

Gender Selection What you Need to Know

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A fascinating topic that stirs discussions on both sides. Selecting the sex of the baby, boy or girl, is an additional procedure that can be combined with IVF, for specific indications. A male baby is the result of fertilization of an egg (X chromosome) with a Y chromosome bearing sperm. Female baby results from fertilization of the egg with an X bearing sperm.

Indication for Gender (Sex) Selection

The World Health Organization defines the indication for sex selection into

- Medical reasons—such as preventing the birth of children affected or at risk of X-linked disorders.
- Family balancing—where couples choose to have a child of one sex because they already have one or more children of the other sex.
- Gender preference— in favor of one sex often male offspring stemming from cultural, social, and economic bias in favor of male children and as a result of policies requiring couples to limit reproduction to one child. Biases vary among different communities e.g Germans has no preference, American men may prefer biological sons and American women has no preference (Gallup 2011) and both prefer adopted daughters.

Ethics of Gender Selection

Many European countries and Canada and Asian countries have banned sex selection in cases unrelated to any health purpose. The American Society of Reproductive Medicine (ASRM) has allowed pre-fertilization sex selection through sperm sorting and IUI and discouraged the use of IVF and PGD solely for sex selection. Sperm sorting is not available in the US as it is not approved by FDA.

The bio-ethical concerns related to sex selection include:

1. Healthy fertile couples choosing IVF for the sole reason of sex selection. An alternative argument is that the risk of pregnancy outweighs the risk of IVF and this becomes relevant in women seeking to limit the number of pregnancies and babies to two of opposite sex.
2. Future imbalance of population and changing the sex ratio. This is unlikely through IVF as only 1% of world population are born following assisted reproduction. Sex ratio imbalance does occur through sex-selective abortion.

Criteria to Consider Couples for Sex Selection Procedures

To address some ethical and safety concerns related to **sex (gender) selection** using IVF + PGD, couples requesting sex selection should fulfill minimal criteria

1. IVF indicated for other fertility factors
2. Not in the first cycle for the first baby except for genetic reason
3. In subsequent cycles or selecting for the under-represented gender for family balancing only

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Methods of Sex Selection

The choice of sex selection method is dependent on availability, cost and accuracy. The majority of couples do not merely prefer certain sex they specifically desire a boy or a girl. For couples interested in a certain sex only, methods of **gender selection** should be very accurate, close to 99%.

Pre-Fertilization

MicroSort

Not available for use in the US. Sperm is sorted and used for intrauterine insemination (IUI). Sperm carrying an X chromosome have approximately 2.8% more DNA material than sperm carrying a Y chromosome. This is the basis of separating X and Y sperm. Microsort requires an excellent sperm sample of 140 million sperm and 50% motility for IUI and 70 million sperm and 50% motility for IVF. Studies reported that 91% of those attempting for a girl do conceive a girl, while the success rates for sex selection and boys using MicroSort® is lower at 74%. The pregnancy rate after ovarian stimulation and IUI is approximately 10%. Thus the success rate for getting pregnant with the desired sex using this method is 7.5 to 9% per attempt or less.

Other pre-fertilization methods

The Shettles Method is based on the fact that male and female sperm travel and survive in the reproductive tract for varying amounts of time. So you time intercourse about 12 hours prior to ovulation for a boy and several days before ovulation for a girl. There is no proof that this method is effective.

Ericsson Albumin Method. Sperm is filtered through albumin and used for IUI. In addition for a girl, Clomid is used since it has been shown to increase the number of girls. There is no

scientific proof that this method is effective.

Post-Fertilization (Pre-embryo transfer)

IVF + Pre-Implantation Genetic Diagnosis (PGD). The ovary is stimulated and eggs are harvested using transvaginal ultrasound, under sedation. A sperm is injected in each egg. On day three, when the resulting embryos are about eight cell each, one cell is biopsied and tested to X and Y chromosome. Laser beam is used to make a hole in the egg shell and one cell is sucked out. This can also be accomplished after biopsy of blastocyst – trophoectoderm biopsy (day 5). The desired embryo(s) are transferred into the uterus. This method is over 99% accurate. *We, in addition sort the sperm used for fertilization and freeze the desired sorted sperm and use it for fertilization of eggs. The aim is to enrich for the desired sperm (X or Y) to increase the chance of getting many embryos of the desired sex.*

PGD can also be performed on frozen thawed embryos for couples that has frozen embryos and coming for frozen embryo transfer and desire sex selection for family balancing.

The biopsy material can also be tested for all the chromosomes or for certain gene. Imposing more criteria on the embryos will certainly make fewer embryos available for transfer.

If IVF cycle pregnancy rate is 35%, then the chance for achieving pregnancy with the desired sex is approximately 35% or less if that sex is found in the embryos

Considerations for sex selection using IVF + PGD

1. Ovarian reserve: In gender selection cycles, the embryos available for transfer are fewer than in IVF cycles without sex selection. Each embryo has to be of good quality in addition to being of the desired sex to be considered for transfer onto the uterus. Women with diminished egg number and quality will have small number

of embryos available for testing and are less likely to realize good quality embryos of the desired sex than women with good reserve and good egg quality. Ovarian reserve is directly related to the mother's age.

2. Inconclusive result. Sometimes, the embryo sex cannot be determined due to degeneration of DNA material in the cell. This minimized by appropriate fixation of the biopsy in expert hand.
3. The desired sex could be under-represented in the embryos , by chance or due to other factors. One of the pre-fertilization methods can be used to enrich the sperm sample for the desired sex

How Do you Know if Gender Selection Worked?

After conception, there are many ways you can confirm success of **gender selection**

1. Non invasive perinatal testing (NIPT): a blood test that reports on chromosomes 21, 18, 13, X and Y using free fetal DNA floating in the mother circulation
2. Ultrasound at 18 weeks or after can detect the external genitalia of the baby.
3. CVS or amniocentesis these are invasive methods to test the chromosomes of the baby. They are the most accurate. Being invasive, they should only be used if indicated, not just to confirm sex.\

To learn more about gender selection please visit nycivf.org