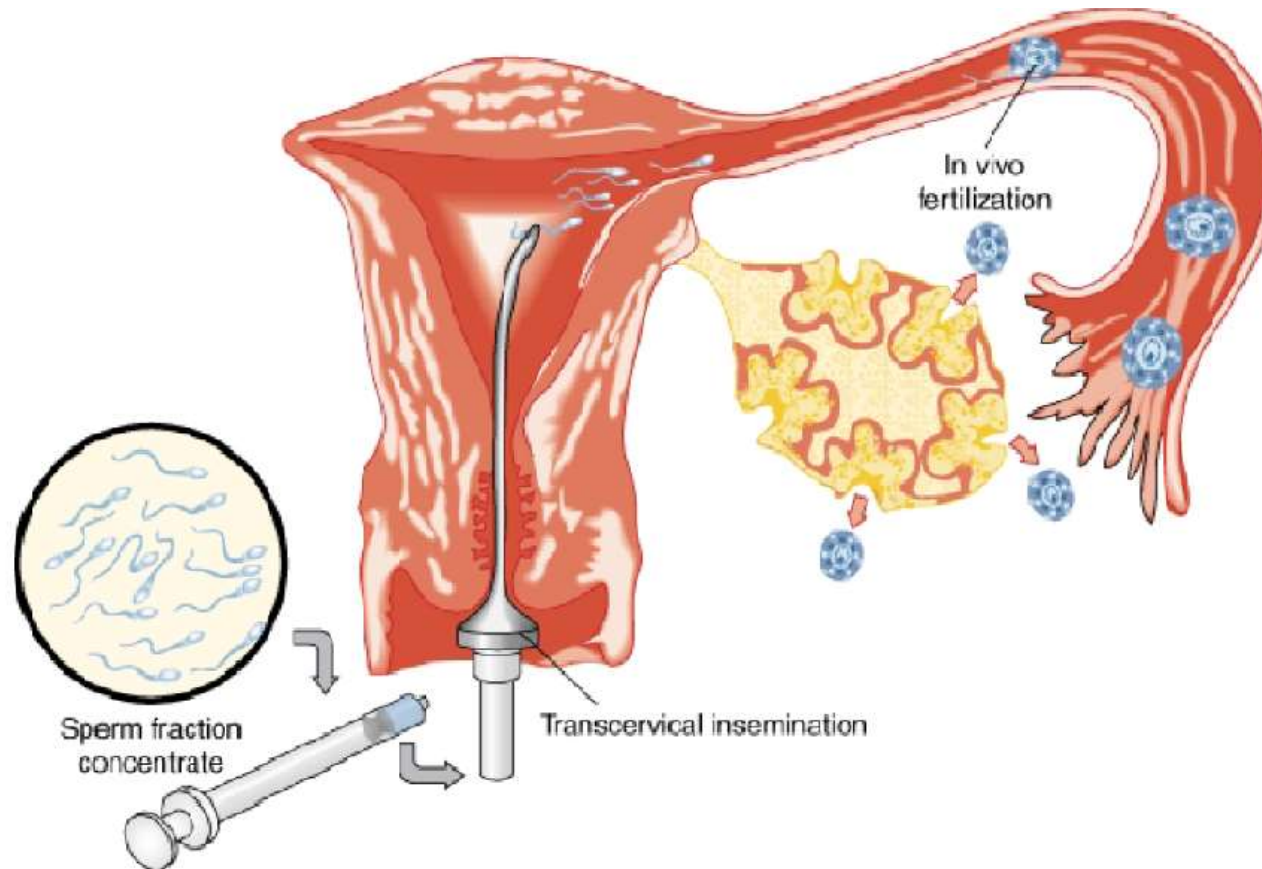




# Assisted Reproductive Technology

- Dr. Rahul Bevara

# Intra uterine insemination



Source: Schorge JO, Schaffer JJ, Halvorson LM, Hoffman BL, Bradshaw KD, Cunningham FG: *Williams Gynecology*; <http://www.accessmedicine.com>

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Intrauterine insemination (IUI). Prior to IUI, partner or donor sperm is washed and concentrated. Signs of impending ovulation are monitored with transvaginal sonography. At the time of suspected ovulation, a long, thin catheter is threaded through the cervical os and into the endometrial cavity. A syringe containing the sperm concentrate is attached to the catheter's distal end, and the sperm sample is injected into the endometrial cavity.

# Sperm retrieval techniques

- Major break through in Male infertility treatment.

## **Indications:**

1. Obstructive azoospermia – CAVD, Ejaculatory duct cysts
2. Non obstructive azoospermia- Testicular pathology

# Sperm retrieval techniques

PESA

MESA



OSTRUCTIVE  
AZOOSPERMIA

TESE

Micro-TESE

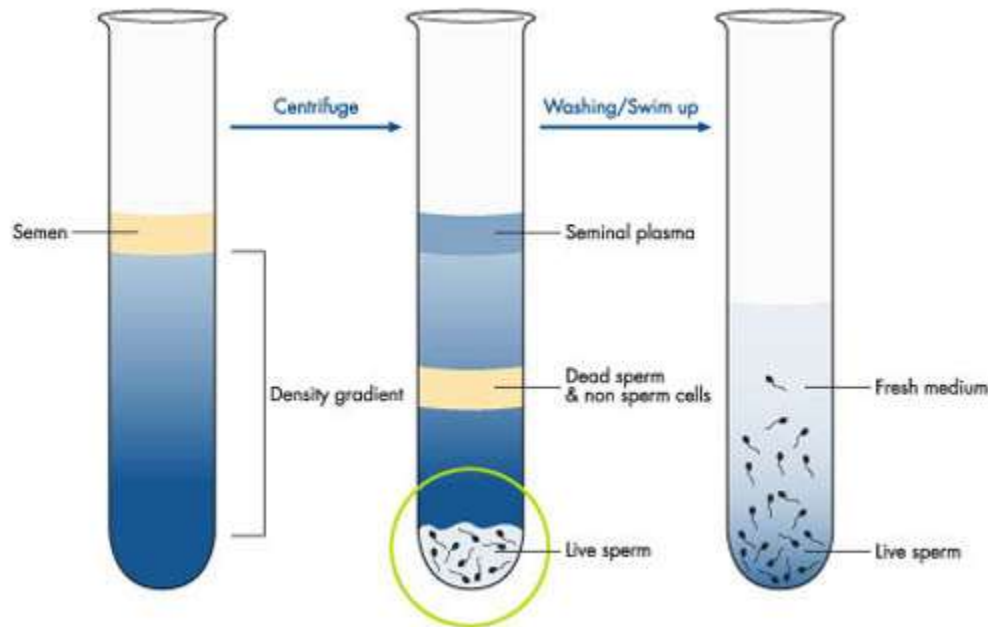
TESA



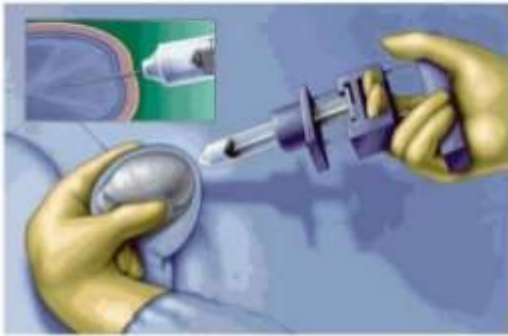
NON OSTRUCTIVE  
AZOOSPERMIA

# Sperm washing

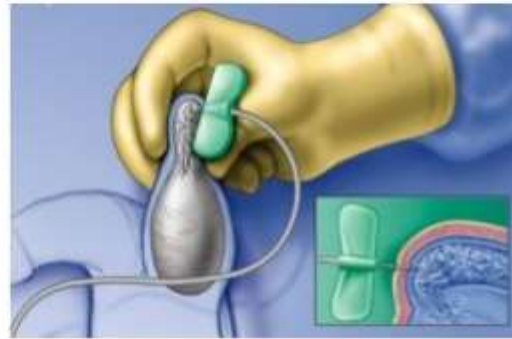
- Takes place following sperm donation.
- Isolates the motile sperms from semen
- Enhances the fertilization capacity .



# TESA and PESA



TESA



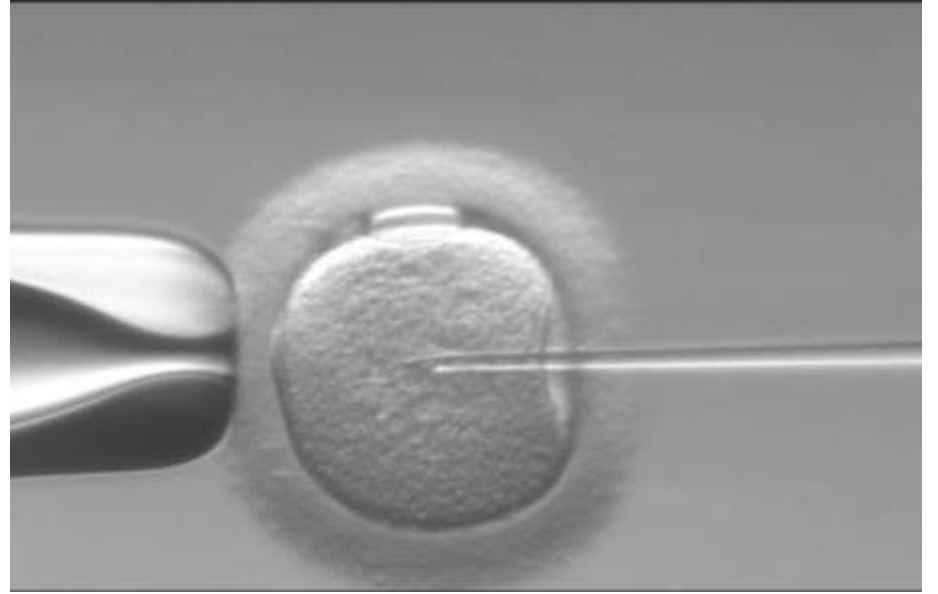
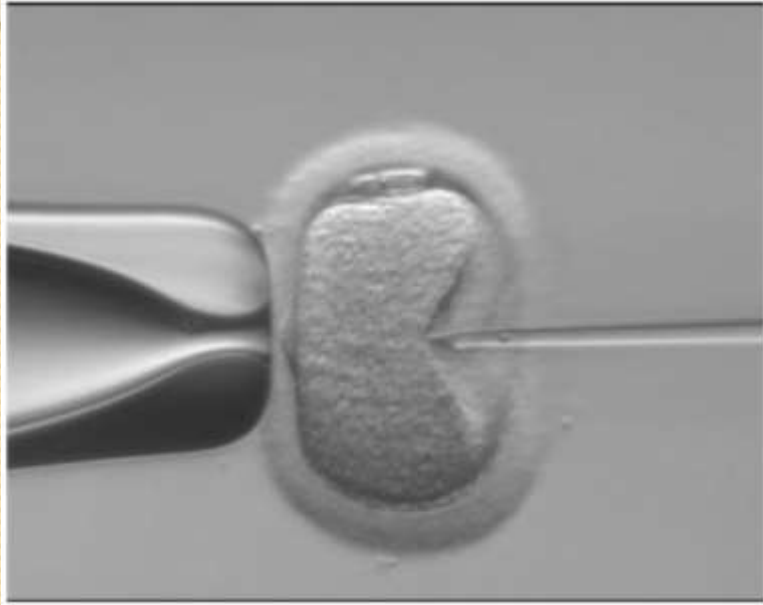
## PESA

PESA is a done for male infertility, where in the ejaculate of men there are sperms due to congenital absence of vas deference. Directly from the epididymis of testicle the sperm unspirated to eject into the egg.



# Intracytoplasmic Sperm Injection

- Microinjection of a single sperm into the ooplasm of a mature oocyte after routine COH and oocyte retrieval for IVF.
- ICSI restores the fertilization rate to normal regardless of the sperm quality.
- Routine use of ICSI for couples with no male factor does not increase pregnancy rates over standard IVF.







# In Vitro Fertilization

- is a process in which the oocyte is fertilized by a sperm outside the body: *in vitro*, and then retransferred intrauterine.



# History

- The extracorporeal fertilization of mammalian oocytes
- First reported over three decades ago by the British team of Steptoe and Edwards.
- IVF and its modifications are collectively know as Assisted reproductive techniques (ART's)

# Patient Selection

- IVF functions as the fallopian tube.
- brings together the oocyte and sperm, allows fertilization and then delivers the embryo to the uterine cavity.

## INDICATIONS

- Failure of conventional therapy
- absent or blocked fallopian tubes
- endometriosis
- male factor infertility
- unexplained infertility

# Timing the treatment

- Age of the mother is critical for ART
- Nontubal factor infertility – offer 3-6cycles of superovulation and intrauterine insemination (IUI) prior to IVF.
- In younger women, waiting for a total of 2 years of unprotected intercourse treatment is a reasonable guideline
- High levels of FSH ( $>20\text{IU/mL}$ ) and estradiol(E2) ( $>100\text{pg/mL}$ ) are associated with IVF failure.

# IVF

IVF cycle consists of:

1. Down-regulation of gonadotrophins.
2. Controlled ovarian stimulation.
3. Maturation of oocytes.
4. Oocytes retrieval.
5. Fertilization and incubation of the gametes.
6. Embryo-transfer.
7. Luteal phase support.

(and cryopreservation choice offered if good quality embryos are available)

# Down regulation of gonadotropins

- Gonadotropins are usually administered at a higher dose to stimulate more follicles to mature.
- Several different stimulation protocols have been described.
- GnRH agonist or antagonist protocols are followed.
- GnRH antagonist protocol preferred for OHSS.
- **AIM**- To reduce the chance of a spontaneous LH surge before oocyte retrieval.  
increase the yield of mature oocytes.

# Controlled ovarian stimulation

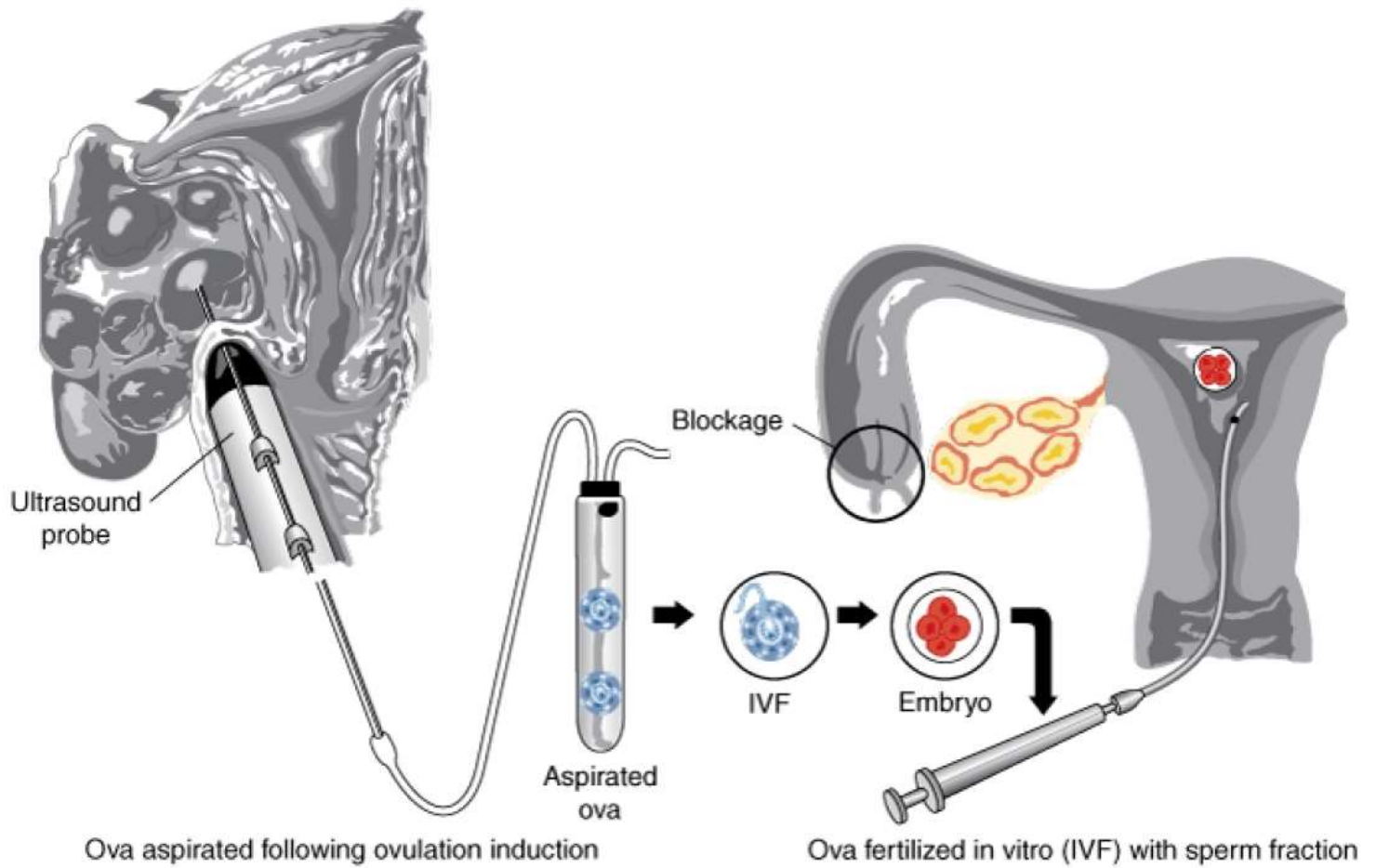
- **FSH preparations** – u-FSH (urinary) , r-FSH.
- **Human Menopausal Gonadotropin (HMG)** – Injectable , contains FSH and LH in equal proportions.
- Dose depends on age, BMI, ovarian reserve, presence of PCO.
- hCG is administered once several follicles have reached 18 to 20 mm



# Oocyte retrieval

- Oocyte retrieval is performed approximately 36 hours later
- Trans-vaginal ultrasound-guided needle aspiration.
- with the patient under intravenous conscious sedation.



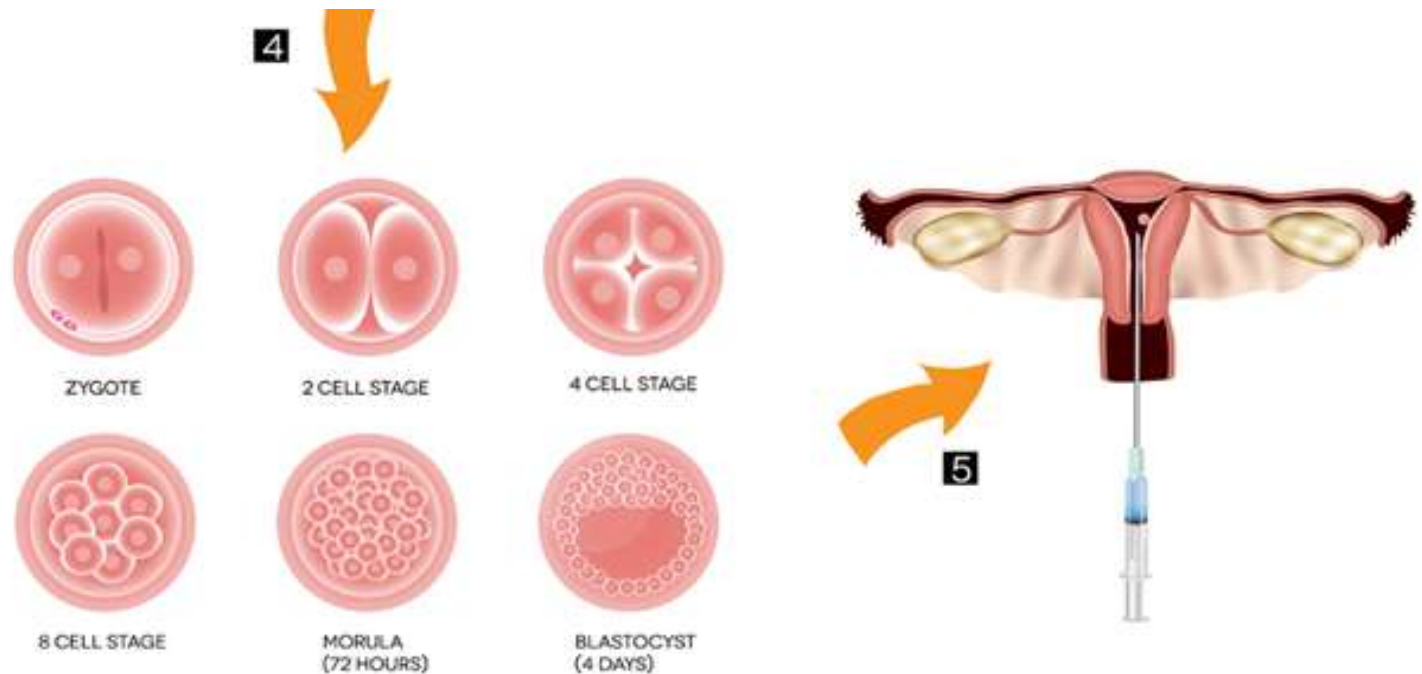


Ova aspirated following ovulation induction

Ova fertilized in vitro (IVF) with sperm fraction

# Fertilization and incubation

- oocytes are inseminated several hours later.
- depending on the semen quality, either washed sperm or ICSI is used



# Luteal support

- Provided from the time of the transfer until menses or 8 to 10 weeks of gestation
- IM progesterone injections, transvaginal progesterone, or serial booster hCG injections,
- hCG injections increase the risk for OHSS.

# Guidelines for transfer

<38 years	Limit to two embryos.
38 to 40 years	three embryos should be used
>40years	four embryos.

- An additional embryo can be transferred if embryo quality is poor or the couple has had multiple failed attempts.
- Exceeding the recommended number does not increase the overall pregnancy rate.

# Hybrids of IVF

- Zygote embryo transfer
- Gamete intrafallopian transfer
- Pronuclear stage transfer
- Tubal embryo transfer
- Techniques differ only by the stage of embryo development at the time of transfer.

# Gamete intrafallopian transfer (GIFT)

- Popular in the mid to late 1980s.
- involved laparoscopic oocyte collection after superovulation.
- immediate transfimbrial cannulation for placement of several oocytes along with washed sperm into the tubal ampulla.
- only remaining indication is for couples opposing IVF for religious reasons. As fertilization is in vivo.
- **50% SUCCESS RATE**
- IVF has higher success rates and laparoscopy not required.

# Natural cycle IVF

- IVF without exogenous stimulation of follicles.
- Mid cycle dose of hCG to augment the natural cycle.
- Followed by follicle aspiration and fertilization.

## **ADVANTAGE OVER STIMULATED IVF**

Higher rate of implantation.

Success rate – 40% upto 38years

Lower pregnancy rate



# In vitro maturation(IVM)

- immature oocytes obtained in the absence of ovarian stimulation.
- Process is similar to IVF

## **ADVANTAGE**

- avoidance of injectable gonadotropins
- Relatively less expensive

Success rates (35%) are lower than standard IVF

# Gestational Carrier Surrogacy

- Variation of IVF places a fertilized egg into the uterus of a surrogate, rather than into the intended mother.

## INDICATIONS

- uncorrectable uterine factors
- Pregnancy causing a health risk
- Repeated unexplained miscarriage

Success rates in India- 45% (Fresh) 25% (Frozen)

# Egg donation

## INDICATIONS

- Ovarian failure/ diminished reserve.
- Risk of maternally transmitted genetic disease.
- Malignancy
- Fresh oocytes have a better success rate  
Exogenous estrogen before  
Gonadotropin suppression, then hCG  
administered followed by Progesterone  
till first trimester

# Cryopreservation

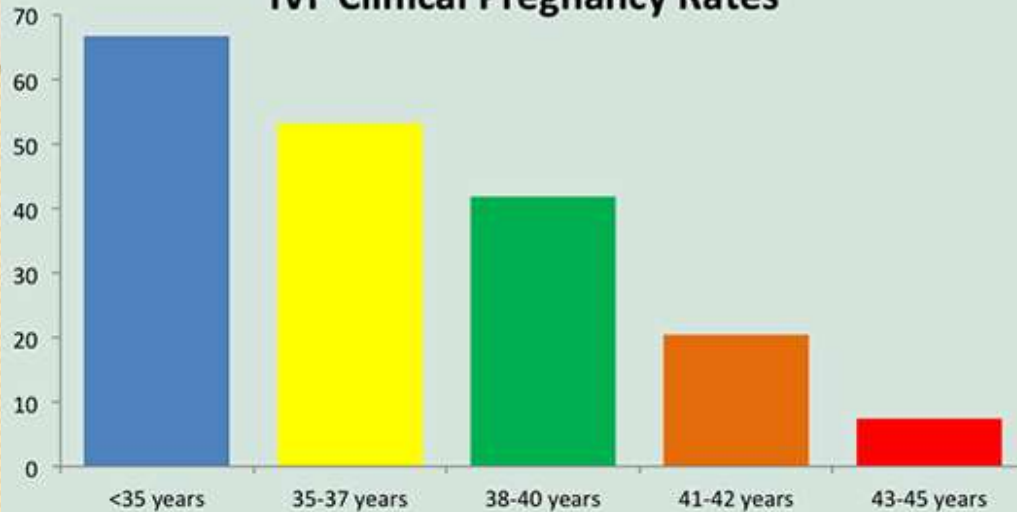
- Advanced stimulation regimens retrieve a large number of oocytes from single aspiration.
- Long term storage of healthy oocytes for further use.
- first successful pregnancy following cryopreservation was reported in 1983

# Cryopreservation

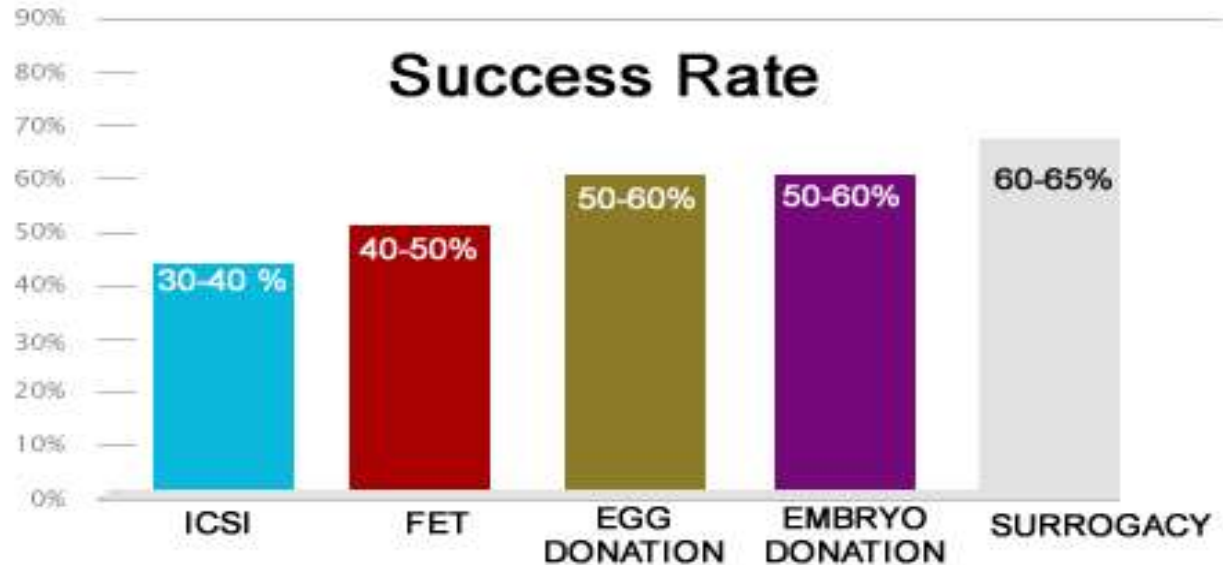
- Lower pregnancy rates with frozen oocytes.
- subtle damage suffered by the embryo during the freezing process
- No reported congenital abnormalities.
- There is no scientific basis for a maximum duration of storage.
- Preserved oocytes can also be donated.

# Outcome of IVF

## IVF Clinical Pregnancy Rates



## Success Rate



# complications

- Multiple births
- Premature delivery and low birth weight
- Ovarian hyperstimulation syndrome
- Miscarriage
- Egg-retrieval procedure complications
- Ectopic pregnancy

# Treatment in India

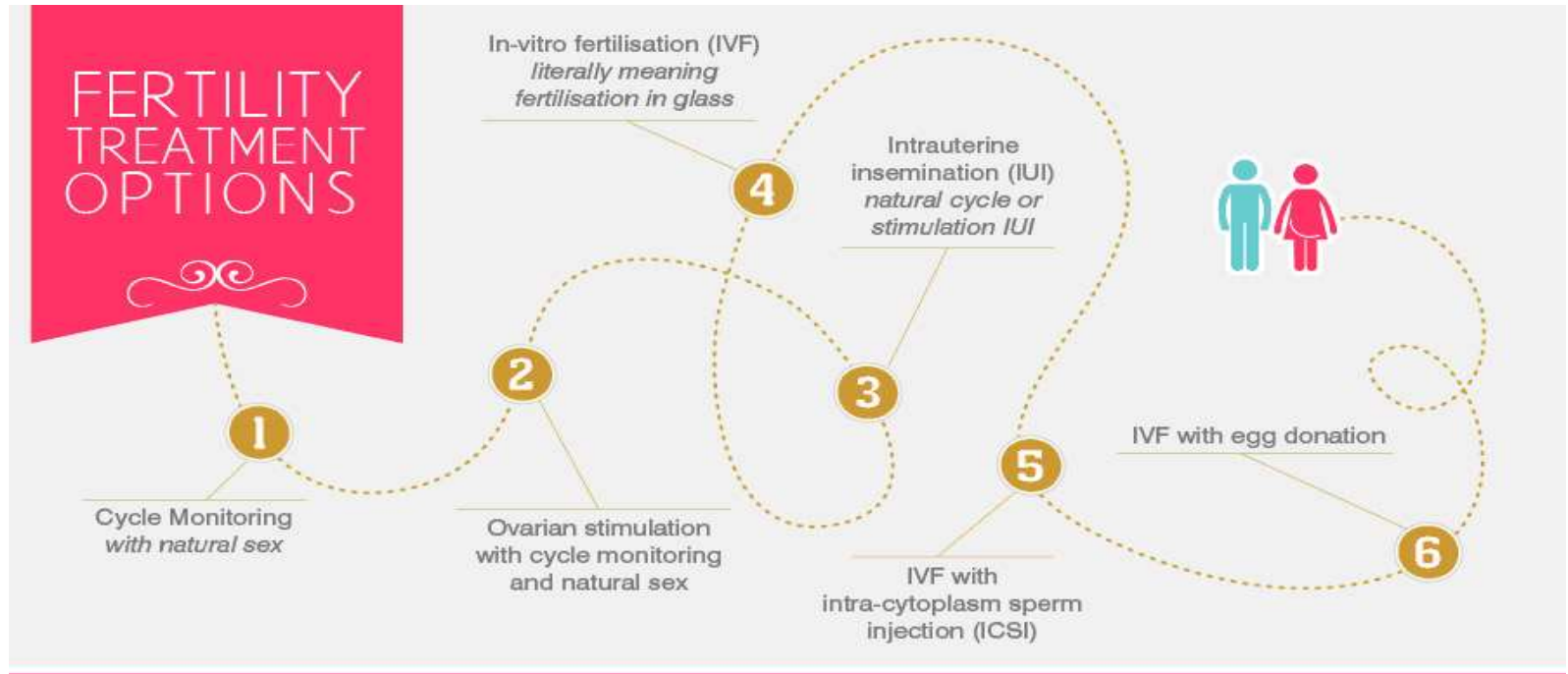
Procedure	Cost (INR)
Intra uterine insemination	30K – 60K
GIFT	50k – 1.2Lakhs
ICSI	80k – 1.5Lakhs
IVF	1.5lakhs – 3lakhs/cycle



# Conclusion

- Treatment should be initiated only after a thorough investigation
- Examine both the partners individually to obtain confidential information.
- Rule out male factor infertility first.
- Initially focus on Lifestyle modifications
- Many cases no obvious cause can be detected
- Proper counseling, explain the risks.

# Conclusion





**THANK YOU**