Long Island Fertility, PLLC
("Long Island IVF")

Assisted Reproductive Technology

Consent Booklet
101

Brooklyn·East Patchogue·Lake Success·Melville

Plainview·West Islip·Stony Brook

Long Island IVF

Mission Statement

As physicians and health professionals dedicated to the treatment of disorders of the female reproductive tract and reproduction, we pledge to deliver care in a warm and supportive environment.

We are sensitive to the emotional, physical and financial demands that infertility and the treatment of infertility can place on a person or couple.

At Long Island IVF, we strive to help every patient develop the best possible plan in order to achieve the best possible outcome and to maximize their understanding as they go through the process.

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Informed Consent for Assisted Reproductive Technology ("ART")

In Vitro Fertilization
Intracytoplasmic Sperm Injection
Embryo Cryopreservation

Please Print

Patient Last Name _____ Patient First Name_____

Partner Last Name_____ Partner First Name_____

Address _____ Home Phone_____

_____ Cell/Other_____

_____ E-mail _____

Please sign below to indicate which components of IVF treatment you agree to undertake in your upcoming treatment cycle. Also, initial each page of this informed consent to indicate that you have read and understand the information provided. If you do not understand the information provided, please speak with your treating physician. There are a few locations within the consent form where you are being asked to make a decision. Please initial your choice and sign where requested.

Chosen Elements of Treatment:

Signatures:

Patient	Partner (if applicable)	Date	
_____	_____	_____	In Vitro Fertilization (Including egg retrieval and embryo transfer)
_____	_____	_____	Intracytoplasmic Sperm Injection (ICSI)
_____	_____	_____	Assisted Hatching
_____	_____	_____	Embryo Cryopreservation

INITIALS
Patient _____
Partner _____

Physician/Witness _____

OVERVIEW

In Vitro Fertilization (IVF) has become an established treatment for many forms of infertility. The main goal of IVF is to allow a patient the opportunity to become pregnant using her own eggs and sperm from her partner or from a donor. This is an **elective** procedure designed to result in the patient's pregnancy when other treatments have failed or are not appropriate.

This consent reviews the IVF process from start to finish, including the risks that this treatment might pose to you and your offspring. While best efforts have been made to disclose all known risks, there may be risks of IVF which are not yet identified at the time of this writing.

An IVF cycle typically includes the following steps or procedures:

- Medications to grow multiple eggs
- Retrieval of eggs from the ovary or ovaries
- Insemination of eggs with sperm
- Culture of any resulting fertilized eggs (embryos)
- Placement ("transfer") of one or more embryo(s) into the uterus
- Support of the uterine lining with hormones to permit and sustain pregnancy

In certain cases, these procedures can be employed:

- Intracytoplasmic sperm injection (ICSI) to increase the chance for fertilization
- Assisted hatching of embryos to increase the chance of embryo attachment ("implantation")
- Egg/Embryo cryopreservation (freezing)
- Co-culture and embryo glue
- Blastocyst transfer
- PGD
- MESE/TESE

We understand that we are required to read this entire booklet and submit a signed ART Boarding Pass prior to our ART procedure. We further understand and agree that our signatures and initials on said ART Boarding Pass shall be considered informed consent to the procedures outlined therein and fully explained in this booklet.

OUTLINE OF CONSENT FOR IVF

A. Technique of In Vitro Fertilization
    1. core elements and their risk
        a. medications
        b. transvaginal oocyte retrieval
        c. in vitro fertilization and development
        d. embryo transfer
        e. PGD (Pre-implantation Genetic Diagnosis)
        f. MESA/TESA (Types of Sperm Aspirations)
        g. hormonal support
    2. additional elements and their risk
        a. intracytoplasmic sperm injection
        b. assisted hatching, co-culture and embryo glue
        c. embryo cryopreservation and disposition
        d. embryo storage
        e. donated or research embryo fate

B. Risks to woman
    1. ovarian hyperstimulation
    2. cyst formation
    3. cancer
    4. ovarian twisting
    5. pregnancy

C. Risks to offspring
    1. overall risks
    2. birth defects
    3. multiple pregnancy

D. Ethical and religious considerations

E. Psychosocial effects

F. Legal considerations and legal counsel

G. Alternatives to IVF

H. Reporting outcomes

A. Technique of IVF

1. Core elements and their risk

a. Medications for IVF Treatment

- The success of IVF largely depends on growing multiple eggs at once.
- Injections of the natural hormones FSH and/or LH (gonadotropins) are used for this purpose
- Additional medications are used to prevent premature ovulation
- An overly vigorous ovarian response can occur, or conversely an inadequate response

Medications may include the following (not a complete list):

Gonadotropins, or injectable "fertility drugs" (Follistim®, Repronex® Gonal-F®, Bravelle®, Menopur®): These natural hormones stimulate the ovary in hopes of inducing the simultaneous growth of several oocytes (eggs) over the span of 8 or more days. All injectable fertility drugs have FSH (follicle stimulating hormone), a hormone that will stimulate the growth of your ovarian follicles (which contain the eggs). Some of them also contain LH (luteinizing hormone) or LH like activity. LH is a hormone that may work with FSH to increase the production of estrogen and growth of the follicles. Luveris®, recombinant LH, can also be given as a separate injection in addition to FSH or alternatively, low-dose hCG. These medications are given either by subcutaneous or intramuscular injection. Proper dosage of these drugs and the timing of egg recovery require monitoring of the ovarian response, usually by way of blood tests and ultrasound examinations during the ovarian stimulation.

As with all injectable medications, bruising, redness, swelling, or discomfort can occur at the injection site. Rarely, there can be an allergic reaction to these drugs. The intent of giving these medications is to mature multiple follicles, and many women experience some bloating and minor discomfort as the follicles grow and the ovaries become temporarily enlarged. **UP to 2.0% of women will develop Ovarian Hyperstimulation Syndrome (OHSS) [see full discussion of OHSS in the Risks to Women section, which follows]. Other risks and side effects of gonadotropins include, but are not limited to, fatigue, headaches, weight gain, mood swings, nausea, and clots in blood vessels.**

Even with pre-treatment attempts to assess response, and even more so with above normal pre-treatment evaluations of ovarian reserve, the stimulation may result in very few follicles developing, the end result may be few or no eggs obtained at egg retrieval or even cancellation of the treatment cycle prior to egg retrieval.

Some research suggested that the risk of ovarian tumors may increase in women who take any fertility drugs over a long period of time. These studies had significant flaws, which limited the strength of the conclusions. More recent studies have not confirmed this risk. A major risk factor for ovarian cancer is infertility *per se*, suggesting that early reports may have falsely attributed the risk resulting from infertility to the use of medications to overcome it. In these more recent studies, conception lowered the risk of ovarian tumors compared to that of fertile women.

GnRH-agonists (Leuprolide acetate) (Lupron®): This medication is taken by injection. There are two forms of the medication: A short-acting medication requiring daily injections and a long-acting preparation lasting for 1-3 months. The primary role of this medication is to prevent a premature LH surge, which could result in the release of eggs before they are ready to be retrieved. Since GnRH-agonists initially cause a release of FSH and LH from the pituitary, they can also be used to start the growth of the follicles or initiate the final stages of egg maturation. Though leuprolide acetate is an FDA (Federal Drug Administration) approved medication, it has not been approved for use in IVF, although it has routinely been used in this way for more than 20 years. Potential side effects usually experienced with long-term use include but are not limited to hot flashes, vaginal dryness, bone loss, nausea, vomiting, skin reactions at the injection site, fluid retention, muscle aches, headaches, and depression. No long-term or serious side effects are known. You will need to use a barrior method of contraception (such as, condoms) the month that you will be starting GnRH-a. GnRH-a have not been associated with any fetal malformations; however you will discontinue use of the GnRH-a as soon as pregnancy is confirmed.

Gn-RH-antagonists (Ganirelex Acetate or Cetrorelix Acetate) (Cetrotide®): These are another class of medications used to prevent premature ovulation. They tend to be used for short periods of time in the late stages of ovarian stimulation. The potential side effects include, but are not limited to, abdominal pain, headaches, skin reaction at the injection site, and nausea.

Human chorionic gonadotropin (hCG) (Novarel®, Pregnyl®, Ovidrel®): hCG is a natural hormone used in IVF to induce the eggs to become mature and fertilizable. The timing and dosing of this medication is critical to retrieve mature eggs. Potential side effects include, but are not limited to, breast tenderness, bloating, and pelvic discomfort.

Progesterone, and in some cases, estradiol: Progesterone and estradiol are hormones normally produced by the ovaries after ovulation. After egg retrieval, in some women, the ovaries will not produce adequate amounts of these hormones for long enough to fully support a pregnancy. Accordingly, supplemental progesterone, and in some cases estradiol, are given to ensure adequate hormonal support of the uterine lining. Progesterone is usually given by injection or by the vaginal route (e.g. Endometrin®, Crinone®, or pharmacist-compounded suppositories) after egg retrieval. Progesterone is often continued for some weeks after a pregnancy has been confirmed. Progesterone has not been associated with an increase in fetal abnormalities. Side effects of progesterone include depression, sleepiness, allergic reaction and if given by intra-muscular injection includes the additional risk of infection or pain at the application site. Estradiol, if given, can be by oral, trans-dermal, intramuscular, or vaginal

administration. Side effects of estradiol include nausea, irritation at the injection site if given by the trans-dermal route and the risk of blood clots or stroke.

Dexamethasone: Most patients will be taking this oral corticosteroid to decrease the production of androgens and progesterone and get better follicles. You will take this pill every day starting on the first day of your stimulating medication and continue until your hCG injection. The dose is one 0.5 mg pill every night.

Doxycycline/Azithromycin: Doxycycline and azithromycin are broad-spectrum antibiotics used for suppression of bacterial growth that may impair embryo development and implantation.

Some common side effects of these medications include nausea and vomiting, rash and diarrhea.

Methylprednisilone (Medrol): Methylprednisilone is a corticosteroid used in patients undergoing any micromanipulation procedure (ICSI or Assisted Hatching). The rationale behind the use of this medication lies in the potential activation of the maternal immune response as a result of changes in the micromanipulated egg or embryo. Thus, Medrol is used to thwart this theoretical aspect of micromaniulaiton. The medication is begun prior to transfer.

Some common side effects of this medication include skin changes (acne; rash), nausea and vomiting, headaches, mood changes, low blood pressure and tachycardia (fast heart beat). In diabetic patients, the use of steroids will increase serum glucose and may make diabetic control difficult during the few days that it is taken.

Estraderm Patches: Estrogen is the hormone secreted by the ovaries and is important for the continued growth of the uterus/uterine lining. Some common side effects of this medication include skin irritation, breast tenderness, headache, nausea and vomiting.

Oral contraceptive pills: Many treatment protocols include oral contraceptive pills to be taken for 2 to 4 weeks before gonadatropin injections are started in order to suppress hormone production or to schedule a cycle. Side effects include unscheduled bleeding, headache, breast tenderness, nausea, swelling and the risk of blood clots or stroke. If you have contraindicaitons to OCP use(e.g., history of blood embolisms, smoker), please inform your doctor.

Other medications: Antibiotics may be given for a short time during the treatment cycle to reduce the risk of infection associated with egg retrieval or embryo transfer. Antibiotic use may be associated with a yeast infection, nausea, vomiting, diarrhea, rashes, sensitivity to the sun and allergic reactions. Anti-anxiety medications (or muscle relaxants) may be recommended prior to the embryo transfer; the most common side effect is drowsiness. Other medications, such as heparin, low molecular weight heparin or aspirin may also be included in the treatment protocol.

b. Transvaginal Oocyte Retrieval

- Eggs are removed from the ovary with a needle under ultrasound guidance
- Anesthesia is provided to make this comfortable
- Injury and infection are rare

Ooctye retrieval is the removal of eggs from the ovary. A transvaginal ultrasound probe is used to visualize the ovaries and the egg-containing follicles within the ovaries. A long needle, which can be seen on ultrasound, can be guided into each follicle and the contents aspirated. The aspirated material includes follicular fluid, oocytes (eggs) and granulosa (egg-supporting) cells. Rarely, the ovaries are not accessible by the transvaginal route and laparoscopy or transabdominal retrieval is necessary. These procedures and risks will be discussed with you by your doctor, if applicable. Anesthesia is used to reduce if not eliminate discomfort. Risks of egg retrieval include:

Infection: Bacteria normally present in the vagina may be inadvertently transferred into the abdominal cavity by the needle. These bacteria may cause an infection of the uterus, fallopian tubes, ovaries or other intra-abdominal organs. The estimated incidence of infection after egg retrieval is less than 0.5%. Treatment of infections could require the use of oral or intravenous antibiotics. Severe infections occasionally require surgery to remove infected tissue. Infections can have a negative impact on future fertility. Prophylactic antibiotics are sometimes used before the egg retrieval procedure to reduce the risk of pelvic or abdominal infection in patients at higher risk of this complication. Despite the use of antibiotics, there is no way to eliminate this risk completely

Bleeding: The needle passes through the vaginal wall and into the ovary to obtain the eggs. Both of these structures contain blood vessels. In addition, there are other blood vessels nearby. Small amounts of blood loss are common during egg retrievals. The incidence of major bleeding problems has been estimated to be less than 0.1%. Major bleeding will frequently require surgical repair and possibly loss of the ovary. The need for a blood transfusion is rare.

Trauma: Despite the use of ultrasound guidance, and the risk being low, it is possible to damage other intra-abdominal organs during the egg retrieval. Previous reports in medical literature have noted damage to the bowel, appendix, bladder, ureters, and ovary. Damage to internal organs may result in the need for additional treatment or surgery for repair or removal of the damaged organ. However, the risk of such trauma is low.

Anesthesia: The use of anesthesia during the egg retrieval can produce unintended complications such as an allergic reaction, low blood pressure, nausea or vomiting and in rare cases death. If you have had an adverse reaction previously, please notify your doctor before undergoing the start of your IVF cycle.

Failure: It is possible that the aspiration will fail to obtain any eggs or the eggs may be abnormal or of poor quality and otherwise fail to produce a viable pregnancy.

c. In Vitro Fertilization and Embryo Culture

- Sperm and eggs are placed together in specialized conditions (culture media, controlled temperature, humidity and light) in hopes of fertilization
- Culture medium is designed to permit normal fertilization and early embryo development, but the content of the medium is not standardized
- Embryo development in the lab helps distinguish embryos with more potential from those with less or none

After eggs are retrieved, they are transferred to the embryology laboratory where they are kept in conditions that support their needs and growth. The resulting embryos are placed in small dishes or tubes containing "culture medium", which is special fluid developed to support development of the embryos made to resemble that found in the fallopian tube or uterus. The dishes containing the embryos are then placed into incubators, which control the temperature and atmospheric gasses the embryos experience.

A few hours after eggs are retrieved, sperm are placed in the culture medium with the eggs, or individual sperm are injected into each mature egg in a technique called Intracytoplasmic Sperm Injection (ICSI) (see below). The eggs are then returned to the incubator, where they remain to develop. Periodically over the next few days, the dishes are inspected so the development of the embryos can be assessed.

The following day after eggs have been inseminated or injected with a single sperm (ICSI), they are examined for signs that the process of fertilization is underway.

It is important to note that since (many) eggs and embryos can be abnormal, it is expected that not all eggs will fertilize and not all embryos will divide at a normal rate. The chance that a developing embryo will produce a pregnancy is related to whether its development in the lab is normal, but this correlation is not perfect. This means that not all embryos developing at the normal rate are, in fact, also genetically normal, and not all poorly developing embryos are genetically abnormal. Nonetheless, their visual appearance is the most common and useful guide in the selection of the best embryo(s) for transfer.

In spite of reasonable precautions, any of the following may occur in the lab that would prevent the establishment of a pregnancy:

- Fertilization of the egg(s) may fail to occur.
- One or more eggs may be fertilized abnormally resulting in an abnormal number of chromosomes in the embryo.
- The fertilized eggs may degenerate before dividing into embryos, or adequate embryonic development may fail to occur.
- Laboratory equipment may fail, or extended power losses, or a laboratory accident can occur which could lead to the destruction of eggs, sperm and embryos.
- Other unforeseen circumstances may prevent any step of the procedure to be performed or prevent the establishment of a pregnancy.

- Hurricane, flooding or other "acts of God" (including bombings or other terrorist acts) could destroy the laboratory or its contents, including any sperm, eggs, or embryos being stored there.

Quality control in the lab is extremely important. Sometimes immature or unfertilized eggs, sperm or abnormal embryos (abnormally fertilized eggs or embryos whose lack of development indicates they are not of sufficient quality to be transferred) that would normally be discarded can be used for quality control. You are being asked to allow Long Island IVF to use this material for quality control purposes before being discarded in accordance with normal laboratory procedures and applicable laws. **None of this material will be utilized to establish a pregnancy or a cell line unless you sign other consent forms to allow Long Island IVF to use your eggs, sperm or embryos for research purposes. Please indicate your choice below:**

____I/We hereby CONSENT to allow Long Island IVF to utilize my/our immature or unfertilized eggs, left-over sperm or abnormal embryos for quality control and training purposes before they are discarded.

Patient	Partner	Date
_____	_____	_____

____I/We hereby DO NOT CONSENT to allow Long Island IVF to utilize my/our immature or unfertilized eggs, left-over sperm or abnormal embryos for quality control and training purposes. This material will be discarded in accordance with normal laboratory procedures and applicable laws.

Patient	Partner	Date
_____	_____	_____

d. Embryo Transfer

- After a few days of development, the best-appearing embryos are selected for transfer.
- The number chosen influences the pregnancy rate and the multiple pregnancy rate.
- A woman's age and the appearance of the developing embryo have the greatest influences on pregnancy outcome.
- Embryos are placed in the uterine cavity with a thin tube.
- Excess embryos of sufficient quality that are not transferred can be frozen.

After a few days of development, one or more embryo(s) are selected for transfer to the uterine cavity. Embryos are placed in the uterine cavity with a thin tube. Ultrasound guidance is used to help guide the catheter or confirm placement through the cervix and into the uterine cavity. Although the possibility of a complication from the embryo transfer is very rare, risks include infection and loss of, or damage to, the embryos.

The number of embryos transferred influences the pregnancy rate and the multiple pregnancy rate. The age of the woman and the appearance of the developing embryo have the greatest influence on pregnancy outcome and the chance for a "multiple pregnancy". While it is possible, it is unusual to develop more fetuses than the number of embryos transferred, but this can happen as a result of identical twinning. It is critical to discuss the number of embryos to be transferred with your doctor before the transfer cycle is begun.

In an effort to help curtail the problem of multiple pregnancies (*see* multiple pregnancies in Section 3 below), national guidelines published recommend limits on the number of embryos to transfer (*see* ASRM recommendations on best practices). These limits differ depending on the developmental stage of the embryos and the quality of the embryos and take into account the patient's personal history.

In some cases, there will be additional embryos remaining in the lab after the transfer is completed. Depending on their developmental normalcy, it may be possible to freeze them for later use. (See section 2.c. for an in-depth discussion of embryo cryopreservation).

Blastocyst Embryo Transfer

The Blastocyst protocol involves developing fertilized eggs to the blastocyst stage, about five to six days from your retrieval.

The benefits of this approach are an increased pregnancy rate per embryo transfer (implantation rate) because over a longer period of time observation of continued development of an embryo may indicate greater viability potential for pregnancy. Another benefit of this procedure is a decrease in high order multiple pregnancy as it is anticipated that only one or two embryos will be transferred into the uterus, therefore, avoiding more than twins. The theoretical and potential problem with this protocol is that an embryo, which might be viable on day two or three in culture, might become non-viable with additional days in culture although it might have been

viable if it had been replaced into the uterus. There is no way to prove or disprove this concern, but it is a theoretical risk of the protocol. Realistically, there is an increased risk of going through IVF and not receiving an embryo transfer because none of the embryos lasted five or six days in culture to the blastocyst stage. The risk is approximately 10-15 percent.

e. PGD may be indicated for your IVF cycle due to your being a carrier of a single gene disease, translocations, or for aneuploidy (abnormal number of chromosomes). Please speak with your physician if this may be something you may want to do or need to do.

f. MESA/TESE: Sperm aspiration refers to the group of procedures used to obtain viable sperm from the male reproductive tract when it is not found in the ejaculate. ICSI is then used during the IVF procedure to increase the couple's chance of conceiving a child. You will be referred to a urologist to be evaluated for the need of these.

g. Hormonal Support of Uterine Lining

- Successful attachment of embryo(s) to the uterine lining depends on adequate hormonal support.
- Progesterone, given by the intramuscular or vaginal route, is routinely given for the purpose of adequate hormonal support.

Successful attachment of embryos to the uterine lining depends on adequate hormonal support of the lining. The critical hormones in this support are progesterone and estradiol. Normally, the ovary makes sufficient amounts of both hormones. However, in IVF cycles, this support is not always adequate. Progesterone is given by the intramuscular or vaginal route. Estradiol is given by the oral, vaginal, or intramuscular route. The duration of this support is from 2 to 10 weeks.

2. Additional Elements and Their Risks

a. Intracytoplasmic Sperm Injection (ICSI)

- ICSI is used to increase the chance of fertilization when fertilization rates are anticipated to be lower than normal.
- Overall success rates with ICSI are slightly lower than for conventional insemination.
- An increased risk of genetic defect in offspring is reported.
- ICSI will not improve oocyte defects.

The use of ICSI provides an effective treatment for male factor infertility. The negative effects of abnormal semen characteristics and sperm quality on fertilization can be overcome with ICSI if viable sperm are available because the technique bypasses the shell around the egg (zona pellucida) and the egg membrane (oolemma) to deliver the sperm directly into the egg. ICSI involves the direct injection of a single sperm into the interior of an egg using an extremely thin glass needle. ISCI allows couples with male factor infertility to achieve fertilization and live birth rates close to those achieved with in vitro fertilization (IVF) using conventional method of

fertilization in men with normal sperm counts. ICSI can be performed even in men with no sperm in the ejaculate if sperm can be successfully collected from the epididymis or the testis.

Reports on the risk of birth defects associated with ICSI (compared to those associated with conventional fertilization in IVF cycles) have yielded conflicting results. The most comprehensive study conducted thus far, based on data from five-year-old children, has suggested that ICSI is associated with an increased risk of certain major congenital anomalies. However, whether the association is due to ICSI procedure itself, or to inherent sperm defects, could not be determined because the study did not distinguish between male factor conditions and other causes of infertility. Note that even if there is an increased risk of congenital malformations in children conceived with ICSI, the risk is relatively low (4.2% versus ~ 3% of those conceived naturally). The impact of ICSI on the intellectual and motor development of children conceived via ICSI also has been controversial. An early report suggested that development in such children lagged significantly behind that of children resulting from conventional IVF or those conceived naturally. However, more recent studies from larger groups, using standardized criteria for evaluation, have not detected any differences in the development or the abilities of children born after ICSI, conventional IVF, or natural conception.

The prevalence of sex chromosome abnormalities in children conceived via ICSI is higher than observed in the general IVF population, but the absolute difference between two groups is small (0.8% to 1.0% in ICSI offspring versus 0.2% in the general IVF population). The reason for the increased prevalence of chromosomal anomalies observed in ICSI offspring is not clear. Whereas it may result from the ICSI procedure itself, it might also reflect a direct paternal effect. Men with sperm problems (low count, poor motility, and/or abnormal shape) are more likely themselves to have genetic abnormalities and often produce sperm with abnormal chromosomes; the sex chromosomes (X and Y) in the sperm of men with abnormal semen parameters appear especially prone to abnormalities. If sperm with abnormal chromosomes produce pregnancies, these pregnancies will likely carry these same defects. The prevalence of translocations (a rearrangement of chromosomes that increases the risk of abnormal chromosomes in egg or sperm and can cause miscarriage) of paternal origin and of *de novo* balanced translocations in ICSI offspring (0.36%) also appears higher than in the general population (0.07%).

Some men are infertile because the tubes connecting the testes to the penis did not form correctly. This condition, called congenital bilateral absence of the vas deferens (CBAVD), can be bypassed by aspirating sperm directly from the testicles or epididymis, and using them in IVF with ICSI to achieve fertilization. However, men with CBAVD are affected with a mild form of cystic fibrosis (CF), and this gene will be passed on to their offspring. All men with CBAVD, as well as their partners, should be tested for CF gene mutations prior to treatment so that the risk of their offspring having CF can be estimated and appropriate testing performed. It is important to understand that there may be CF gene mutations that are not detectable by current testing, and parents who test negative for CF mutations can still have children affected with CF.

Some men have no sperm in the ejaculate because their testes do not produce adequate quantities (non-obstructive azoospermia). This can be due to a number of reasons such as prior radiation, chemotherapy or undescended testicles. In some men, small deletions on their Y chromosomes lead to extremely low or absent sperm counts. Testicular biopsy and successful retrieval of

viable sperm can be used to fertilize eggs with ICSI. However, any sperm containing a Y chromosomal microdeletion will be transmitted to the offspring. Thus the risk that male offspring might later manifest disorders including infertility is very real. However, men without a detectable deletion by blood testing can generate offspring having a Y chromosome microdeletion, because the chromosomes in the sperm may not be the same as those seen when tested by a blood test.

b. Assisted Hatching, Co-Culture and Embryo Glue

- Assisted Hatching involves making a hole in the outer shell (zona pellucida) that surrounds the embryo.
- Hatching may make it easier for embryos to escape from the shell that surrounds them

The cells that make up the early embryo are enclosed within a flexible membrane (shell) called the zona pellucida. During normal development, a portion of this membrane dissolves, allowing embryonic cells to escape or "hatch" out of the shell. Only upon hatching can the embryonic cells implant within the wall of the uterus to form a pregnancy.

Assisted hatching is the laboratory technique in which an embryologist makes an artificial opening in the shell of the embryo. The hatching is usually performed on the day of transfer, prior to loading the embryo into the transfer catheter. The opening can be made by mechanical means with a needle or with a laser, or chemical means by dissolving a small hole in the shell with the dilute acid solution.

We have incorporated artificial or "assisted hatching" into our treatment protocols because we believe it improves implantation rates, and ultimately, live birth rates although definitive evidence of this is lacking.

Risks that may be associated with assisted hatching include damage to the embryo resulting in loss of embryonic cells, or destruction or death of the embryo. Artificial manipulation of the zygote may increase the rates of monozygotic (identical) twinning, which are significantly more complicated pregnancies. There may be other risks not yet known.

Assisted hatching appears to benefit patients transferring cleaved embryos who are older than 38 years of age and those with thick zonae. We have included Assisted Hatching as part of our protocol for these patients as well as many who have previous failed cycles as well as those transferring thawed frozen embryos.

Co-culture

Co-culture is a laboratory procedure whereby "helper" cells are grown along with the developing embryo. Cumulus cells, removed with the egg during an IVF retrieval are placed in the culture dish with the embryo. Cumulus cells produce growth factors as wells as a chemical called hyaluronan, which is involved in regulating cell adhesion, growth and development.

Co-culture of cumulus cells with embryos provides an opportunity as well to detoxify the embryo's culture medium that the embryos are growing in and produce growth factors important for cell development. 1,2 This may explain why performing co-culture has improved implantation rates in a study of patients over age 38 or whose previous IVF cycles were unsuccessful. As a result co-culture is offered as part of the IVF protocol for many of these patients.

References:
1. Barmat LI, Worrilow KC, Paynton BV, Growth factor expression by human oviduct and buffalo rat liver co culture cells. Fertil Steril 1997; 67:775-9.

2. Fukui Y, McGowan LT, James RW, Pugh PA, Tervit HR, Factors affecting the in vitro development of blastocysts of bovine oocytes matured and fertilized in vitro. J Reprod Fertil 1991;92:125-31

Embryo Glue

Embryo glue is a protein medium including hyaluronan, which is involved in regulating cell adhesion, growth and development that is added to the transfer medium just prior to the embryo transfer. In 2008, a study was presented at the ASRM, the national society of Reproductive Medicine, that suggested that when embryo glue was used for patients over age 38 or whose previous IVF cycles were unsuccessful that there was an increase in pregnancy rates when compared to the same group who did not use embryo glue. We have therefore included embryo glue as part of the IVF protocol for these patients.

c. Embryo Cryopreservation and Disposition

- Freezing of viable embryos not transferred after egg retrieval provide additional future chances for pregnancy.
- Frozen embryos do not always survive the process of freezing and thawing.
- Freezing of eggs before fertilization is currently much less successful than freezing of fertilized eggs (embryos) and is considered experimental.
- Ethical and legal dilemmas can arise when couples separate or divorce; disposition agreements are essential.
- It is the responsibility of each couple with frozen embryos to remain in contact (on an annual basis) while embryos are still being stored at Long Island IVF.

Freezing (or "cryopreservation") of embryos is a common procedure. Since multiple eggs (oocytes) are often produced during ovarian stimulation, on occasion there are more embryos available than are considered appropriate for transfer to the uterus. These embryos, if viable, can be frozen for future use. This saves the expense and inconvenience of stimulation to obtain additional eggs in the future. Furthermore, the availability of cryopreservation permits patients to transfer fewer embryos during a fresh cycle, reducing the risk of high-order multiple gestations (triplets or greater). Other possible reasons for cryopreservation include freezing all embryos in the initial cycle to prevent severe ovarian hyperstimulation syndrome (OHSS), or if a couple were concerned that their future fertility potential might be reduced due to necessary

medical treatment (e.g., cancer therapy or surgery). The pregnancy success rates for cryopreserved embryos transferred into the human uterus can vary. Overall pregnancy rates at the national level with frozen embryos are lower than with fresh embryos. This, at least in part, results from the routine selection of the best-looking embryos for fresh transfer, reserving the "second-best" for freezing. There is some evidence that pregnancy rates are similar when there is no such selection.

Indications:

- To reduce the risks of multiple gestation;
- To preserve fertility potential in the face of certain necessary medical procedures;
- To increase the chance of having one or more pregnancies from a single cycle of ovarian stimulation;
- To minimize the medical risk and cost to the patient by decreasing the number of stimulated cycles and egg retrievals;
- To temporarily delay pregnancy and the risks of OHSS occurs by freezing all embryos, when this risk is high.

Risks of embryo cryopreservation: There are several techniques for embryo cryopreservation, and research is ongoing. Traditional methods include "slow", graduated freezing in a computerized setting, and "rapid" freezing methods, called "vitrification". Current techniques deliver a high percentage of viable embryos thawed after cryopreservation, but there can be no certainty that embryos will thaw normally, nor be viable enough to divide and eventually implant in the uterus. Cryopreservation techniques could theoretically be injurious to the embryo. Extensive animal data (through several generations), and limited human data, do not indicate any likelihood that children born of embryos that have been cryopreserved and thawed will experience greater risk of abnormalities than those born of fresh embryos. However, until very large numbers of children have been born following freezing and thawing of embryos, it is not possible to be certain that the rate of abnormalities is no different from the normal rate.

Because of the possibility of you and/or your partner's separation, death or incapacitation, it is important to decide on the disposition of any embryo(s) cryopreserved that remain in the laboratory. Since this is a rapidly evolving field, both medically and legally, Long Island IVF cannot guarantee what the available or acceptable avenues for disposition will be at any future date. At the present time, the alternatives are:

1) Discarding the cryopreserved embryo(s);
2) Donating the cryopreserved embryo(s) for approved research studies;
3) Donating the cryopreserved embryos to another couple in order to attempt pregnancy. (You may be asked to undergo additional infectious disease testing and screening recommended by the FDA if you select this option.)

Embryos are understood to be your property, with rights of survivorship. No use can be made of these embryos without the consent of both partners.

a) In the event of divorce or dissolution of the marriage or partnership, the ownership and/or rights to the embryo(s) will be directed by court decree and/or settlement agreement.
b) In the event of the death or incapacitation of one partner, the embryo(s) will become the sole and exclusive property of the surviving partner unless otherwise stipulated in a legally recognized document.

In the event of death or incapacitation of both partners or of a last surviving partner, the embryo(s) shall become the sole and exclusive property of Long Island IVF. In this event, I/we elect to: (please select and initial your choice)

	Patient	Partner
1) Thaw and discard embryo(s)	_____	_____
2) Donate the embryo(s) for research	_____	_____

d. Cryopreserved Embryo Storage

Patients/couples who have frozen embryo(s) must remain in contact with Long Island IVF in order to inform Long Island IVF of their wishes as well as to pay fees associated with the storage of their embryo(s) as long as there are embryos frozen there. If within twelve months there is no contact with Long Island IVF, or fees associated with the embryo storage have not been paid and you fail to respond to all attempts to contact you, the embryo(s) will be considered to be abandoned and may be destroyed by Long island IVF in accordance with normal laboratory procedures and applicable law.

If I/we the patient/couple decide to cease to store our cryopreserved embryo(s), I/we elect to: (please initial your choice)

	Patient	Partner
1) Discard the cryopreserved embryo(s)	_____	_____
2) Donate the cryopreserved embryo(s) for research	_____	_____
3) Donate to an infertile couple	_____	_____

e. Donated or Research Embryo Fate

In certain situations, donating embryo(s) for research or to another couple may not be possible or may be restricted by law. While efforts will be made to abide by your wishes, no guarantees can be given that embryos will be used for research or donated to another couple. In these instances, if no recipient or research project can be found, or your embryo(s) are not eligible, your

embryo(s) will be discarded by the lab in accordance with laboratory procedures and applicable laws.

B. Risks to the Woman

1. Ovarian Hyperstimulation Syndrome

To increase the number of eggs that develop, a series of hormone shots are given. The hormones used in this regimen are known to have, or suspected of having, a variety of side effects, some minor and some potentially major.

The most serious side effect of ovarian stimulation is ovarian hyperstimulation syndrome (OHSS). Its symptoms can include increased ovarian size, nausea and vomiting, accumulation of fluid in the abdomen, breathing difficulties, and increased concentration of red blood cells, kidney and liver problems, and in the most severe cases, blood clots, kidney failure, or death. The severe cases affect only a very small percentage of women who undergo in vitro fertilization – 0.2% or less of all treatment cycles – and the very severe are an even smaller percentage. OHSS occurs at two stages: early, 1 to 5 days after egg retrieval (as a result of the hCG trigger); and late, 10 to 15 days after retrieval (as a result of hCG if pregnancy occurs). The risk of severe complication is about 4 to 12 times higher if pregnancy occurs which is why sometimes no embryo transfer is performed to reduce the possibility of this occurring.

2. Cyst Formation

As mentioned above, the hormones used in the regimen may result in large cysts forming on the ovaries. In the majority of cases, ovarian cysts induced by fertility drugs/medications disappear spontaneously requiring no intervention. In very rare instances (less than 1% of cycles), these cysts could result in significant abdominal discomfort that, in turn, could result in the need for hospitalization for observation purposes. One of these cysts could rupture requiring emergency surgery to stop the bleeding and could result in a need for blood transfusion and possible loss of one or both ovaries (0.1% of cycles).

3. Cancer

Many have worried that the use of fertility drugs could lead to an increased risk of cancer – in particular, breast, ovarian, and uterine (including endometrial) cancers. One must be careful in interpreting epidemiological studies of women taking fertility drugs. Because all of these cancers are more common in women with infertility, merely comparing women taking fertility drugs with women in the general population inevitably shows an increased incidence of cancer. When the analysis takes into account, the increased cancer risk due to infertility *per se*, the evidence does not support a relationship between fertility drugs and an increased prevalence of breast or ovarian cancer. More research is required to examine what the long-term impact of fertility drugs may be on breast and ovarian cancer prevalence rates. For uterine cancer, the numbers are too small to achieve statistical significance, but it is at least possible that use of fertility drugs may indeed cause some increased risk of the uterine cancer.

4. Adnexal Torsion (Ovarian Twisting)

Less than 1% of the time, the stimulated ovary can twist on itself, cutting off its own blood supply. Surgery is required to untwist or even remove it.

5. Risks of Pregnancy

Pregnancies that occur with IVF are associated with increased risks of certain conditions. Some of these risks stem from the higher average age of women pregnant by IVF and the fact that the underlying cause of infertility may be the cause of the increased risk of pregnancy complications. There may be additional risks related to the IVF procedure *per se*, but it is difficult to assign the relative contributions.

Currently more than 30% of IVF pregnancies are twins or higher-order multiple gestations (triplets or greater), and about half of all IVF babies are a result of multiple gestations. Identical twinning occurs in 1.5% to 4.5% of IVF pregnancies. IVF twins deliver on average on average three weeks earlier and weigh 1,000 gm less than IVF singletons. Of note, IVF twins do as well as spontaneously conceived twins. Triplet (and greater) pregnancies deliver before 32 weeks (7 months) in almost half of cases.

Additionally, while embryos are transferred directly into the uterus with IVF, ectopic, (tubal, cervical and abdominal) pregnancies as well as abnormal intra-uterine pregnancies have occurred either alone or concurrently with a normal intra-uterine pregnancy. These abnormal pregnancies oftentimes require medical treatments with methotrexate (a weak chemotherapy drug) and/or surgery to treat the abnormal pregnancy. Side effects of methotrexate include nausea or vomiting, diarrhea, cramping, mouth ulcers, headache, skin rash, sensitivity to the sun and temporary abnormalities in liver function tests. Risks of surgery include the risks of anesthesia, scar tissue formation inside the uterus, infection, bleeding and injury to any internal organs.

C. Risks to Offspring

- IVF babies may be a slight increased risk for birth defects.
- The risk for a multiple pregnancy is significantly higher for patients undergoing IVF, even when only one embryo is transferred.
- Multiple pregnancies are the greatest risk for babies following IVF.
- Some risk may also stem from the underlying infertile state, or from the IVF techniques, or both.

1. Overall Risks

Since the first birth of an IVF baby in 1978, more than 3 million children have been born worldwide following IVF treatments. Numerous studies have been conducted to assess the overall health of IVF children, and the majority of studies on the safety of IVF have been

reassuring. As more time has passed and the dataset has enlarged, some studies have raised doubts about the equivalence of risks for IVF babies as compared to naturally conceived babies.

A major problem in interpreting the data arises from the fact that comparing a group of infertile couples to a group of normally fertile couples is not the proper comparison to make if one wants to assess the risk that IVF technology engenders. Infertile couples, by definition, do not have normal reproductive function and might be expected to have babies with more abnormalities than a group of normally fertile couples. This said, even if the studies suggesting an increased risk to babies born after IVF prove to be true, the absolute risk of any abnormal outcome appears to be small.

Singletons conceived with IVF tend to be born slightly earlier than naturally conceived babies (39.1 weeks as compared to 39.5 weeks). IVF twins are not born earlier or later than naturally conceived twins. The risk of a singleton IVF conceived baby being born with a birth weight under 5 pounds 9 ounces (2500 grams) is 12.5% versus 7% in naturally conceived singletons.

2. Birth Defects

The risk of birth defects in the normal population is 2-3%. In IVF babies, birth defect rate may be 2.6-3.9%. The difference is seen predominately in singleton males. Studies to date have not been large enough to prove a link between IVF treatment and specific types of birth defects.

Imprinting Disorders. These are rare disorders having to do with whether a maternal or paternal gene is inappropriately expressed. In two studies, approximately 4% of children with the imprinting disorder called Beckwirth-Weidemann Syndrome were born after IVF, which is more than expected. A large Danish study, however, found no increased risk of imprinting disorders in children conceived with the assistance of IVF.

Childhood Cancers. Most studies have not reported an increased risk with the exception of retinoblastoma. In one study in the Netherlands, five cases were reported after IVF treatment which is 5 to 7 times more than expected.

Infant Development. In general, studies of long-term developmental outcomes have been reassuring so far; most children are doing well. However, these studies are difficult to do and suffer from limitations. A more recent study with better methodology reports an increased risk of cerebral palsy (3.7 fold) and developmental delay (4 fold), but most of this stemmed from the prematurity and low birth weight that was a consequence of multiple pregnancy.

3. Risks of a Multiple Pregnancy

The most important maternal complications associated with multiple gestation are preterm labor and delivery, pre-eclampsia, and gestational diabetes. A premature delivery may jeopardize the life and long-term health of a child and may result in substantial costs both financially and emotionally. Other complications include gall bladder problems, skin problems, excess weight gain, anemia, excessive nausea and vomiting, and exacerbation of pregnancy-associated

gastrointestinal symptoms including reflux and constipation. Chronic back pain, intermittent heartburn, postpartum laxity of the abdominal wall, and umbilical hernias also can occur. Triplets and above increase the risk to the mother of more significant complications, including post-partum hemorrhage and transfusion.

Fetal death rates for singleton, twin, and triplet pregnancies are 4.3 per 1,000, 15.5 per 1,000, and 21 per 1,000, respectively. The death of one or more fetuses in a multiple gestation (vanishing twin) is more common in the first trimester and may be observed in up to 25% of pregnancies after IVF. Loss of a fetus in the first trimester is unlikely to adversely affect the surviving fetus or mother. No excess perinatal or maternal morbidity has been described resulting from a "vanishing" embryo.

Demise of a single fetus in a twin pregnancy after the first trimester is more common when they share a placenta, ranging in incidence from 0.5% to 6.8%, and may cause harm to the remaining fetus.

Multiple fetuses (including twins) that share the same placenta have additional risks. Twin-twin transfusion syndrome in which there is an imbalance of circulation between fetuses may occur in up to 20% of twins sharing a placenta. Excess or insufficient amniotic fluid may result from twin-to-twin transfusion syndrome. Twins sharing the same placenta have a higher frequency of birth defects compared to pregnancies having two placentas. Twins sharing the same placenta appear to occur more frequently after blastocyst transfer.

Placenta previa and vasa previa are more common complications in multiple gestations. Abruptio placenta also is more common and postpartum hemorrhage may complicate 12% of multifetal deliveries. Consequences of multiple gestations include the major sequelae of prematurity (cerebral palsy, retinopathy of prematurity and chronic lung disease) as well as those of fetal growth restriction (polycythemia, hypoglycemia, necrotizing enterocolitis). It is unclear to what extent multiple gestations themselves affect neuro-behavioral development in the absence of these complications. Rearing twins and high-order multiples may generate physical, emotional, and financial stresses, and the incidence of maternal depression and anxiety is increased in women raising multiples. At mid-childhood, prematurely born offspring from multiple gestations have lower IQ scores, and multiple birth children have an increase in behavioral problems compared with singletons. It is not clear to what extent these risks are affected by IVF *per se*.

The Option of Selective Reduction: Pregnancies that have more than 2 fetuses are considered an adverse outcome of the infertility treatment. The greater the number of fetuses within the uterus, the greater is the risk for adverse perinatal and maternal outcomes. Patients with more than twins are faced with the options of continuing the pregnancy with all risks previously described, terminating the entire pregnancy, or reducing the number of fetuses in an effort to decrease the risk of maternal and perinatal morbidity and mortality. Multifetal pregnancy reduction (MFPR) decreases risks associated with preterm delivery but often creates profound ethical dilemmas. Pregnancy loss is the main risk of MFPR. However, current data suggest that such complications have decreased as experience with the procedure has grown. The risk of loss of the entire pregnancy after MFPR is approximately 1%.

D. Ethical and Religious Considerations in Infertility Treatment

Infertility treatment can raise concerns and questions of an ethical or religious nature for some patients. The technique of in vitro fertilization (IVF) involves the creation of human embryos outside the body, and can involve the production of excess embryos and/or "high-order" multiple pregnancy (triplets or more). We encourage patients and their spouses or partners who so desire to consult with trusted members of their religious or ethics community for guidance on their infertility treatment.

E. Psychosocial Effects of Infertility Treatment

A diagnosis of infertility can be a devastating and life-altering event that impacts on many aspects of a patient's life. Infertility and its treatment can affect a patient and her spouse or partner medically, financially, socially, emotionally and psychologically. Feelings of anxiousness, depression, isolation, and helplessness are not uncommon among patients undergoing infertility treatment. Strained and stressful relations with spouses, partners and other loved ones are not uncommon as treatment gets underway and progresses.

Our health care team is available to address the emotional as well as physical symptoms that can accompany infertility. In addition to working with our health care team, to minimize the emotional impacts of infertility treatments, patients are seen by a social worker prior to their IVF cycle and may also consider working with mental health professionals who are specially trained in the area of infertility care.

While it is normal to experience emotional ups and downs when pursuing infertility treatment, it is important to recognize when these feelings are of a severe nature. If you experience any of the following symptoms over a prolonger period of time, you may benefit from working with a mental health professional:

- Loss of interest in usual activities
- Depression that does not lift
- Strained interpersonal relationships (with partner, family, friends and/or colleagues)
- Difficulty thinking of anything other than your infertility
- High levels of anxiety
- Diminished ability to accomplish tasks
- Difficulty with concentration
- Change in your sleep patterns (difficulty falling asleep or staying asleep; early morning awakening; sleeping more than usual for you)
- Change in your appetite or weight (increase or decrease)
- Increased use of drugs or alcohol
- Thoughts about death or suicide
- Social isolation

- Persistent feelings of pessimism, guilt, or worthlessness
- Persistent feelings of bitterness or anger

Our health care team can assist you in locating a qualified mental health professional who is familiar with the emotional experience of infertility, or you can contact a national support group such as RESOLVE (www.resolve.org, Tel.-888-623-0744) or The American Fertility Association (AFA) (www.theafa.org, Tel. 1-888-917-3777).

F. Legal Considerations and Legal Counsel

The law regarding embryo cryopreservation, subsequent thaw and use, and parent-child status of any resulting child(ren) is, or may be, unsettled in the state in which either the patient, spouse, partner, or any donor currently or in the future lives, or the state in which the ART Program is located. We acknowledge that the ART Program has not given us legal advice, that we are not relying on the ART Program to give us any legal advice, and that we have been informed that we should consult a lawyer who is experienced in the areas of reproductive law and embryo cryopreservation and disposition if we have any questions or concerns about the present or future status of our embryos, our individual or joint access to them, our individual or joint parental status as to a resulting child, or about any other aspect of this consent and agreement.

G. Alternatives to IVF

There are alternatives to IVF treatment including gamete intrafallopian transfer (GIFT), zygote intrafallopian transfer (ZIFT) or tubal embryo transfer (TET) where eggs and sperm, fertilized eggs or developing embryos, respectively, are placed into the fallopian tube(s). Using donor sperm, donor eggs, adoption or not pursuing treatment are also options. Gametes (sperm and/or eggs), instead of embryos may be frozen for future attempts at pregnancy in an effort to avoid potential future legal issues relating to disposition of any cryopreserved embryos. Sperm freezing - but not egg freezing - has been an established procedure for many decades. Egg freezing is considered an experimental procedure at this time. We have had the opportunity to discuss these options as well as others with our (my) physician. In an attempt to have a child, we (I) now elect to utilize in vitro fertilization and embryo transfer at Long Island IVF.

H. Reporting Outcomes

The 1992 Fertility Clinic Success Rate and Certification Act requires the Centers for Disease Control and Prevention (CDC) to collect cycle-specific data as well as pregnancy outcome on all assisted reproductive technology cycles performed in the United States each year and requires them to report success rates using this data. Consequently, data from my/our IVF procedure will

be provided to the CDC and to the Society of Assisted Reproductive Technologies (SART) of the American Society of Reproductive Medicine (ASRM) (if Long Island IVF continues as a member of this organization). The CDC may request additional information from the treatment center of contact me/us directly for additional follow-up. Additionally, my/our information may be used and disclosed in accordance with HIPAA guidelines in order to perform research of quality control. All information used for research will be de-identified prior to publication. De-identification is a process intended to prevent the data associated with my/our treatment being used to identify me/us as individuals.

References:

General IVF overviews available on the internet

http://www.sart.org/

http://www.cdc.gov/art/

http://www.resolve.org.site.PageServer

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Genetic considerations related to intracytoplasmic sperm injection (ICSI). The Practice Committee of the American Society for Reproductive Medicine and the Practice Committee of the Society for Assisted Reproductive Technology. Fertil Steril 2006; 86 (suppl 4): S103-S105

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Ovarian Hyperstimulation

Ovarian hyperstimulation syndrome. The Practice Committee of the American Society for Reproductive Medicine. Fertil Steril 2006, 86 (suppl 4)" S178-S183

Risks of Pregnancy

Infertility, assisted reproductive technology, and adverse pregnancy outcomes. Executive Summary of a National Institute of Child Health and Human Development Workshop. Reddy UM, Wapner RJ, Rebar RW, Tasca RJ. Obstet Gynecol 2007; 109(4)L967-77

Risks to Offspring

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Imprinting diseases and IVF: A Danish National IVF cohort study. Lidegaard O, Pinborg A and Anderson AN. Human Reproduction 2005; 20(4):950-954

Data from your ART procedure will also be provided to the Centers for Disease Control and Prevention (CDC). The 1992 Fertility Clinic Success Rate and Certification Act requires that CDC collect data on all assisted reproductive technology cycles performed in the United States annually and report success rates using these data. Because sensitive information will be collected on you, CDC applied for and received an "assurance of confidentiality" for this project under the provisions of the Public Health Service Act, Section 308(d). This means that any information that CDC has that identifies you will not be disclosed to anyone else without your consent.