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Introduction to In Vitro Fertilization

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The In Vitro Fertilization journey can be exciting, but it can also be overwhelming.. Throughout this series, we'll guide you through the processes and procedures utilized in vitro fertilization, commonly known as IVF.. We'll provide you with in-depth information about the risks, benefits, and choices involved in your treatment program. Patients who understand the overall process tend to have a more positive experience as they progress through the cycle.

We'll cover a lot of ground, so take your time and feel free to repeat videos if there's anything you don't understand. We hope that after you complete this module that you'll feel confident discussing any further concerns with your medical team. Now let's get started. .

The Menstrual Cycle

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Before you begin fertility treatment it's helpful to understand the menstrual cycle. Learning about the similarities and differences between the two can help you feel more comfortable with how fertility treatment works. The menstrual cycle is regulated by a fascinating series of coordinated hormonal changes throughout the body. A part of the brain called the hypothalamus produces a hormone known as gonadotropin releasing hormone, or GnRH, which stimulates the pituitary gland. The pituitary gland then releases two Gonadotropin hormones: follicle stimulating hormone, or FSH, and Luteinizing hormone, LH. In the first half of the menstrual cycle, or follicular phase, the ovary is populated by small fluid-filled structures called follicles, which produce estrogen and contain an immature egg. FSH from the pituitary gland stimulates the growth of a single follicle in one ovary. This happens over about 14 days, causing the follicle to produce more estrogen, and the egg within that follicle to mature. The rising estrogen level causes the uterine lining, also known as the endometrium, to thicken in preparation for the eventual fertilized egg. Once the follicle is fully mature and the estrogen level high, production of LH rises sharply completing maturation of the egg and triggering ovulation. Ovulation is the release of an egg from the ovary into the fallopian tube, where sperm traveling through the reproductive tract can find the egg and fertilize it. The sperm must do so within about 24 hours of ovulation or the egg will degenerate and pregnancy will not occur.

The second half of the menstrual cycle, after ovulation, is known as the luteal phase. During this phase, what remains of the follicle develops into a hormone-producing structure known as the corpus luteum. In addition to continuing to produce estrogen, the corpus luteum also produces large amounts of progesterone, which matures and maintains the endometrium. If the egg is not fertilized, the corpus luteum will degenerate after about 14 days, at which point progesterone levels drop, the uterine lining sheds, and a new menstrual cycle begins.

However, if fertilization does occur, the fertilized egg, or embryo, enters the uterus from the fallopian tube after about 6 days, and may become embedded in the uterine lining. This is called implantation. As a result of implantation, cells in the outer layer of the embryo begin to produce a hormone called human chorionic gonadotropin, or hCG. hCG continually stimulates the corpus luteum to produce more progesterone, preventing the loss of the uterine lining. As you progress through this module, you will see that all of the hormones that are produced in a typical menstrual cycle are also used in fertility treatment, often in

higher quantities to increase the number of eggs that may be produced in any one cycle, to improve your chances of successful treatment.

Controlled Ovarian Stimulation: The Process

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To begin treatment, fertility clinics often use medications that stimulate the ovaries to produce multiple eggs at once in a process known as Controlled Ovarian Stimulation, or COS. The goal of COS is to increase the number of high quality eggs for use in fertility treatment. It's helpful to think of the controlled ovarian stimulation process in three phases: suppression, stimulation, and trigger. First, let's look at the suppression phase. This phase may or may not be required, or may overlap with the next phase depending on your specific clinical situation. During this phase, medication is used to suppress the typical production of hormones in order to prevent the development of a single follicle, preparing the ovaries to grow multiple follicles of a relatively even size in the next phase. This also allows your medical team to schedule a cycle. To establish a baseline, your medical team will perform hormonal blood work and ultrasound scans. Typically, hormone levels will be low, the endometrial lining will be thin, and the follicles will be small. If everything is as expected, you will progress to the stimulation phase. In the stimulation phase, you'll undergo daily injections of Gonadotropin medications. Your medical team will carefully determine the amount and type of FSH and LH to use based on your medical history and ovarian reserve, in order to produce the optimal number of eggs desired for the cycle. The stimulation phase will usually take between 8 and 14 days, during which time you will be monitored to assess your body's response to the medication. At each monitoring visit, your team may draw blood and measure your estrogen level on a specialized hormone assay machine. As the follicles develop and mature, they will produce more estrogen; your estrogen level will reflect the number and maturity of the follicles and the eggs inside.. Internal sonograms at monitoring visits also help your medical team visualize the number and size of the growing follicles in the ovary. The developing follicles are measured in 2 dimensions and grow approximately 1 to 2 millimeters every day. The majority of follicles over 15-16 mm will contain a mature egg, and the largest will usually measure above 17 millimeters. By the end of the stimulation process, a good response produces about 8 to 20 follicles, each measuring between 12 and 22 millimeters. However the number of follicles produced can vary from 0 to as many as 50 based on ovarian function, medication dosage, and the protocols used. If an optimal number of follicles does not develop, your medical team may consider canceling this cycle. The likelihood of cancellation increases with advancing age. For people under 35, around 5% of cycles are canceled. This number increases to 15-20% for people older than 42. If this cycle is canceled, your medical team will talk to you about trying different protocols or treatments.. The final stage of the controlled ovarian stimulation process is the trigger injection which is administered once the largest follicles reach the optimal size. This trigger shot completes the final maturation of the eggs, allowing egg retrieval to be performed 35 to 37 hours later. In some cases, your doctor may wish to check hormone levels the day after the trigger injection to ensure it was effective.

. Throughout the entire controlled ovarian stimulation process, the uterine lining slowly thickens and by the time the follicles reach full maturity, you'll be ready for Egg Retrieval..

Controlled Ovarian Stimulation: The Drugs and Protocols

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There are various medications and protocols that may be used for controlled ovarian stimulation. Some people are anxious about the injections required, but rest assured, this anxiety is completely natural. You may choose to administer the shots yourself, or you may choose to have a friend, family member, or partner perform the injections for you. The medications needed will vary depending on your clinical situation. Your medical team will select the specific protocol and medications required for

each phase.. Oral contraceptive pills, commonly known as birth control pills, are frequently used during the suppression phase to decrease hormone production or to schedule a cycle. Possible side effects of the pill include irregular bleeding, headaches, chest tenderness, nausea, and swelling. In extremely rare cases, they can cause blood clots or a stroke.

. During the stimulation phase, hormone drugs called gonadotropins will be used to stimulate the ovaries to grow multiple eggs simultaneously. Both FSH and LH are gonadotropins, which are produced by the pituitary gland during a typical menstrual cycle. FSH can be administered by subcutaneous injection, which means that the needle used is very short and the injection occurs under the skin, rather than into the muscle. Overall, FSH drugs are well tolerated, however, there are infrequent side effects, including: fatigue, headaches, nausea, mood swings, or rarely: clots in blood vessels. Temporary weight gain of between 2 and 5 pounds may also occur due to fluid retention. As with any medicine taken as an injection, mild injection site reactions, such as bruising, irritation, or redness, can occur.. Clomiphene Citrate, commonly referred to as Clomid, and Letrozole, are oral tablet medications that work by increasing the amount of FSH and LH released. Clomiphene citrate is usually very well tolerated and side effects are mild and infrequent; however, a small percentage of people may experience dizziness and other visual symptoms which could be serious. Letrozole, while not currently cleared by the FDA for fertility use, has minimal side effects even when compared to Clomid.

. Another type of injectable medication, known as GnRH-antagonists, are usually given to patients mid-cycle as the follicles start growing to prevent premature ovulation. GnRH-antagonists are typically well tolerated, but can produce mild local injection site reactions, abdominal pain, headaches, and nausea.. GnRH-agonists, not to be confused with GnRH-antagonists, initially stimulate the pituitary gland to release FSH and LH, but after a few days of continuous use, they have a suppressive effect. This means, they can be used for various purposes throughout the different phases. Your doctor might prescribe GnRH-agonists to start the growth of eggs, to suppress premature ovulation, or as a trigger shot to complete the final maturation of the eggs. One commonly used GnRH-agonist is called Leuprolide-Acetate, or Lupron. Lupron is FDA-approved for a variety of medical conditions and although not specifically approved for fertility treatment, it has been used in fertility treatment for over 20 years. When GnRH-agonists are used in ovarian suppression, patients may experience a few days of menopausal-like side effects, such as: headaches, hot flashes, muscle aches, and a depressed mood. When used as a trigger shot, these side effects are very rare.. hCG, or Human Chorionic Gonadotropin, is often prescribed as the trigger injection to complete the final maturation of the developing eggs before retrieval. HCG acts in a similar fashion to the LH surge that occurs in the non-medicated menstrual cycle. Side effects of HCG may include chest tenderness, bloating, and pelvic discomfort.. Because all patients are unique, your medical team will select protocols and dosage based on many factors, including age, weight, previous response to medication, blood hormone levels, and the number of follicles seen on ultrasound..

Risks from Fertility Medication

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In some cases, ovarian stimulation can result in a condition known as OHSS, ovarian hyperstimulation syndrome. Symptoms of OHSS include excessive swelling of the ovaries and buildup of fluid in the body, which can occur in mild to severe forms depending on your age, clinical situation, and the medications used. The HCG trigger injection can lead to the early onset of OHSS 1 to 5 days after egg retrieval. After your embryo transfer, you may be at risk of late-onset OHSS that can result from the HCG produced when the embryo implants. This is less common for people who are not performing a fresh transfer. The mild form of OHSS occurs in 5 to 10% of ovarian stimulation cycles. People with this condition will experience moderate abdominal bloating and discomfort that will resolve without medical treatment over the course of 3 to 7 days. More severe forms of OHSS occur in no more than 1 to 2% of ovarian stimulation cycles. Fluids, known as ascites may accumulate in the abdomen and pleural space around the lungs, resulting in pain, discomfort, and shortness of breath. This fluid build-up also results in thickening and concentration of the blood, which can raise the risk of kidney failure and blood clots, most commonly in the lungs and legs. These extreme complications occur very rarely, in only 0.2% of all treatment cycles. Severe OHSS typically resolves over the course of 1 to 2 weeks and is effectively treated by *administering* intravenous fluids, and *draining* the *accumulated* fluid. Advancements in fertility research and technology have helped develop strategies that have dramatically reduced the frequency and severity of OHSS. It is typically more mild when it *does* occur, and it can be managed effectively by

diagnosing it early and treating it actively.. It's also important to be aware of the controversy surrounding cancer risks that may be presented by injections of FSH.. In the 1990s, a few studies suggested that fertility drugs could result in an increased risk of breast, ovarian, or uterine cancer. Many later studies did not confirm this finding and recognized that the original studies didn't account for the fact that infertility itself is associated with an increased risk of cancer. Millions of people have gone through fertility treatment since these initial studies and there does not seem to be any increased risk of cancer due to fertility drugs. It's important that you carefully consider these studies in making your decision to undergo a fertility treatment cycle. Each risk, however small, should be evaluated thoroughly and all questions discussed with your medical team..

Egg Retrieval

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If controlled ovarian stimulation has been completed successfully, the follicles have reached optimum size, and the trigger injection has been administered, the eggs should be ready to be retrieved. The objective is to retrieve mature eggs that can be successfully used in fertility treatment. Your clinical team will provide you with an estimated date for the procedure; however, the timing of egg retrieval is based on your response to the stimulating medications, which will be different for different people. So you should be prepared for your egg retrieval to take place any day of the week, including on a weekend.. Your clinical team will let you know when to arrive for the procedure as well as when to refrain from eating and drinking. Egg retrieval is a minor surgical procedure performed under anesthesia that lasts approximately 10 to 30 minutes. Your medical team will retrieve the eggs using an ultrasound probe and needle. With internal ultrasound guidance, the needle is inserted through the upper vaginal wall and into each follicle.

. Fluid from the follicles is removed through gentle suction that draws it into a tube. As seen on the ultrasound, once the needle has been inserted into the follicle, the fluid, is removed through gentle suction that draws it into a tube.

. An embryologist will immediately examine the fluid for eggs under a microscope. A single egg is present in roughly 65 to 90% of optimal follicles.

In rare cases, no eggs will be retrieved, or none of the retrieved eggs will be of proper maturity to fertilize. This is more likely when very few follicles are present.. Egg retrieval may be postponed if it's suspected that there has been a failure in the delivery or response to the trigger shot, which can happen in 1 to 2% of cycles. If this occurs, it may be necessary to give the shot again and retry egg retrieval two days later. After the egg retrieval procedure is completed, the recovery period begins. Depending on the type of anesthesia that is administered during the procedure, you may experience grogginess, but this will gradually wear off throughout the day. Your medical team may monitor vital signs, such as blood pressure, heart rate, and oxygen saturation. Some cramping may occur after egg retrieval and you may be given pain and/or anti-nausea medications as needed. Once alert and awake, discharge instructions and next steps will be reviewed with you.. Most people leave the recovery room about one hour after the procedure..

Egg Retrieval: The Risks

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While egg retrieval is a routine part of fertility treatment, it is still a minor surgical procedure, which means that there is always some possibility of complications. If IV sedation is used, it may also carry some very rare risks, such as low blood pressure, nausea or vomiting, and in fewer than 1 in every 100,000, cases; death. Because the ovaries are covered with very small blood vessels, there is a chance that the egg retrieval could result in some bleeding. While this bleeding is usually minor and stops on its own, in fewer than 1 in 1,000 retrievals, the bleeding will continue and accumulate in the pelvic and abdominal cavity. If this

happens, hospitalization may be required to monitor and manage the blood loss and may necessitate a blood transfusion. In extremely rare situations, people may require surgery to stop the bleeding which could result in the removal of the ovary. In fewer than 1 in 5000 cycles, the enlarged ovary may twist around its blood supply in a complication known as ovarian torsion. This condition cuts off the blood supply to the ovary and can cause severe pain. Surgery may be required to untwist the ovary. Rarely, torsion may result in loss of viability, necessitating removal of the ovary.. Less than 1 in 1000 egg retrievals may result in pelvic or ovarian infection. This is more likely if there is severe endometriosis. Endometriosis is a condition in which tissue similar to the uterine lining grows outside the uterus. This can produce a fluid-filled structure in the ovary called an endometrioma. These endometriomas may be punctured in the process of egg retrieval and can become infected. You may be given antibiotics before or after egg retrieval to prevent or treat an infection. Severe infections may require surgery to remove the infected tissue. While unlikely, infections can reduce chances of getting pregnant in the future.. In a very small number of egg retrievals, there can be damage to other organs in the pelvis, including the bladder, ureters, intestines, or major blood vessels.. It's important to be aware of the potential risks associated with Egg Retrieval. Your medical team will take every measure possible to minimize the likelihood of these risks and have established procedures to manage the impact if they do occur.

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Fertilization

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Once eggs have been successfully retrieved from the ovary, or thawed if frozen, the next step will be fertilization to create embryos.. The retrieved eggs are placed in a petri dish with specially prepared fluid, known as culture medium. Culture medium is designed to be very similar to the fluid in the fallopian tube. Everything is made of non-toxic material, and is kept at a controlled temperature.. Fertilization of the eggs is performed either by conventional insemination, or by intracytoplasmic sperm injection commonly referred to as ICSI. ICSI is required for eggs that were frozen.. In the conventional insemination process, the sperm is prepared, then mixed with the eggs in a petri dish, where a single sperm will hopefully penetrate and fertilize the egg.. In the ICSI procedure, the embryologist uses a high-powered microscope with special micromanipulators to stabilize and position the egg. A single sperm is carefully selected, drawn up into a micropipette, and injected directly into the cytoplasm of the egg.. The morning after insemination, the presence of two pronuclei, one from the sperm and one from the egg, confirms that fertilization has occurred. If everything goes successfully, your embryo will begin to develop.

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Embryo Development

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If fertilization was successful, the embryo begins its journey of development to prepare it for transfer. On day 2, a good quality embryo should be composed of 2 to 4 cells. On day 3, a good quality embryo will have 6 to 8 evenly sized cells and a minimal amount of cellular debris, known as fragments. In the next stage of embryo development, the cells compact together and the lines between them blur. At this stage, the embryo is essentially a ball of cells known as a morula. After developing into a morula, the embryo begins to expand and form a fluid-filled cavity in the center, in a process called cavitation. In the final stage of embryo development, the embryo separates into an outer layer of cells called the trophoblast, which will form the placenta, *and* an inner cell mass that will form the actual fetus. The inner cell mass is surrounded by the blastocoel, the fully formed cavity filled with fluid from the cavitation stage. This usually takes place by day 5 or 6, and embryos at this stage are called

blastocysts. The blastocyst is graded based on the quality and number of cells in the inner cell mass and trophoblast, as well as the size of the blastocoel. Your medical team will determine which embryos will be most eligible for transfer or freezing.

Typical Progression of Eggs and Embryos

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Typical Progression of Eggs and Embryos. At every stage of fertilization and development, the number of embryos decreases significantly. It's important to understand and be prepared for this. Typically, an egg will be retrieved from 65-85% of follicles over 13mm in diameter.. 60-90% of the eggs retrieved will be mature, and 60-80% of *those* will fertilize successfully. 60-80% of these *fertilized* eggs will form good-quality embryos by day 3. By day 5 or 6, 20-60% of these day 3 embryos should progress to the most advanced, *blastocyst* stage. Let's walk through a typical scenario to better demonstrate the decreasing number of embryos. For example, if 15 follicles ~~will~~ develop, retrieval may yield 12 eggs, 10 of which are mature. Of those 10 mature eggs, 7 are likely to fertilize successfully, 5 may develop into good-quality embryos, and ultimately, 2 blastocysts result. Of course these numbers will vary significantly on a case-by-case basis. These rates are typical, however it should be noted that in some cases, no eggs retrieved will fertilize successfully or develop properly. It's also possible that even if they do develop properly, no embryos will reach the final stage of development and be suitable for transfer or freezing. This is highly dependent on the number of eggs retrieved and the age of the person they were retrieved from. In people under the age of 35, about 5% of retrievals will yield no embryos to transfer. In people over the age of 42, this rate increases to 40% of retrievals. It's important to remember that this decrease in the number of embryos is expected and you should not be discouraged by it. The processes used by the embryology team are designed to optimize the development of embryos that are most likely to result in pregnancy.

Assisted Hatching

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In some situations, additional measures may be necessary to prepare the embryo for implantation. The embryo develops within the shell of the egg, which is known as the zona pellucida. Once the embryo has developed into an expanded blastocyst, it will need to hatch out of this shell to implant into the uterine lining. In some situations, the shell may be too thick or hard for the embryo to hatch out of. If this is suspected, the embryologist can perform assisted hatching, which involves cutting a small hole in the shell of the egg with a laser, acid solution, or by mechanical means. However, there is a very small chance of damaging or destroying the embryo in the assisted hatching process. Assisted hatching also causes a very small increase in the probability of having identical twins, which is usually a high-risk pregnancy. Despite these risks, assisted hatching may be necessary, and can increase the chances of successfully achieving a pregnancy.

Cryopreservation of Embryos

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Cryopreservation of embryos. Once you have developed embryos which are suitable for transfer, you may have the choice to freeze some or all of them in a process called cryopreservation.. However, freezing all of your embryos may be the best option if your provider determines that you are at high risk for ovarian hyperstimulation syndrome, or for any other reason you may

need to delay your transfer. If Preimplantation Genetic Testing, or PGT, is performed, you will also need to freeze your embryos. . PGT is a form of analysis which can reveal the chromosomal makeup of your embryos, providing valuable information on which embryos should be transferred. Embryos can be frozen at any stage of development, including the undivided stage, day two, day three or the later blastocyst stage. The most frequently used cryopreservation technology utilizes rapid freezing known as vitrification, which involves plunging the embryos directly into liquid nitrogen. Fertility clinics have caretaker responsibility to both store and maintain cryopreserved embryos. These processes involve numerous safeguards and systems of quality control to ensure the safety of your embryos. Once you are ready to use your frozen embryos, you will undergo a frozen embryo transfer cycle, in which the uterine lining is prepared with estrogen and progesterone protocols before the embryo is thawed and transferred. The vast majority of frozen embryos will be viable when thawed, but this will vary based on the stage of development and quality of the embryo when frozen. It's important for you to maintain contact with your facility for the duration of time your embryos are frozen, and in most cases, the patient is responsible for paying storage fees. Decisions on discontinuing the storage of frozen embryos may pose challenging, ethical and logistical issues, which you should consider carefully. Because the embryos may be the property of more than one person, it's important to make a decision on the fate of any surplus embryos in advance. The options include allowing one person to use the embryos independently, donating them for use by a third party, donating them for research, or disposing of the embryos. Embryo cryopreservation has been safely performed since the 1980s and risks have been studied in both humans and animals. There have not been any indications that children born from frozen embryo transfers are at any greater risk for birth anomalies than children born from fresh embryo transfers.

Laboratory Risks

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Fertility treatment and the storage of sperm, eggs, and embryos involve very complex processes requiring the use of sophisticated equipment by highly trained embryologists. These processes depend on the reliable function of equipment and human consistency. In very rare cases, equipment can fail and even the most highly skilled embryologists can make human errors leading to the loss or compromise of sperm, eggs, or embryos. Very infrequently, damage can occur due to a laboratory accident such as a broken pipette or a dropped petri dish. In extreme cases, the laboratory is vulnerable to natural disasters such as fires, floods or earthquakes, which could damage or destroy the embryology laboratory and everything in it. There are, however, safeguards built into the system, such as backup generators to minimize the risk from loss of power. The most critical and basic responsibility of the embryology laboratory is to be 100% certain that the correct sperm, eggs, and embryos are used for the correct people and procedures. You can rest assured knowing that there are very rigid protocols used for patient identification at every step of the cycle.

Support of the Uterine Lining for Fresh Transfers

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You will be prescribed hormonal medication to thicken and mature your uterine lining in preparation for embryo implantation. This protocol will vary based on your situation. . If you are freezing all embryos, support for the uterine lining will be provided at a later date to support your frozen embryo transfer.. . If you are undergoing a fresh embryo transfer, you will be prescribed hormonal supplementation the day of or the day after egg retrieval. In a fresh transfer, progesterone can be used to prepare and maintain the endometrium lining for embryo implantation. Progesterone may be administered via pill, vaginal suppository, or intramuscular injection. The intramuscular injection may be painful when injected, and approximately 1% of patients develop an allergic reaction that may manifest as a skin rash. If the rash escalates into redness and pain at the injection site, you may be given a different form of progesterone instead. You may also be given estrogen to support the uterine lining before or after the

embryo transfer. This can be taken orally, via skin patch, in a cream, or by injection. Estrogen is usually very well tolerated, but occasionally causes local reactions, and, in extremely rare cases, an increase in the risk of blood clots or stroke. If pregnancy is achieved, this hormonal regimen may be continued for several weeks in order to support the pregnancy.

Embryo Transfer

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Once the endometrial lining is prepared to be optimally receptive, viable embryos can be transferred into the uterus. If you are using a frozen embryo, it will first be thawed and then transferred. The transfer procedure is simple and nearly painless, and in the vast majority of cases, sedation is not required. You must come in with a moderately full bladder which will allow your medical team to better visualize the uterus using an abdominal ultrasound. To start the embryo transfer procedure, the embryologist looks at the embryo under a microscope. Using a small syringe, the embryologist draws the embryo and a small amount of culture media into the thin, flexible transfer catheter. A speculum is placed into the vaginal canal to visualize the cervix. The clinician then threads the catheter through the cervix and into the upper portion of the uterus, often with guidance from an abdominal ultrasound. Then the embryo is released into the uterine cavity for implantation. The procedure typically takes less than 10 minutes. Following the embryo transfer, your medical team will provide comprehensive instructions on next steps leading up to the pregnancy test.

The Number of Embryos to Transfer

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An Important part of preparing for an embryo transfer, is the decision you and your medical team will make about how many embryos to transfer. The goal of this decision is to increase the likelihood of pregnancy while minimizing the risk of multiple pregnancy. Multiple pregnancy is one of the most significant complications you can experience from fertility treatment and can cause serious health risks for the pregnancy as well as the babies. To avoid a multiple pregnancy, the best approach is often to transfer only one embryo. The American Society for Reproductive Medicine, or ASRM, provides recommendations on the number of embryos to transfer based on factors such as age, quality and stage of embryo development, and other clinical issues. Transferring more than one is sometimes recommended because embryos created from eggs taken from older people are more likely to be chromosomally abnormal, even when they look viable under the microscope. Most chromosomally abnormal embryos will not implant, and even if they do they will usually miscarry. This is part of the reason lower pregnancy rates and higher miscarriage rates are seen with advancing age whether using fertility treatment or not. For patients who are older than 38 and are using their own eggs, transfer of multiple embryos may be recommended. In most other cases, one embryo is recommended. . If the chromosomal analysis from PGT suggests an embryo is viable, single embryo transfer is highly recommended regardless of age. If the egg is from a patient who is younger than 35 and PGT suggests an embryo is viable, patients achieve singleton pregnancy at similar rates whether one or two embryos are transferred.. If two of these embryos are transferred, at least one out of every four patients will experience a twin pregnancy.. It's also possible to have a multiple pregnancy due to embryo splitting. . In less than 3% of cycles, a single embryo transferred can split and result in identical twins. Similarly, when 2 embryos are transferred, there is a less than 3% chance of one embryo splitting, which could result in a triplet pregnancy. If both embryos were to split, the transfer of 2 embryos could also lead to quadruplets, but this is incredibly rare. Because each patient is different, individualized plans should be discussed with your medical team. It's also possible to have a multiple pregnancy due to embryo splitting.

Risks of Multiple Pregnancies

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Multiple pregnancies, in general, carry an increased risk of pregnancy problems. The most significant risk associated with multiple pregnancies is prematurity. On average, twins deliver three weeks earlier than singleton babies, with some delivering before the third trimester.. Additionally, they weigh approximately 2 pounds less than singleton babies. Triplet and higher order pregnancies deliver before the third trimester in almost half of cases. Babies that are born very premature face a higher incidence of bleeding into the brain, cerebral palsy, lung disease, intestinal disease, or visual and hearing issues. Additionally, multiple pregnancies also have an increased risk of pre-eclampsia, excess bleeding upon delivery, gestational diabetes, problems with the placenta, problems with the gallbladder, skin problems, the need for extra weight gain and the need to be put on bedrest. The fetal death rate increases from 0.43% for singletons, to 1.55% for twins, and 2.1% for triplets. Multiple fetuses that share the same placenta, such as identical twins, have additional risks, such as a 20% chance of twin to twin transfusion syndrome, where circulation is not equal between fetuses. Twins sharing a placenta also have a higher frequency of birth defects and death of one fetus after the first trimester, which may cause harm to the remaining fetus. In the event of a triplet or higher order pregnancy, the obstetric risks significantly increase. If this happens, you might face an ethical dilemma of continuing a high-risk pregnancy or having a selective reduction performed. A selective reduction means that the development of one or more fetuses will be stopped for the sake of one or more remaining fetuses. Selective reduction is performed at about 11-12 weeks of pregnancy by giving one or more fetuses an injection under abdominal ultrasound guidance. This carries a 1% chance of losing the entire pregnancy, and these odds are increased if there are more than 3 fetuses present. If successful, the pregnancy will continue with fewer fetuses, reducing the risk of a more complicated multiple pregnancy outcome. No matter your situation, your medical team will help provide the information you need to make the best decision possible.

Pregnancy Risk and Health of an IVF Baby

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Before deciding to begin treatment, it is important for patients to understand that Fertility Treatment, like most medical procedures, poses the potential for risks. The first delivery of an IVF baby occurred in 1978, and since then over 7 million children have been born as a result of fertility treatment. Over time, thousands of studies on the health of these babies have been published. The majority of these studies found that there is no increase in pregnancy complications or birth defects in cases where fertility treatment was used. Other studies, however, suggest that fertility treatment may be associated with a higher likelihood of pregnancy complications or birth defects. It is possible, however, that these increased risks can be attributed to the underlying infertility issues that cause people to pursue treatment in the first place, rather than from the treatment itself. The presence of these confounding variables makes interpreting the data difficult. However, you can be comforted by the fact that even if there is an increased risk associated with fertility treatment, the overall risk remains low. Some of the pregnancy risks that may be more likely in pregnancies achieved through fertility treatment are: . gestational diabetes, placental complications, the need for a primary cesarean delivery, preterm birth, and low birth weight. In addition to these *pregnancy* risks, the likelihood of birth defects in babies conceived from fertility treatment is 5.3%, which is slightly higher than the national average, which is 4.4%. The risk of *severe* birth defects in babies conceived from fertility treatment is 3.7%, compared to a national average of 3%. However, as mentioned earlier, studies suggest this is likely due to underlying fertility issues, not the treatment itself . If you and your medical team decide to use ICSI, the procedure where a single sperm is injected directly into the egg, the risk of birth defects may also be slightly higher. Experts are still debating whether ICSI has an impact on the development of children, but the most recent studies have not detected any impact. There's also conflicting data about whether fertility treatment increases the risk of imprinting disorders, which affect the expression of genes. Regardless, the risk of imprinting disorder is still very low, less than 1 in 15,000 births. Most studies about the long-term development of children born from fertility treatment are very positive, and have concluded that the vast majority of these pregnancies are straightforward, and the children from these pregnancies are thriving. However, such studies are difficult to conduct and

cannot yet be considered conclusive. It's important to remember that the health of any baby, regardless of how they were conceived, is affected by many variables, including obstetric factors, and genetic and chromosomal variations. Although many of these risks are very low, it is important to evaluate these risks against the benefits of achieving a pregnancy through fertility treatment.

Conclusion

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We hope you now feel informed about the many processes, procedures, and considerations of an IVF program. You should feel empowered to discuss any questions or concerns with your medical team as you decide how to proceed with your treatment. If you choose not to pursue IVF, there are alternatives that you may want to consider, including donor sperm, donor eggs, adoption, or simply not pursuing treatment at all. Treatment with IVF may feel intimidating, but it can be reassuring to remember that millions of families have been formed using IVF. Continuous improvements and years of research have led to better pregnancy rates, fewer complications, and easier cycles. Thank you for watching, and we wish you the best in your journey.

IVF_V3 Revisions

Backend Name: IVF_V3_US_ALL_

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