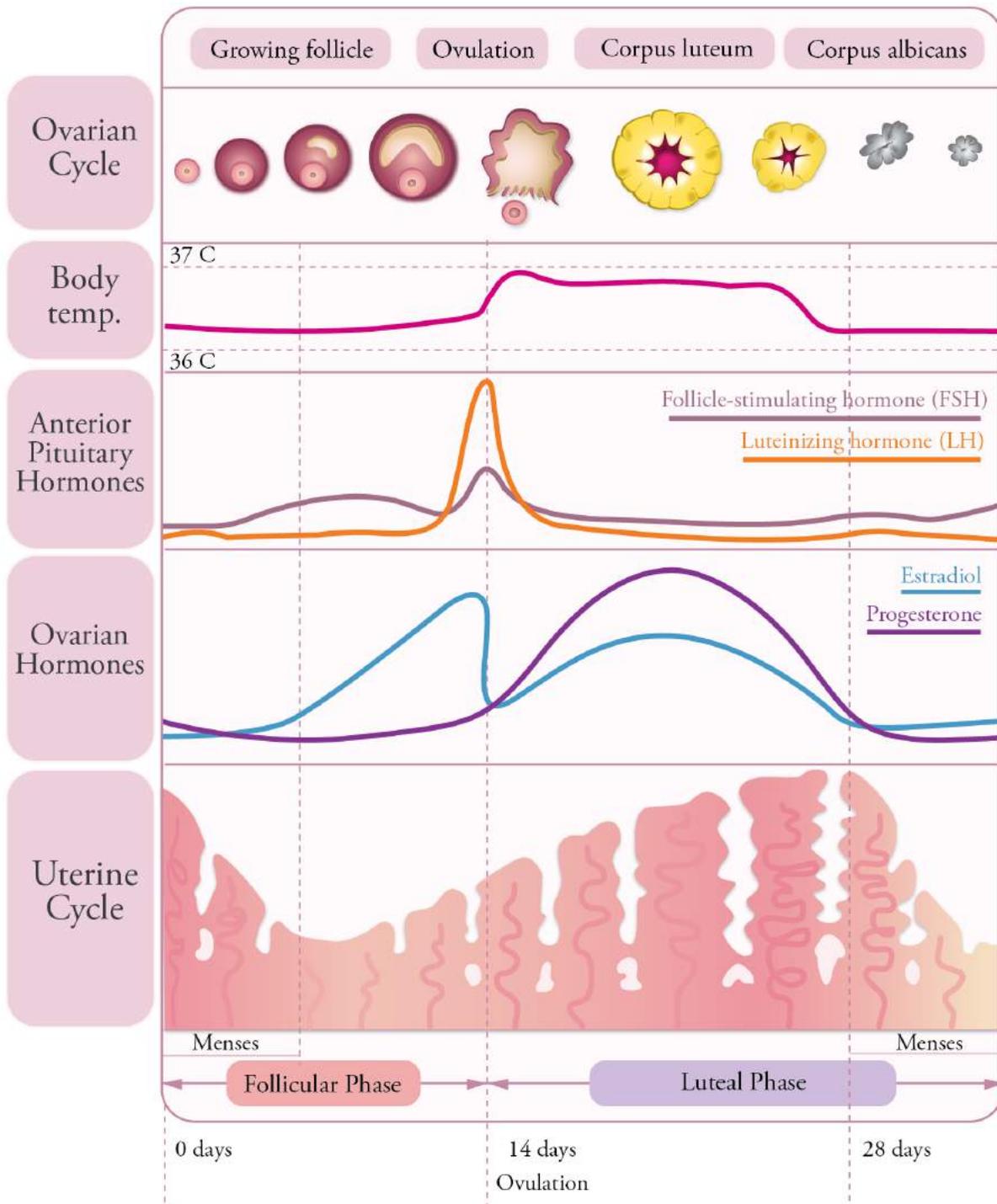


Figure 1.2c and 1.2d The Menstrual Cycle

The corpus luteum lasts only 12-14 days, unless it begins to receive human chorionic gonadotropin (hCG) from the implanted embryo, in which case it remains active for 10 weeks. If pregnancy does not occur, the corpus luteum breaks down, progesterone levels decrease, and menstruation occurs; the endometrium, which is no longer needed, is expelled through the cervix and vagina. The corpus luteum is replaced by a scar called the corpus albicans. Use the following figures to guide you through the phases of the menstrual cycle.



Fertilization and Pregnancy

Pregnancy can occur only if the egg encounters sperm within 24 hours of ovulation. After ejaculation, sperm swim from the vagina up through the cervix into the uterus. From the uterus, they make their ascent into both of the fallopian tubes, propelled by their tails and by the contractions of the uterine walls. If ovulation has not occurred when they arrive at the fallopian tubes they can survive up to three days, waiting to fertilize an egg.

When egg and sperm connect, many sperm attempt to burrow through the outer membrane of the egg, called the zona pellucida (see Figure 1.3a). If a single sperm is successful in breaking through the zona, fertilization occurs. The egg becomes impenetrable to other sperm and the single sperm that has entered fuses with the egg, transferring its genetic material. The fertilized egg goes through cell division over the course of the next four days and the fertilized egg, now known as an embryo, travels to the uterus. On day five, the embryo rearranges itself into a hollow ball of cells called a blastocyst. Pregnancy may occur once the blastocyst or embryo has attached to the endometrium. Embryo implantation is shown in figure 1.3b on the next page.

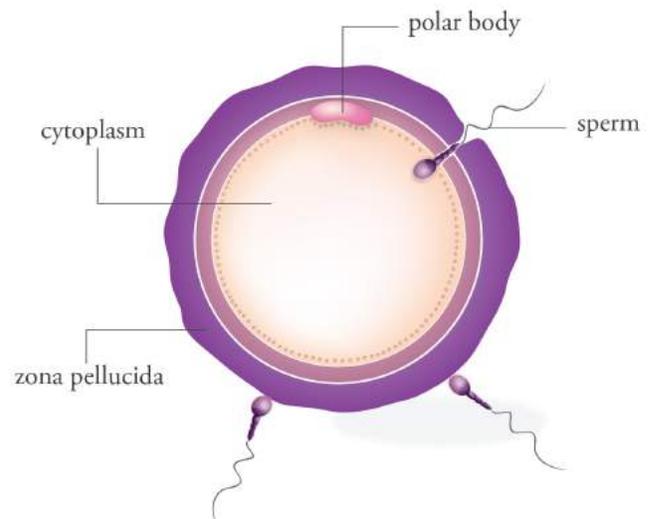


Figure 1.3a Fertilization: Sperm burrowing through the zona pellucida.

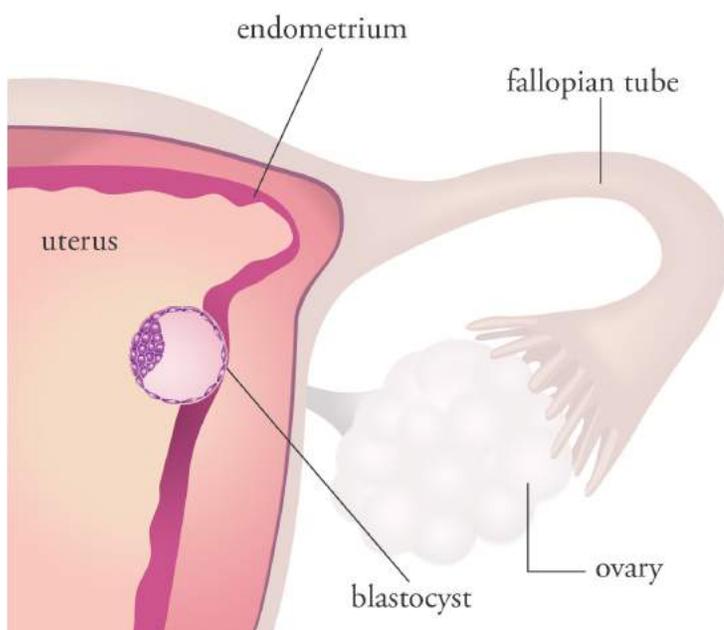


Figure 1.3b Embryo implantation.

Common Causes of Female Infertility

Below you will find a list of the most common causes of female infertility. In general, these include gynecological factors, hormonal dysregulation, sexually transmitted diseases, diet and lifestyle.

• **Age:** Fertility is greatly influenced by age. After the age of 35, fertility decreases rapidly, and by age 45, the monthly chance of becoming pregnant naturally is approximately 5%.

• **Early menopause:** The absence of menstruation and the early depletion of ovarian follicles before age 35 can result in infertility. Although the cause is often unknown, immune system diseases, radiation, chemotherapy and smoking are often associated with this condition.

• **Elevated prolactin:** Prolactin is the hormone that, when elevated, stimulates breast milk production. In women who are not pregnant or nursing elevated prolactin can negatively affect ovulation. High levels may result from a pituitary tumor or as a side effect of various drugs.

• **Emotional stress:** Prolonged emotional stress may interfere with the normal production of the FSH and LH hormones required for reproduction, decreasing the body's ability to produce a follicle and ovulate naturally.

• **Endometriosis:** Endometriosis is the growth of endometrial tissue outside of the uterus. This tissue responds to the hormonal cycle and grows, sheds and bleeds in sync with the lining of the uterus each month. Endometriosis can lead to inflammation, pelvic pain and infertility.

• **Ovulation disorders:** Hypothalamic-pituitary disorders can result in low levels of LH and FSH, disrupting normal ovulation.

• **Polycystic Ovary Syndrome (PCOS):** An ovulation disorder caused by many ovarian cysts. In most patients this syndrome goes along with absent or irregular menstrual periods and is also associated with endocrine anomalies like changes in sugar and fat metabolism. In addition, patients with PCOS can have excessive reaction to gonadotropins. Once normal menses are resumed, the patients should have excellent chances to get pregnant.

• **Smoking:** The chemical components of cigarettes have been isolated in the fluid surrounding developing oocytes (eggs) to show that smoking can cause DNA damage during oocyte cell division.

• **Pelvic adhesions:** Pelvic adhesions form bands of scar tissue that bind organs after pelvic infections, such as Gonorrhea or Chlamydia. They may form as a result of appendicitis, abdominal or pelvic surgery, and may impact fertility.

• **Thyroid disorders:** Hyperthyroidism and hypothyroidism can disrupt the menstrual cycle and cause infertility.

• **Tubal factors:** Obstruction caused by benign uterine fibroids or scarring in the fallopian tubes can affect fertility both by making it more difficult for an egg to travel down the fallopian tubes, and by preventing the sperm from reaching the oocyte, preventing fertilization. If the sperm and the oocyte do meet, the fertilized egg may not be able to travel to the uterus, increasing the risk for an ectopic pregnancy. Tubal infection may also have long term effects on fertility since the risk of ectopic pregnancy increases with each occurrence of tubal infection.

• **Weight management:** Being over or underweight can disrupt the menstrual cycle, which can interfere with ovulation and hormone regulation. Women who have difficulty with weight management may have reduced pituitary hormones such as FSH and LH that hinder ovulation.

• **Other medical conditions:** Fertility may be impaired as a result of autoimmune disorders, sexually transmitted diseases, cancer treatments, diabetes, anemia and the irregular shape of reproductive organs such as the uterus.

The Male Reproductive System

The male reproductive system differs from the female reproductive system in many ways. Unlike women, men produce their sex

cells, called sperm, throughout sexual maturity. Additionally, male reproductive organs are both internal and external. Use Figure 1.5 to familiarize yourself with the main parts of the male reproductive system

- **The penis and the testes are both external parts of the male reproductive system.** The testes make sperm and secrete the hormone testosterone.

- **Sperm are stored and mature in the epididymis, the tissue layer surrounding the testes.**

The production and maturation of sperm takes approximately 72 hours and sperm remain viable within the epididymis for several months.

- **From the epididymis, sperm travel via the vas deferens to a walnut-sized gland called the prostate.** The prostate surrounds the urethra and produces prostatic fluid that is added to semen.

- **Located above the prostate gland are seminal vesicles,** which produce seminal fluid and join the vas deferens at the ejaculatory duct.

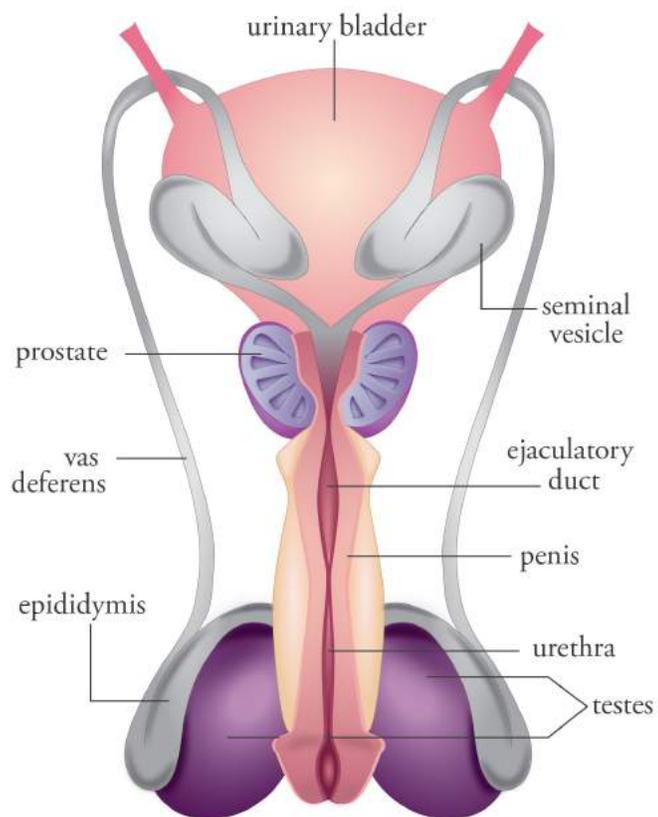


Figure 1.5 Male Reproductive System: The male reproductive system is composed of both external and internal organs.

Common Causes of Male Infertility

A number of factors can contribute to male infertility. These include conditions affecting sperm function, production and delivery, hormonal dysregulation, sexually transmitted diseases, and general health and lifestyle factors

• **Age:** Though not as marked in men as it is with women, a gradual decline in fertility is common after age 40 in men.

• **Impaired shape and motility:** Abnormal spermatogenesis, or sperm production, may result in sperm that are not able to reach the egg or to penetrate it.

• **Low sperm concentration:** Normal sperm concentration in men is greater than or equal to 20 million sperm per milliliter of semen. Sperm count \leq 50% of this number indicates low sperm concentration.

• **Varicocele:** Varicose veins in the scrotum, called varicocele, may prevent normal cooling of the testicles and lead to reduced sperm count and motility.

• **Undescended testicle:** This congenital condition occurs when one or both testicles fail to descend from the abdomen into the scrotum during fetal development. Because undescended testicles are exposed to higher internal body temperatures compared to the temperature in the scrotum, sperm production may be decreased.

• **Testosterone deficiency (male hypogonadism):** Disorders of the testicles, or conditions affecting the hypothalamus or pituitary gland in the brain, may result in low testosterone levels that impair fertility.

• **Testicular overheating:** Frequent use of saunas or hot tubs can impair sperm production and lower sperm count by raising the core body temperature.

• **Genetic defects:** Some sperm abnormalities may be the result of genetic predispositions.

• **Sexually transmitted diseases:** Repeated bouts of sexually transmitted diseases, such as chlamydia and gonorrhea, can affect sperm motility.

• **Organic issues:** Erectile dysfunction, premature ejaculation, painful intercourse and psychological problems can all contribute to infertility.

• **Retrograde ejaculation:** This occurs when ejaculate does not leave the body during orgasm but, instead, enters the bladder.

• **Blockage of the reproductive system or anatomical irregularities:** Blockage of the ejaculatory ducts or various passages through which sperm and ejaculate flow can affect fertility. Men with cystic fibrosis sometimes have a missing or blocked vas deferens, and the lack or misplacement of any part of the reproductive system will often require reconstructive surgery.

• **No semen (ejaculate):** Men with spinal cord injuries or diseases may not have the ability to produce the fluid required to carry the sperm from the penis into the vagina.

• **Pesticides and other chemicals:** Herbicides and insecticides have been associated with reduced sperm production and testicular cancer. Lead exposure may also cause infertility.

• **Malnutrition and weight management:** Deficiencies in nutrients such as vitamin C, selenium, zinc and folate may contribute to infertility. Additionally, a high body mass index is associated with impaired fertility in men.

• **Smoking, alcohol and substance abuse:** Use of any of these substances may temporarily reduce the number and quality of sperm.

• **Cancer treatments:** Cancer treatments such as radiation, chemotherapy, and in the case of testicular cancer, the removal of the testicles, can affect fertility.

• **Other medical conditions:** Fertility may be impaired as a result of various health conditions such as autoimmune disorders, diabetes, thyroid disease, Cushing's syndrome and anemia

Glossary

Glossary

The following terms either appear in this handbook or will be used commonly by your Personal Care Team

Androgen: A male sex hormone that is produced in the testes and is responsible for typical male sexual characteristics.

Anovulatory cycle: A cycle during which the ovaries fail to release an oocyte. Therefore, ovulation does not take place. Chronic anovulation is a common cause of infertility.

Anesthesia: Loss of bodily sensation with or without loss of consciousness.

Antral follicle count: The number of follicles detected by the ultrasound at the beginning of the menstrual cycle. This indicates the size of your ovarian reserve.

Assisted hatching: A procedure performed after fertilization and prior to implantation in which the zona pellucida of the embryo is partially opened by application of a laser to facilitate embryo implantation.

Assisted reproductive technology (ART): All fertility treatments that include the handling of eggs and sperm.

Basal Body Temperature (BBT): Body temperature in the morning before rising, moving about or eating.

Blastocyst: An embryo usually five days after fertilization that has formed a fluid-filled cavity. At this stage the cells begin to form the early placenta.

Cervix: The narrow entrance to the uterus.

Clinical pregnancy: A pregnancy confirmed by hormone levels and visible by ultrasound.

Clomiphene challenge test (CCCT): A common test of ovarian reserve in which FSH is checked on days three and ten of the menstrual cycle and Clomid is taken on days five through nine.

Cryopreservation: Freezing at a very low temperature to keep embryos, eggs, or sperm viable for further transfer or fertilization. Vitrification is an advanced type of cryopreservation.

Corpus albicans: The regressed form of the corpus luteum.

Corpus luteum: A yellow mass of cells that forms from an ovarian follicle during the luteal phase of the menstrual cycle.

Cyst: An abnormal, closed, sac-like structure within a tissue that contains either fluid or tissue. A cyst can occur anywhere in the body and can vary in size.

DNA: The hereditary material in humans and almost all other organisms.

Dominant follicle: The follicle that outgrows all other follicles in the ovary. In a natural cycle only one follicle becomes dominant and this results in only one egg being released.

Ectopic pregnancy: A pregnancy where the embryo is not embedded in the uterine lining. Usually it is lodged in the fallopian tubes.

Egg: The female sex cell produced and matured by the ovary, also called an ovum or oocyte.

Egg retrieval: A procedure performed right before ovulation in which eggs are removed from the ovaries via an ultrasound-guided needle and suction.

Ejaculation: The discharge of semen.

Ejaculatory duct: A canal formed by the union of the vas deferens and the duct from the seminal vesicles.

Embryo: A fertilized egg that has begun cell division.

Embryo bank: A collection of stored embryos.

Embryo transfer: Placement of an embryo into the uterus.

Endometriosis: A condition in which tissue resembling the lining of the uterus grows outside the uterus. It is often associated with infertility.

Endometrium: Layer of fine tissue completely covering the inside of the uterus. It is very sensitive to hormones and there is a window of time when the embryo can attach and start growing into it.

Epididymis: A tubule in each testicle that carries sperm to the vas deferens.

Estradiol: The most common estrogen (hormone) produced by the ovaries.

Estrogen: The female hormone largely responsible for the development of female secondary sex characteristics, the thickening of the endometrium and regulating the other aspects of the menstrual cycle.

Fallopian tubes: Part of the female reproductive system where sperm and egg meet in normal conception. This pair of tubes leads from each ovary to each side of the uterus.

Female factor infertility: Infertility caused by the female reproductive system.

Fertilization: The union of sperm and egg to form one cell with the genetic material of both parents.

Fibroids: Non-cancerous growths of the uterine wall that can cause abnormal uterine bleeding and pain.

Fimbria: Thin finger-like projections lining the fallopian tubes. Fluorescent In Situ hybridization: A technique that uses fluorescent markers to detect changes in the genetic material.

Fluoroscopy: An imaging technique that uses X-rays to cast shadows of an internal structure on a fluorescent screen; the shadows vary in intensity according to the density of the structure.

Follicle: A fluid-filled sac in the ovary containing an egg.

Follicle-stimulating hormone (FSH): The pituitary hormone responsible for stimulating the growth and maturation of follicles. It acts in concert with LH.

Frozen egg bank: A collection of stored eggs.

Frozen embryo transfer (FET): The transfer of a once cryopreserved embryo, now thawed, via IVF into the uterus.

Genome: The total genetic information of a particular organism.

Gestation: The period during which an embryo develops.

Gestational surrogate: A woman who carries a pregnancy for another woman. The surrogate does not have a genetic relationship to the resulting child. The pregnancy is derived from the egg and sperm of the intended parent and her partner or donor, not the surrogate.

Gonadotropin releasing hormone (GnRH): Hormone secreted by the hypothalamus, a control center in the brain, that prompts the pituitary gland to release FSH and LH.

GnRH agonists: A GnRH analog that initially stimulates the pituitary gland to release LH and FSH. It can be used at the beginning of an IVF cycle to help stimulate follicular growth.

GnRH analogs: Synthetic hormones similar to the naturally occurring gonadotropin releasing hormone used to prevent premature ovulation. There are two types of GnRH analogs: GnRH agonists and GnRH antagonists.

GnRH antagonists: Synthetic hormones similar to the naturally occurring gonadotropin releasing hormone, that are used to prevent premature ovulation. These medications have an immediate suppressive effect on the pituitary gland.

Human chorionic gonadotropin (hCG): A hormone produced by the placenta, the detection of which is the basis for most pregnancy tests. It induces ovulation and follicular maturation.

Hormone replacement therapy (HRT): The administration of estrogen, progesterone, or a combination of the two to counteract the hormonal effects and the decrease in these hormones during menopause.

Hyperthyroidism: Over production of thyroid hormones due to an overactive thyroid.

Hypothyroidism: Under production of thyroid hormones due to an underactive thyroid.

Hypothalamic pituitary disorder: The loss of function in an endocrine gland due to a failure of the pituitary gland to secrete hormones that stimulate the endocrine gland's function.

Hypothalamus: A specific area of the brain that regulates many basic functions in the body including temperature, blood pressure, and satiety.

Hysterectomy: This refers to the surgical removal of a woman's uterus.

Implantation: The process in which the embryo attaches to the endometrium and starts growing into it, inducing blood vessel growth. Incubator: An apparatus consisting of a box designed to maintain a constant temperature by the use of a thermostat.

Incubator: An apparatus consisting of a box designed to maintain a constant temperature by the use of a thermostat

Intracytoplasmic sperm injection (ICSI): A procedure in which a single sperm is injected directly into an egg.

Insemination: The placement of sperm into the uterus.

In-vitro fertilization (IVF): A process in which an egg and sperm are united in a laboratory dish to facilitate fertilization.

In-vitro maturation: The technique of allowing ovarian follicles to mature in vitro.

Intrauterine insemination: Also known as artificial insemination, this procedure involves placing washed sperm directly into the uterus.

IV sedation: Sedation or anesthetic medications delivered through an intravenous (IV) line.

Laser-assisted hatching: A method for softening the zona pellucida of the egg to facilitate implantation.

Laparoscopy: A diagnostic procedure in which a long narrow fiber-optic instrument, called a laparoscope, is inserted through an incision in or below the woman's navel so that the internal organs may be observed.

Luteinizing hormone (LH): The pituitary hormone that controls the length and sequence of the menstrual cycle, including ovulation and follicular maturation.

Male factor infertility: Infertility caused by a problem in the male reproductive system.

Menopause: The period when the menstrual cycle ceases.

Menstruation: Monthly discharge of the endometrial lining from the uterus in non-pregnant women from puberty to menopause.

Motility: Sperm cells' ability to move spontaneously and independently.

Oocyte: See "egg."

Ovarian Hyperstimulation Syndrome (OHSS): A condition that can result from ovulation induction. OHSS is a particular concern in conventional IVF. It is characterized by enlargement of the ovaries, ovarian tenderness, fluid retention and weight gain.

Ovarian reserve: A woman's fertility potential, measured by the number of eggs she has remaining.

Ovary (Ovaries): The two female sex glands in the pelvis, located on each side of the uterus near the end of the fallopian tubes. The ovaries produce eggs and various hormones.

Ovulation: Release of an egg from the ovary.

Penis: The external part of the male reproductive system.

Pituitary gland: A small gland just beneath the hypothalamus in the brain that secretes many hormones regulating body processes, including FSH and LH.

Placenta: The membranous vascular organ that develops during pregnancy, lining the uterine wall and partially enveloping the fetus. It is attached by the umbilical cord. Following birth, the placenta is expelled.

Preimplantation genetic diagnosis (PGD): A genetic screening test in which a few cells are removed from an embryo on day three or from a blastocyst on day five.

Pregnancy: The period from conception to birth when a woman carries a developing fetus in her uterus.

Progesterone: A female hormone secreted during the luteal phase of the menstrual cycle that prepares the lining of the uterus for embryo implantation.

Prolactin: A hormone produced by the pituitary gland that controls milk production (lactation).

Prostate: A chestnut sized gland in males at the neck of the urethra which produces the fluid part of semen.

Rh: Rhesus factor is a blood group antigen found on red blood cells of Rh positive individuals.

Scrotum: A pouch of skin that contains the testes, epididymis and lower portions of the spermatic cords.

Semen: The fluid containing sperm, also known as seminal fluid.

Seminal vesicles: A pair of pouch-like glands located on either side of the urinary bladder that secrete seminal fluid.

Sonogram: A diagnostic medical image of internal organs or an unborn fetus created using an ultrasound.

Sperm: The male reproductive cells that can fertilize a woman's egg.

Sperm washing: A procedure to separate out sperm from seminal fluid.

Spermatogenesis: The formation and development of sperm.

Subcutaneous: Beneath the skin.

Sexually transmitted disease (STD): An illness that is passed on by means of sexual contact.

Testes: Male reproductive glands that produce sperm and secrete androgens.

Testicular sperm extraction (TESE): Operative removal of testicular tissue in an attempt to collect living sperm for use in an IVF-ICSI procedure.

Testosterone: A steroid hormone primarily secreted in the testes and the ovaries that is responsible for male traits.

Timed intercourse: Planning intercourse to sync with the sustained shift in body temperature that occurs during a woman's menstrual cycle.

Traditional Surrogate: Used in cases of female factor infertility. A traditional surrogate is a fertile woman who carries a pregnancy intended for another family, conceived from her egg and the sperm of the infertile woman's partner. The resulting child carries the surrogate's genes.

Transvaginal ultrasound aspiration: An ultrasound-guided technique for egg retrieval whereby a long, thin needle is passed through the vaginal and ovarian walls and into the ovarian follicle. Egg retrieval occurs when suction is applied.

Trophectoderm: Outer cell layer of a blastocyst.

Turner's syndrome: A chromosomal disorder in females who have only one X chromosome. The disease is characterized with dwarfism, heart abnormalities, and underdeveloped sex organs.

Ultrasound: A technology that uses high-frequency sound waves to create an image of internal organs on a monitor. Fertility specialists use it to monitor the growth of ovarian follicles, to retrieve eggs from follicles, and to evaluate a pregnancy.

Urethra: A duct in males and females through which urine is discharged. The urethra in males also serves as the genital duct.

Uterus: The hollow, muscular, female reproductive organ located in the pelvis that houses the embryo during pregnancy. The lining of the uterus is shed each month during menstruation when pregnancy has not occurred.

Vagina: The canal in the female reproductive system that leads to the cervix.

Vaginal culture: A sample of the bacteria in the vagina.

Vas deferens: The two muscular tubes in the male reproductive system that carry sperm from the epididymis to the urethra.

Vitrification: An advanced form of cryopreservation that uses cryoprotectants and a flash-freezing method to preserve eggs, sperm and embryos. It has a thaw success rate of 98%, largely because the method does not allow damaging ice crystals to form in the preserved specimen.

Zona pellucida: The egg's outer layer that a sperm must penetrate in order to fertilize the egg. In assisted hatching the zona pellucida is punctured.

Zygote: A fertilized egg before cell division begins. It is a single cell that contains the genetic material of both parents.

Meet Our Doctors



John J. Zhang, MD, MsC, PhD

Doctor Zhang is the Founder/CEO of New Hope Fertility Center in New York City where he has served as the Medical Director since opening in 2004, and oversaw the expanding fertility network internationally to China, Russia, and Mexico.

A true pioneer in the area of minimally invasive (Natural Cycle and Mini-IVF™) fertility care, Dr. John Zhang is an active researcher and medical technology developer. He has been behind several notable achievements in the area of assisted reproductive technology (ART), including the birth of a child by a 49 year-old using her own eggs, helping to restore a young woman's fertility through a recent ovarian tissue transplant surgery in February of 2012, and being named one of New York's Top Doctors.

Dr. Zhang completed his medical degree in at the Zhejiang University School of Medicine, and

subsequently received his Master's Degree at Birmingham University in the UK. In 1991, Dr. Zhang earned his Ph.D. in In-Vitro Fertilization (IVF), and, after studying and researching the biology of mammalian reproduction and human embryology for nearly ten years, became the first Fellow in the Division of Reproductive Endocrinology and Infertility of New York University's School of Medicine in 2001.

Today, Dr. Zhang continues his research in non-embryonic stem cell research, long-term cryopreservation of oocytes, and oocyte (human egg cell) reconstruction by nuclear transfer. He is currently one of a handful of Reproductive endocrinologists in the United States to hold a Ph.D. in embryology while also being certified as a High Complexity Lab Director.

Keep up with the latest from Dr. Zhang on his blog where he talks about trending topics in the field of Assisted Reproductive Technologies and IVF.

Dr. Zhang speaks English and Chinese.

“Every woman is unique and therefore customized treatments will give each couple the highest chance of success—a more tailored approach in combination with the latest IVF technology will give you the family you hope for.”



ZAHER MERHI, MD, FACOG

Dr. Merhi is an internationally recognized fertility doctor, guest lecturer and grant reviewer. With a strong background in Reproductive Endocrinology and Infertility, his research focuses on “needle-free IVF”. The purpose of needle-free IVF is to use oral medications instead of the daily injections and also to measure hormones in the urine and saliva rather than in the blood. His research also focuses on obesity-related infertility, Polycystic Ovary Syndrome (PCOS), Minimal Stimulation IVF (Mini IVF), and Natural IVF for women with low ovarian reserve.

Dr. Merhi attained his Bachelor of Science degree in Biology and a medical degree from the American University of Beirut in Lebanon. He completed his residency in Obstetrics and Gynecology at Maimonides Medical Center in Brooklyn, New York after which he did a two-year Postdoctoral Fellowship in Reproductive Endocrinology at Albert Einstein College of Medicine in Bronx, New York. Subsequently, he completed a three-year Clinical Fellowship in Reproductive Endocrinology and Infertility at Albert Einstein College of Medicine/ Montefiore Medical Center in Bronx, New York.

Board-certified in Reproductive Endocrinology and Infertility by the American Board of Obstetrics and Gynecology, Dr. Merhi is an Assistant Professor in Reproductive Endocrinology and Infertility. As an active researcher and honoree of many awards, Dr. Merhi has published over 60 manuscripts in respected medical journals such as Journal of Clinical Endocrinology and Metabolism, Fertility and Sterility, and Human Reproduction, as well as many book chapters. He continues to present his research at national and international scientific conferences. Various media outlets have reported on his research including ABC News, Medscape, and dietsinreview.com.

Dr. Merhi serves as a Chair, Moderator, Reviewer, and Member on several committees such as American Society for Reproductive Medicine (ASRM), New England Fertility Society, Society for Reproductive Investigation, and Endocrine Society. He has also served as a grant reviewer for the National Institute of Health (NIH). He evaluates, edits, and reviews manuscripts for over 60 scientific journals. Dr. Merhi uses his extensive research background to provide the most up-to-date medical advances in infertility treatments. Dr. Merhi Speaks English, Arabic, French and Spanish.

“I look to form a personal relationship with patients to establish confidence and provide superior fertility and endocrinology care.”



ZITAO LIU, MD, PH.D., FACOG

Dr. Zitao Liu is world-renowned fertility doctor with a deep understanding of the field of Assisted Reproduction Technology (ART). His focus is on the development and implementation of individualized patient protocols in order to maximize a patient's chance of conception. He received his medical degree from the Norman Bethune University of Medical Sciences in China, then went on to earn his PhD from Wayne State University, studying pre-implantation embryonic development and completed his post-doctoral research on uterine responses to embryo implantation at Vanderbilt University. He completed his residency training in Obstetrics and Gynecology at Bronx-Lebanon Hospital Center, an affiliate of the Albert Einstein College of Medicine and, before joining New Hope Fertility Center in New York City, he practiced academic medicine as an attending physician in the Department of Obstetrics and Gynecology at Tufts Medical Center.

“I would like to integrate the results of the cutting-edge research into clinical practice and find the best protocol for each individual woman I work with.”

Dr. Liu has received many teaching awards from the Albert Einstein College of Medicine, the Tufts University School of Medicine, and the American College of Obstetricians and Gynecologists. Years of clinical practice and academic research have shown Dr. Liu the limitations of conventional IVF. He is not only a strong advocate of minimal stimulation IVF protocols (Natural IVF and Mini-IVF™) for indicated patients, but is an accomplished surgeon for minimally invasive procedures as well.

Dr. Liu still actively continues his clinical research in embryo implantation and trophoblast differentiation. At the same time, he is constantly pursuing the development of new medical devices, novel medications, and advanced diagnostic approaches.

Dr. Liu Speaks English and Chinese



MINGXUE YANG, MD, PH.D.

Dr. Yang is an internationally celebrated, NY infertility doctor, board certified in Obstetrics and Gynecology. He specializes in minimally invasive procedures with a strong interest in treating patients with PCOS, diminished ovarian reserve, Mini-IVF™, Natural IVF, and uterine lining issues. Since joining New Hope Fertility Center in 2008, he has actively participated in groundbreaking research projects as well as daily clinical procedures. He has been selected as a Top Obstetrician & Gynecologist in the United States since 2009.

Dr. Yang received his MD with high honors from Henan Medical College in 1983, and his Masters and Ph.D. in Toxicology from Tongji Medical University in China in 1986 and 1989. While working in Beijing, Dr. Yang was appointed Associate Director of the Molecular Biology Laboratory at the Institute of Occupational Medicine with the Chinese Academy of Preventive Medicine. He

was subsequently appointed as Assistant Professor in the Department of OB/GYN at New York University's School of Medicine in 1998. He has published more than 30 papers in internationally recognized journals.

Doctor Yang completed his internship and residency training in Obstetrics & Gynecology at NYU's School of Medicine and the New York Downtown Hospital. Upon graduating, he was appointed as teaching attending in the Department of OB/GYN at New York Downtown Hospital affiliated with New York-Presbyterian Healthcare System and Weill Cornell Medical College. He received the National Faculty Award for Excellence in Resident Education in 2006 by the Council on Resident Education in Obstetrics and Gynecology. In 2005, he also received an award for Special Excellence in Endoscopic Procedures by the American Association of Gynecologic Laparoscopists.

Dr. Yang speaks English and Chinese.

"In my last four years with New Hope, I've done more than 2000 procedures involving embryo transfers. With a background in internal medicine, I've instilled this experience into our treatments, which complement the mind, body, and health history of each patient."

Department directory

If you would like to contact one of our departments

directly please use the numbers below:

NEW PATIENTS

If you would like to schedule a consultation or learn about becoming a patient at New Hope Fertility Center, **call us at 917-525-5496 or contact us online.**

GENERAL INQUIRIES

If you are an existing patient or a referring physician with questions about our practice, **please contact us at 212.517.7676**

OFFICE ADDRESS

**4 Columbus Circle, 4th Floor
New York, NY 10019**

(corner of W. 58th St. and 8th Ave.
next to Duane Reade in the Steel
Case Building)

OFFICE HOURS

Monday-Friday: **7am - 5pm**
Saturday-Sunday: **7am - 3pm**

MONITORING HOURS

Monday-Friday: 7am - 2pm
(by appointment only)
Saturday-Sunday: 7am - 2pm
(by appointment only)

HOLIDAY HOURS

7:30am - 10:30am

DEPARTMENT

New Patients Schedule Online

Phone: 917-525-5496

Email: iov@nhfc.com

Embryology

Phone: 212.400.9613

Email: embryology@nhfc.com

Andrology

Phone: 212.400.9624

Email: lab@nhfc.com

Billing

Phone: 212.969.7423

Email: billing@nhfc.com

Clinical Questions

Phone: 212.400.9628

Email: nurses@nhfc.com

Pharmacy/Prescription

Phone: 212.969.7473

Fax: 347.708.1804

Email: eprescribe@nhfc.com

Donor Program

Phone: 212.400.9634

Email: donors@nhfc.com

Surrogacy Program

Phone: 212.969.7491

Email: surrogacy@nhfc.com

NON-CLINICAL

General Information

Email: information@nhfc.com

Media Inquiries

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Career Opportunities

Email: careers@nhfc.com

Fellowships

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Partnerships and

International Collaboration

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