

Assisted reproductive technology

Dr. Alia Kareem



definition

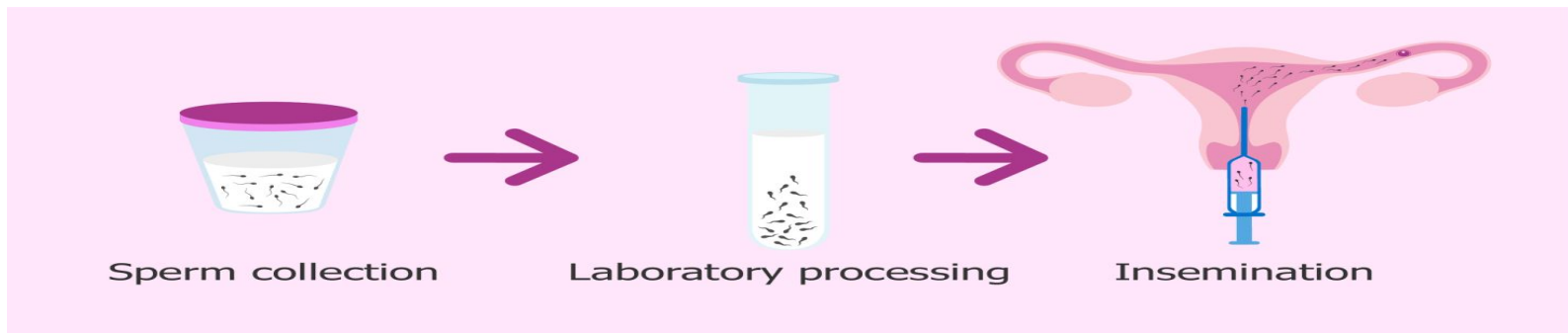
Assisted reproductive technologies include all methods of infertility treatment that required laboratory handling of gametes.

Types of ART

- ***(IUI) Intrauterine insemination***
- ***(IVF)In vitro fertilization***
- ***(ICSI) Intra-cytoplasmic sperm injection***
- ***(PGD) Preimplantation genetic diagnosis***
- ***(PGS) Preimplantation genetic screening***
- (DOT) Direct oocyte transfer PROST Pro-nuclear stage transfer
- (DIPI) Direct intraperitoneal insemination
- (MESA) Microepididymal sperm aspiration
- (PESA) Percutaneous epididymal sperm aspiration
- (TESE) Testicular sperm extraction
- (GIFT) Gamete intrafallopian transfer

Intrauterine insemination(IUI)

- Intrauterine insemination (IUI) is where a prepared sample of sperm (normally produced by masturbation) being placed into the uterine cavity using a cannula, at the appropriate time of the patient ' s menstrual cycle. The success rate of this procedure ranges between 15 and 20 per cent in top fertility units.



IUI

Indications

- Unexplained infertility.
- Mild male factor.
- Ejaculatory problems.
- Cervical problems.
- Ovulatory disorders.
- Mild endometriosis.
- To optimize the use of donor sperm.



Steps of IUI

1. With or without ovarian stimulation(protocols)
2. Monitoring
3. Ovulation induction by HCG injection
4. Intrauterine insemination

1-With or without ovarian stimulation (protocols)

intrauterine insemination can be performed in

- Unstimulated cycle(a natural cycle)
- Stimulated cycle with Clomid alone, with Clomid followed by FSH injection purely with FSH.

2- ovulation Monitoring

To determine the time the ovulation(36 hr after HCG injection) and hence determine the time of insemination

And also to determine the best time for HCG injection(one or tow follicle 18mm)

.

The monitoring by either:

- urinary luteinizing hormone (LH) monitoring by home dipstick methods for unstimulated ovulation(determine LH surge).

or

- follicle tracking by TVU(by using serial ovarian sonography to demonstrate the development of a mature antral follicle and its subsequent collapse during ovulation.

3- ovulation induction by HCG injection

the ovulation induction is having the desired effect when one (or at most two) developing follicle(s) over 18 mm determined by ULTRASOUND(time of HCG injection)

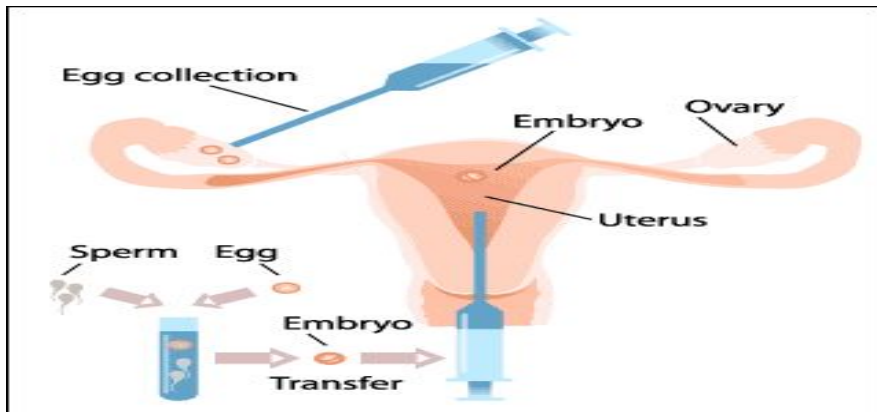
4- Intrauterine insemination(IUI)

prepared sample of sperm (normally produced by masturbation) being placed into the uterine cavity using a cannula at time of ovulation(36 hr after HCG injection .

In vitro fertilization

In vitro fertilization is where the mature oocyte is surgically removed from the ovary and then fertilized with sperm in the laboratory

The success rate of IVF per cycle is about 30 per cent in women under 35 years of age



Indications of IVF

1. Severe tubal disease – tubal blockages
2. Severe endometriosis
3. Moderate male factor
4. Unexplained infertility
5. Unsuccessful IUI

Stages of in vitro fertilization cycle :

- Pituitary down regulation.
- Ovarian stimulation.
- hCG trigger.
- Oocyte retrieval.
- Fertilization (insemination or ICSI)
- Embryo cultur
- Embryo transfer.
- Luteal support.
- Pregnancy test and confirmation of intrauterine pregnancy

1-Pituitary gonadotrophin suppression.

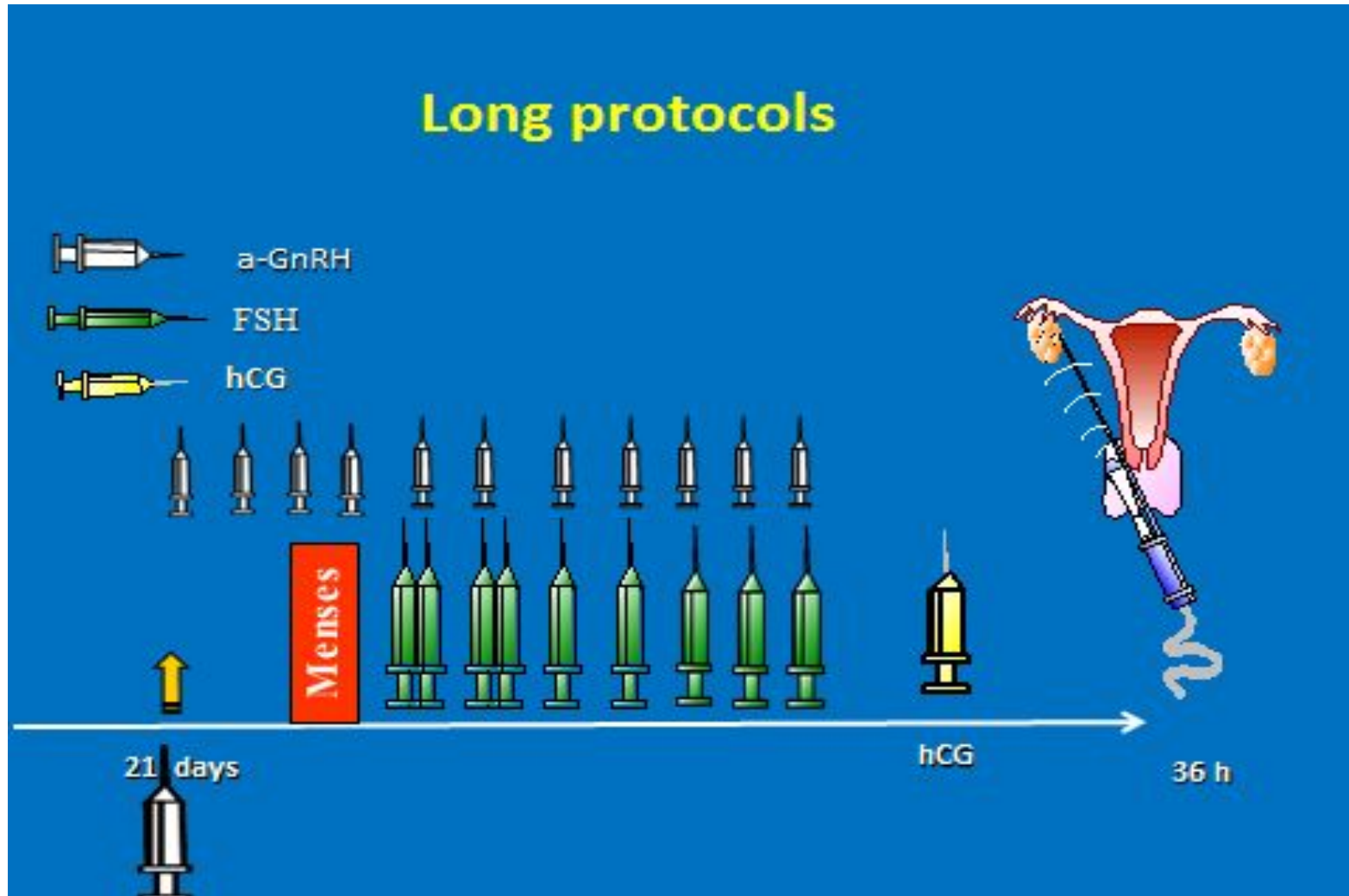
-to avoid premature luteinising hormone surges in gonadotrophin stimulated IVF treatment cycles.

- by using continuous administration gonadotrophin-releasing hormone agonist down-regulation of GnRH receptor or gonadotrophin-releasing hormone antagonists

2- controlled ovarian hyperstimulation

- in order to produce multiple mature oocyte(8-10 follicle) capable of fertilization ,implantation and pregnancy.
- use an individualised starting dose of follicle-stimulating hormone, based on factors that predict success, such as:
 - age
 - BMI
 - presence of polycystic ovaries
 - ovarian reserve
- do not use a dosage of follicle-stimulating hormone of more than 450 IU/day

Protocols for ovarian stimulation



Antagonist protocols



antag-GnRH



FSH



hCG



Menses



Day4 or df 14

hCG or GnRH-a

36 h

3- monitoring by serial TVU and estradiol

the aim of monitoring are:

1- to determine the optimum time for administration of HCG

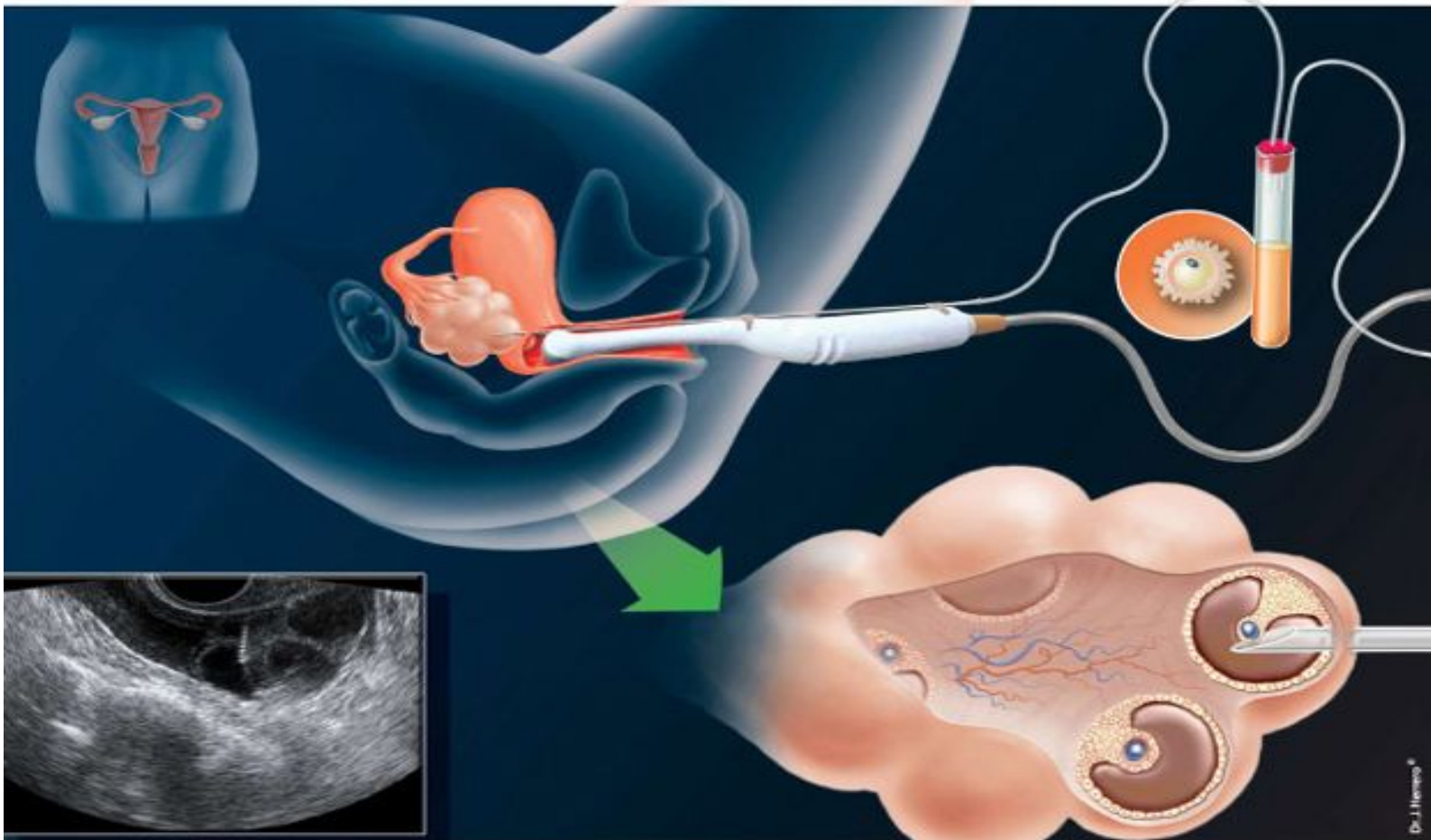
2- to predict and then prevent the OHS

3- to identify poor responses to improve response or cancelling the cycle.

4-HCG injection

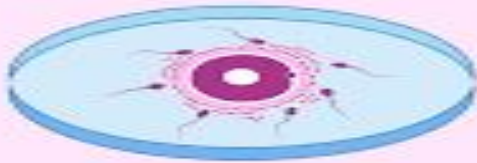
- To induce final maturation of the oocytes prior to the oocyte retrieval.
- 5000- 10,000 units of urinary hCG or 150 μg recombinant hCG is generally used.
- hCG should be given when multiple follicles have reached 18mm.
- The injection is normally given around midnight to allow for oocyte retrieval approximately 34 hours later prior to physiological ovulation occurring.

5- oocyte reteriaval

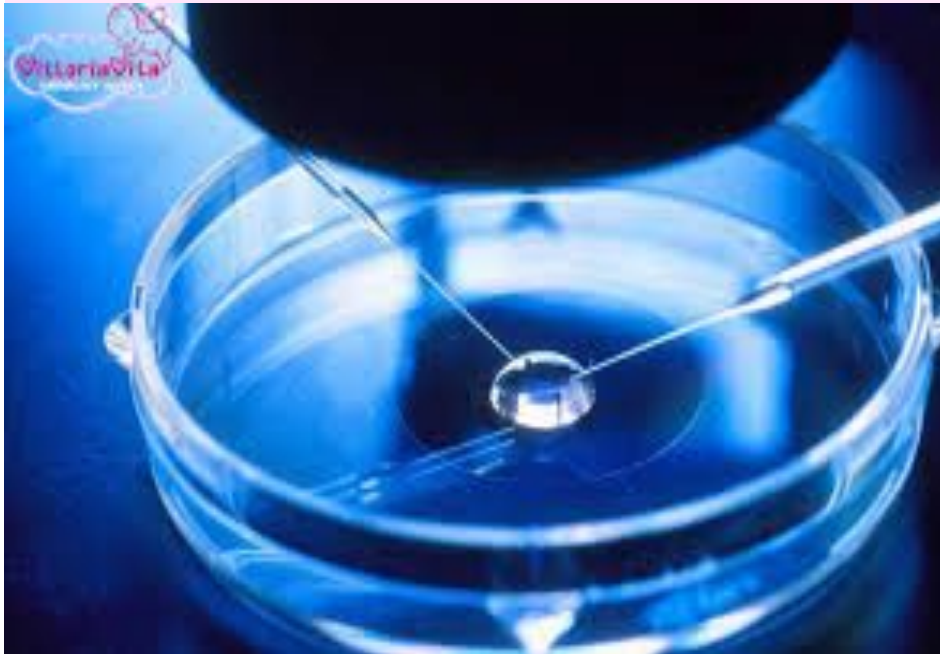


6-- in vitro fertilization

Conventional IVF



IVF-ICSI



7- embryo culture

embryos are incubated in a commercially prepared culture medium under strict laboratory conditions

Day 1



Day 2



Day 3

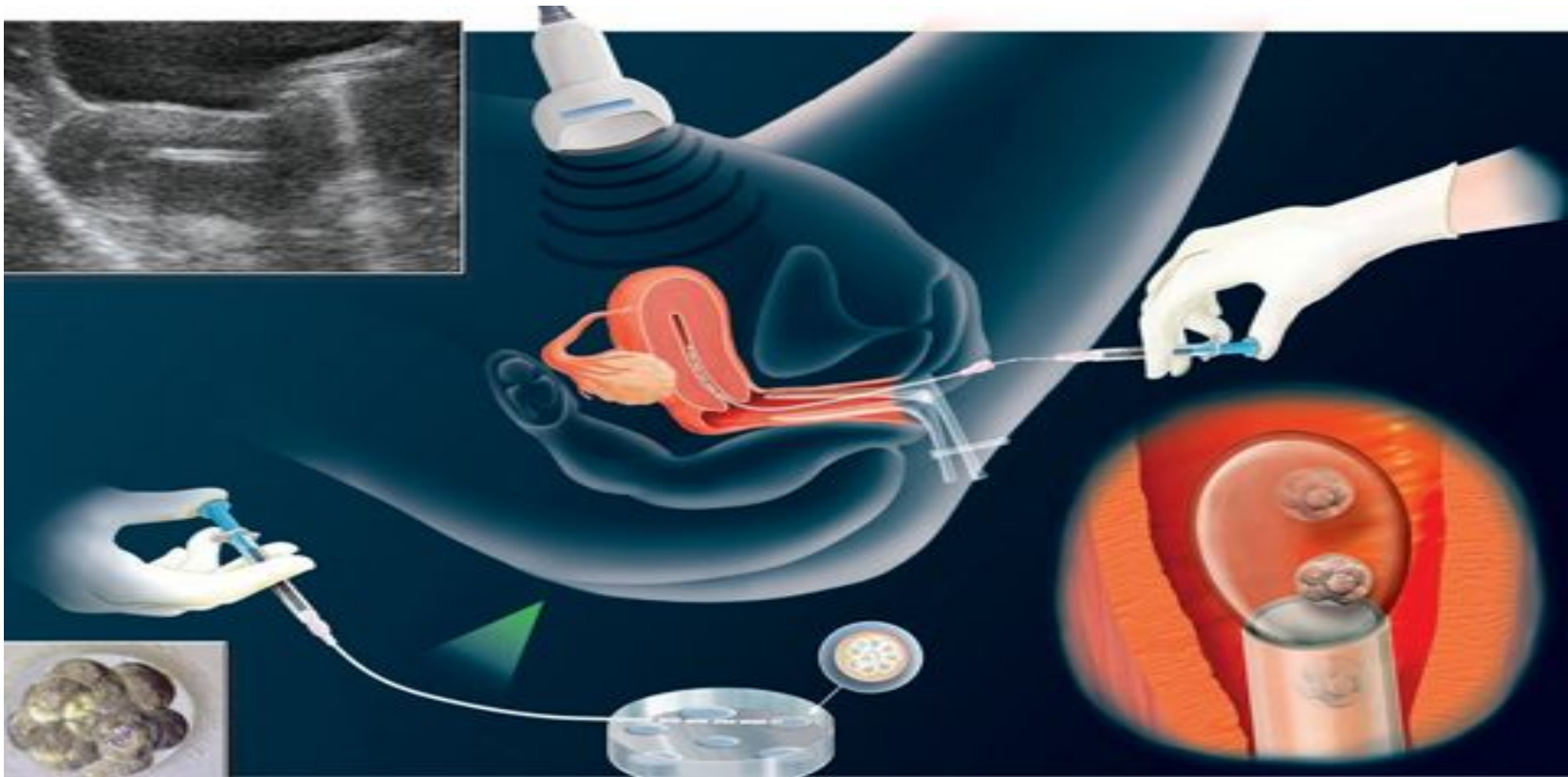


Day 4



Day 5

7-Embryo transfer(2-3 embryos)
more embryo transferdoing at 2 days
or 5day embryo



8-Luteal phase support after IVF

1-directly by progesterone for luteal phase support after IVF treatment.

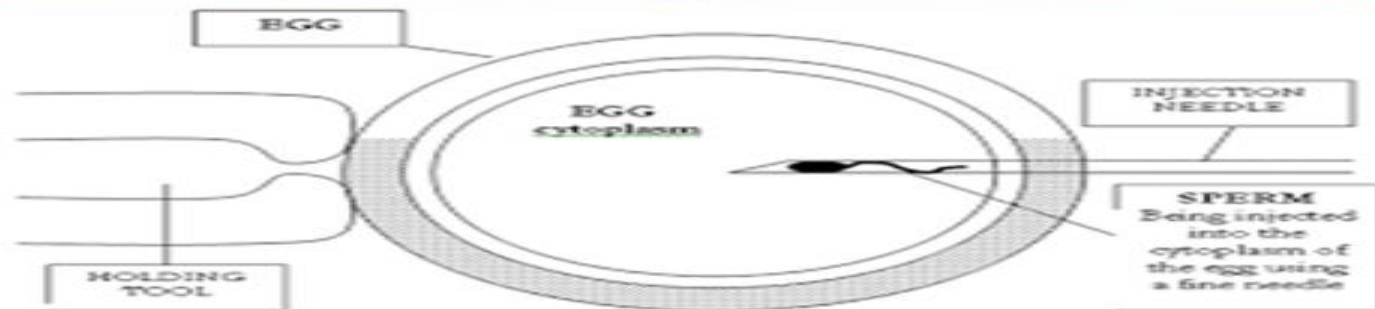
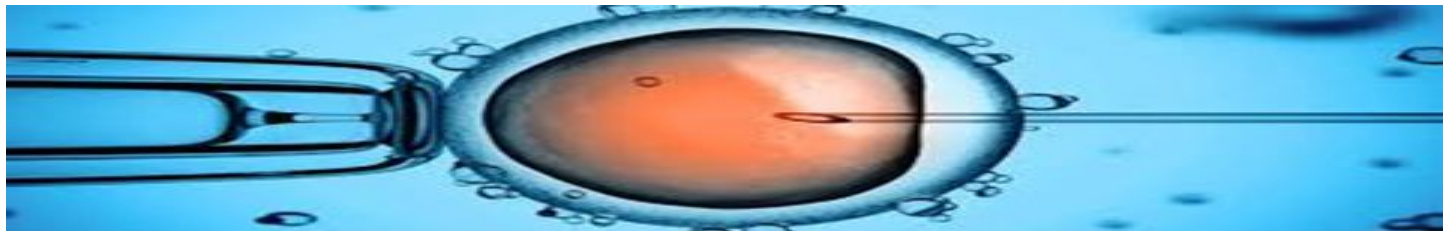
2- indirectly by HCG however it is increased the likelihood of ovarian hyperstimulation syndrome.

9-Pregnancy test after 2week of ET confirmation of intrauterine pregnancy by ultrasound



Intracytoplasmic sperm injection(ICSI)(had same stages of **IVFexcept fertilization)**

when an individual, morphologically normal, sperm is immobilized by 'striking' the tail injected into a mature oocyte that has had its surrounded cumulus and corona cells removed.

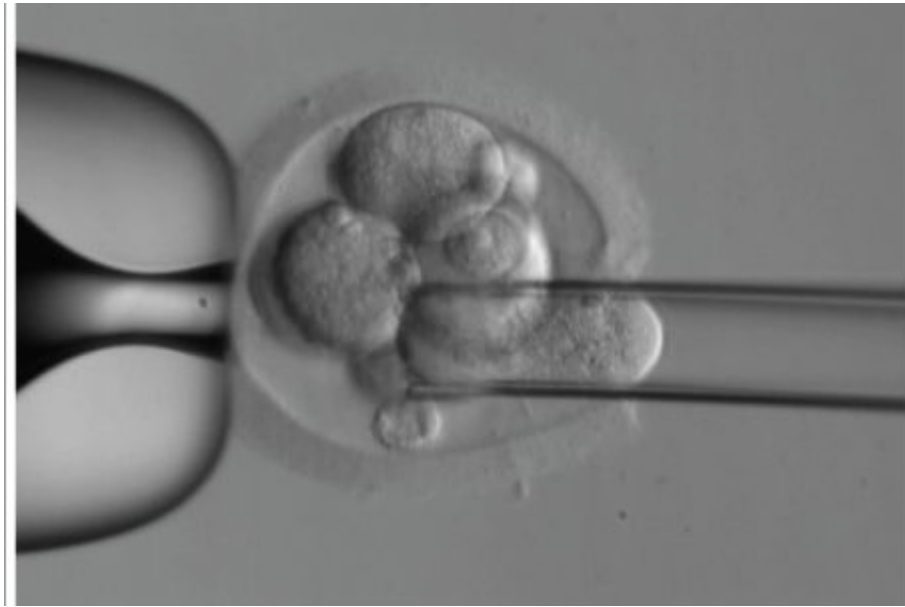


Indications

- Severe male factor infertility including azoospermia and subsequent surgical sperm retrieval by, for example, microepididymal sperm aspiration (MESA), testicular sperm extraction (TESE) or percutaneous epididymal sperm aspiration (PESA).
- Severe oligoasthenoteratozoospermia.
- Poor or total non - fertilization from previous IVF cycles.
- Preimplantation genetic diagnosis cycles.

Preimplantation genetic diagnosis

- ❖ Preimplantation genetic diagnosis (PGD) is where one or two cells (blastomeres) are removed from the embryo prior to replacement in an IVF cycle



Indication of PGD

- Single - gene defects such as cystic fibrosis, thalassaemia or sickle cell disease.
- Chromosomal rearrangements such as translocations.

Preimplantation genetic screening

-Preimplantation genetic screening is the use of PGD techniques to detect these aneuploidies.

-Initial indications for the technique were advanced maternal age, recurrent IVF failure at the stage of implantation, previous aneuploidy pregnancies and recurrent miscarriage.

Complications of assisted conception

- Multiple pregnancy.(25% of IVF pregnancy)
- Ovarian hyperstimulation syndrome (OHSS) < 2% of cases.
- Ectopic pregnancy.(2-5% of IVF pregnancy)
- Complications of oocyte retrieval: haemorrhage, ovarian infection, trauma to adjacent organs.

Thank you

