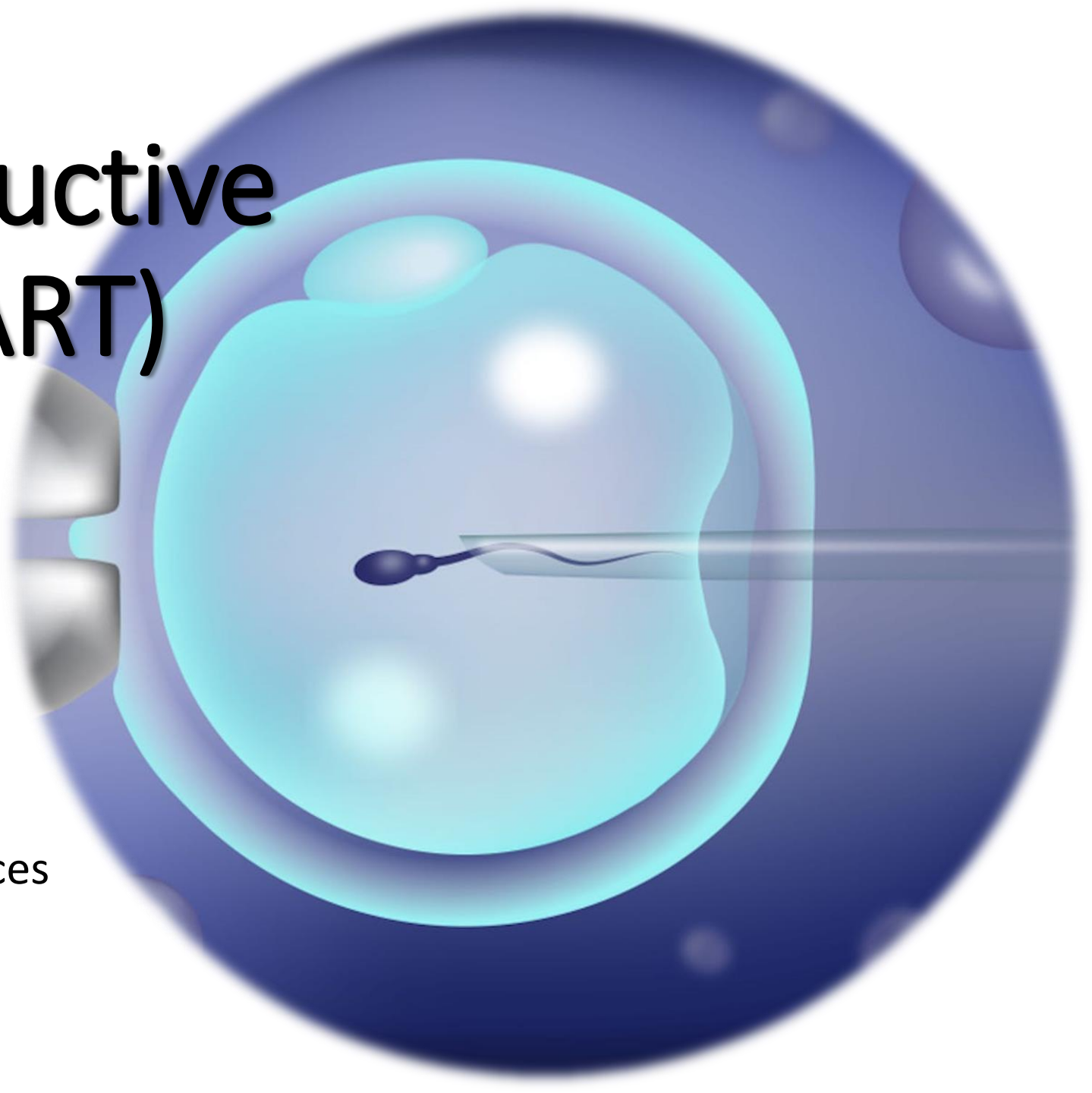


# Assisted reproductive techniques (ART)

**Dr. Ali Talebi, PhD**

IVF Lab director, Embryologist

Shahroud University of Medical Sciences



# Infertility treatment

There are 3 main types of fertility treatment:

- **Medicines**
- **Surgical procedures**
  - *Surgical Techniques in Male Infertility*
    - *Varicocelectomy*
    - *Vasovasostomy and vasoepididymostomy*
    - *Transurethral resection of ejaculatory duct*
  - *Some causes of infertility in women that can be corrected by surgery include endometriosis, fibroids, polyps and other problems in the reproductive organs.*
- **Assisted reproductive techniques (ART)**

# History

- **1973**
  - The first IVF pregnancy was reported by the Monash research team of Professors Carl Wood and John Leeton in Melbourne, Australia. Unfortunately, this resulted in early miscarriage
- **1976**
  - *Patrick Steptoe* and *Robert Edwards* published a report on an ectopic pregnancy following transfer of a human embryo at the late morulae /early blastocyst stage
- **1978**
  - The first ever IVF birth occurred in Oldham, England on July 25, 1978. This birth was the result of the collaborative work of Patrick Steptoe and Robert Edwards



# Assisted reproductive techniques (ART)

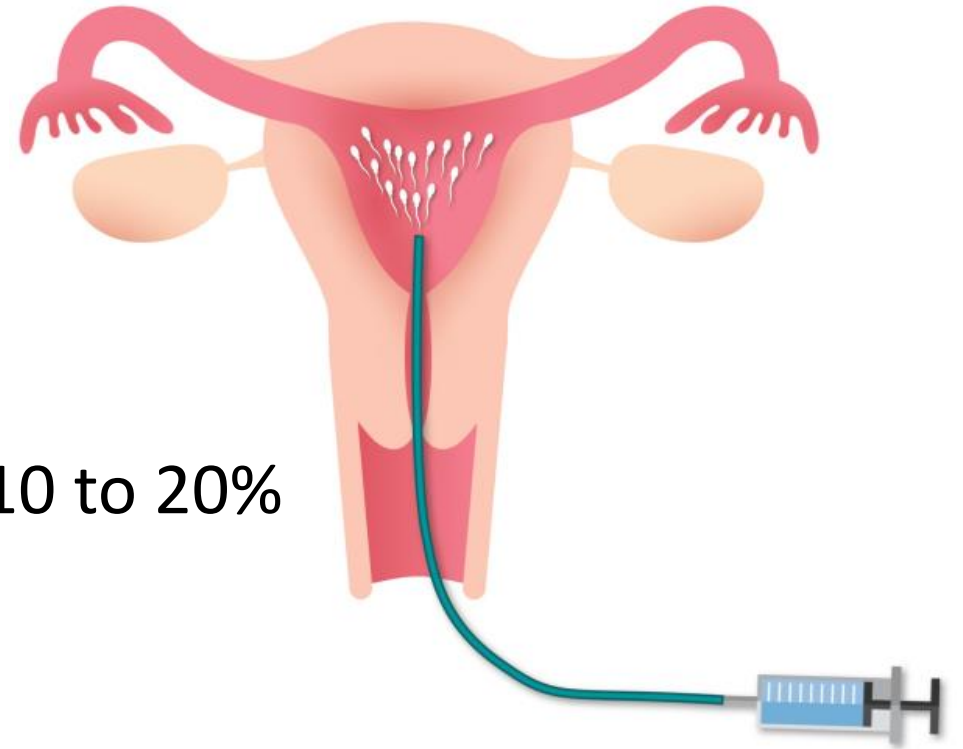
- IUI
- ZIFT
- GIFT
- IVF
- ICSI
- Cryopreservation
- PGT

# Intrauterine insemination (IUI)

IUI is a **simple, cost-effective, noninvasive first-line therapy** for

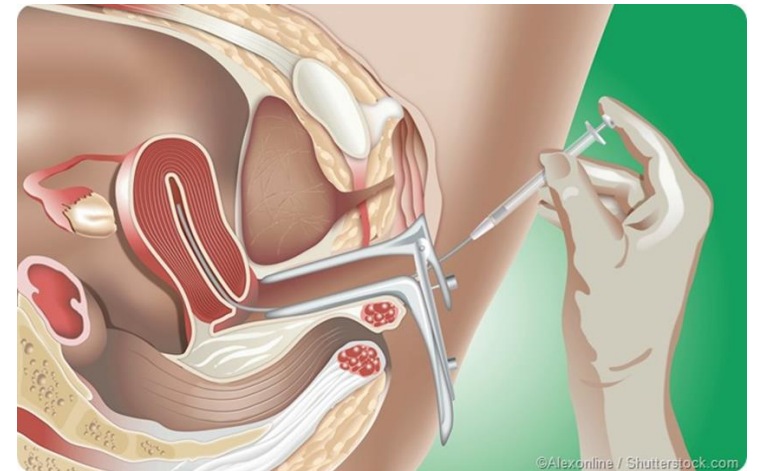
- *moderate male factor,*
- *cervical factor,*
- *anovulatory infertility,*
- *unexplained infertility, and*
- *immunological infertility*

with clinical pregnancy rates ranging from 10 to 20%



# Maternal factors

- IUI is most effective for **ovulatory dysfunction**, **unexplained infertility**, and **cervical factor** infertility.
- Women with **stage I-II endometriosis** may benefit from IUI, while those with stage III-IV endometriosis and tubal factor have the lowest IUI pregnancy rates, and thus may benefit less from insemination.



# Maternal factors

- Maternal **age** and infertility diagnosis have a significant impact on IUI pregnancy outcomes, while maternal **BMI** may not have a large effect.
- Increasing maternal **BMI** leads to higher medication requirements during OI/IUI but does not appear to impact pregnancy outcomes.
- Underweight women may benefit from increasing weight prior to initiating fertility treatments.

# Paternal factors

- Paternal and sperm parameter data support IUI for men with TMC > 5 million sperm and post-wash sperm count > 1 million.
- Higher post-wash sperm counts may increase pregnancy rates up to a threshold of 4 million.
- High sperm DFI reflects sperm DNA abnormalities but does not consistently impact pregnancy rates.



# Cycle factors

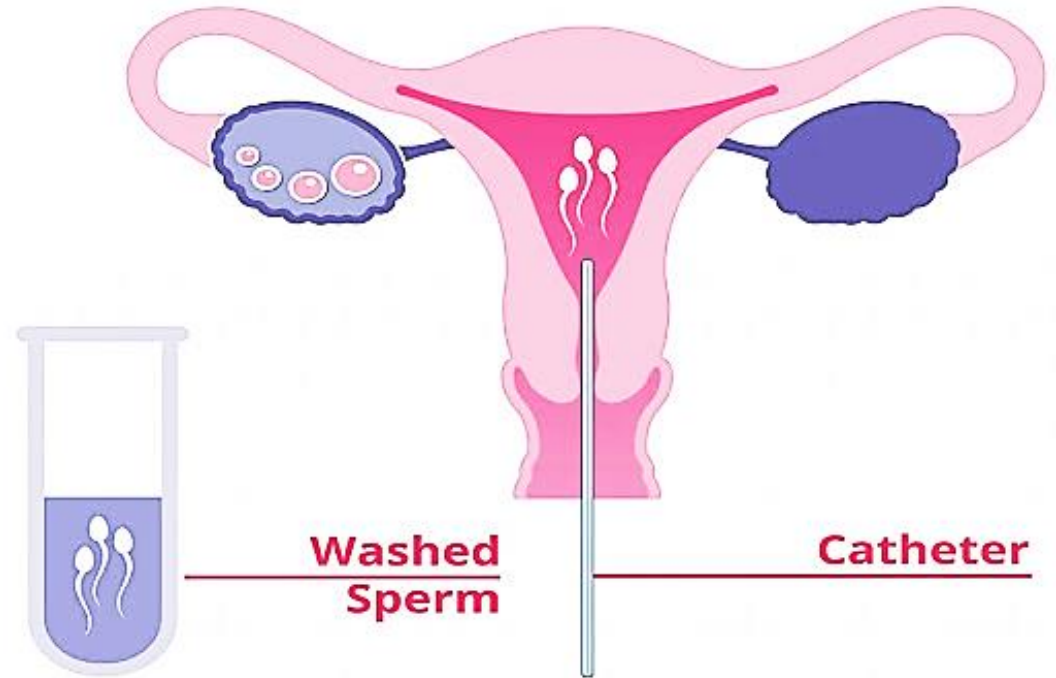
- **Ovulation induction** regimens include CC, letrozole and gonadotropins.
- Gonadotropins achieve the highest pregnancy rates, but also increase risk of multiple gestation and OHSS.
- CC and letrozole appear to have similar efficacy with no difference in CPRs, LBRs, SAB rates or multiple gestation among women with unexplained infertility.
- For patients with PCOS, letrozole increases LBR and CPR. For women who do not conceive on CC/IUI, proceeding to IVF rather than attempting FSH/IUI may be beneficial.

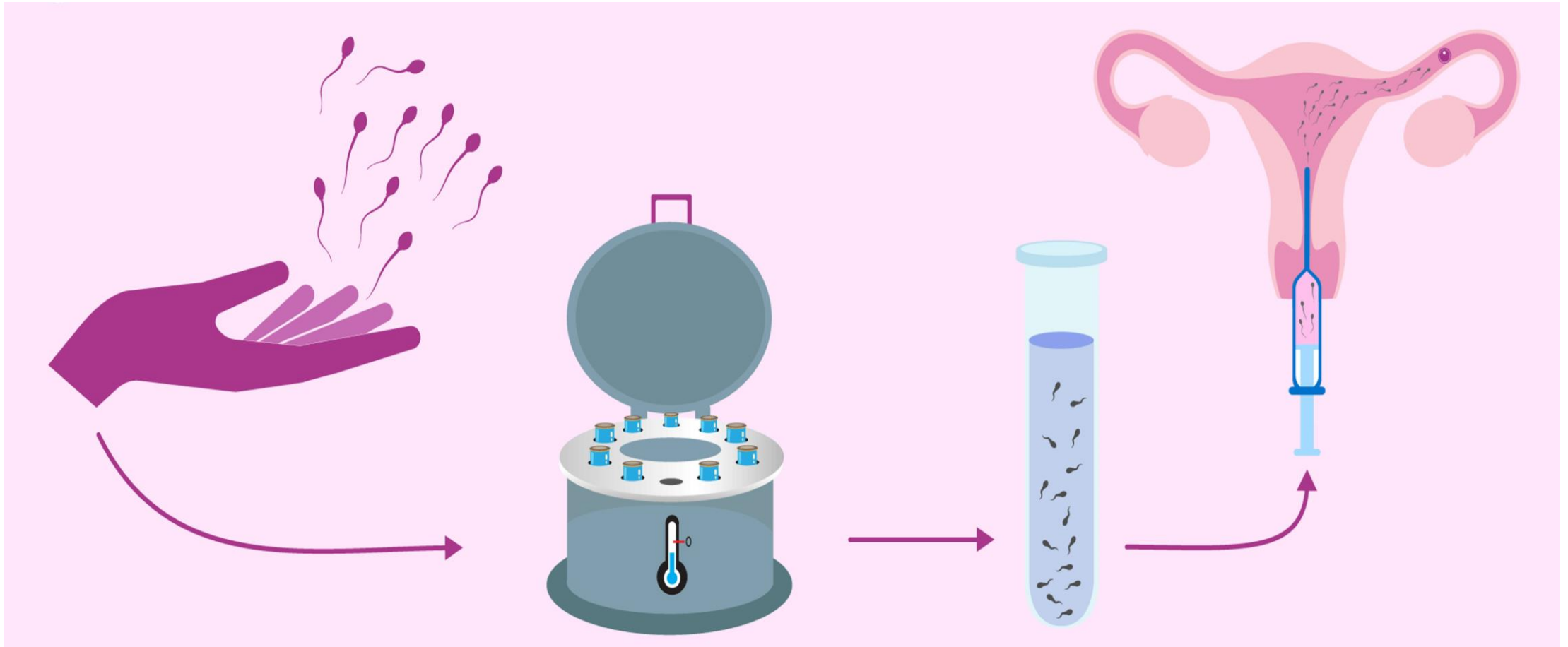
- Most pregnancies occur within the first three to four IUI cycles, after which alternate therapies should be considered.
- Insemination may occur 24–40 hours after hCG injection, or 24 hours after LH surge in natural cycles.
- Brief rest after insemination may increase pregnancy rates.

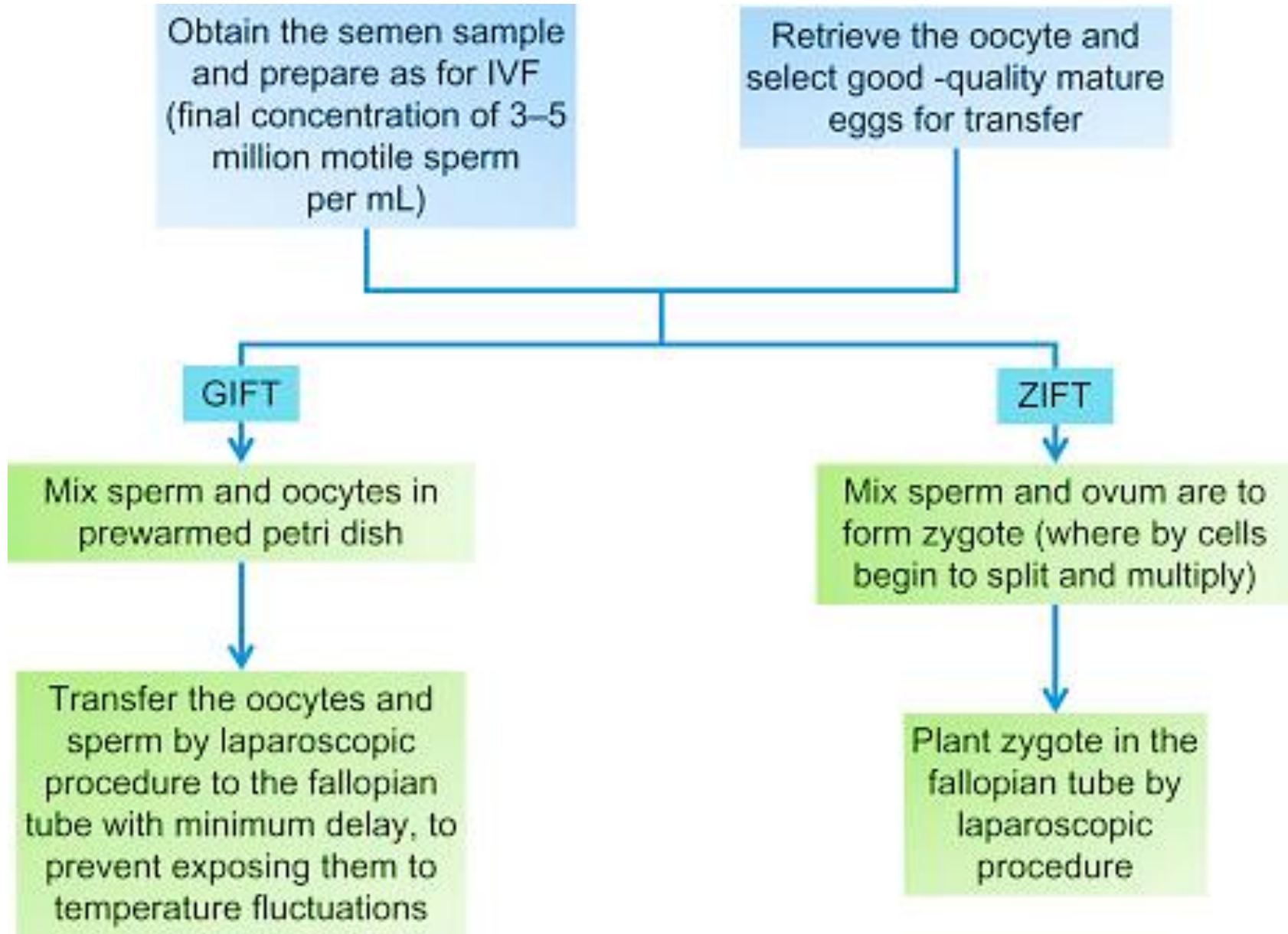
# Procedure

The minimum requirements for performing the procedure are:

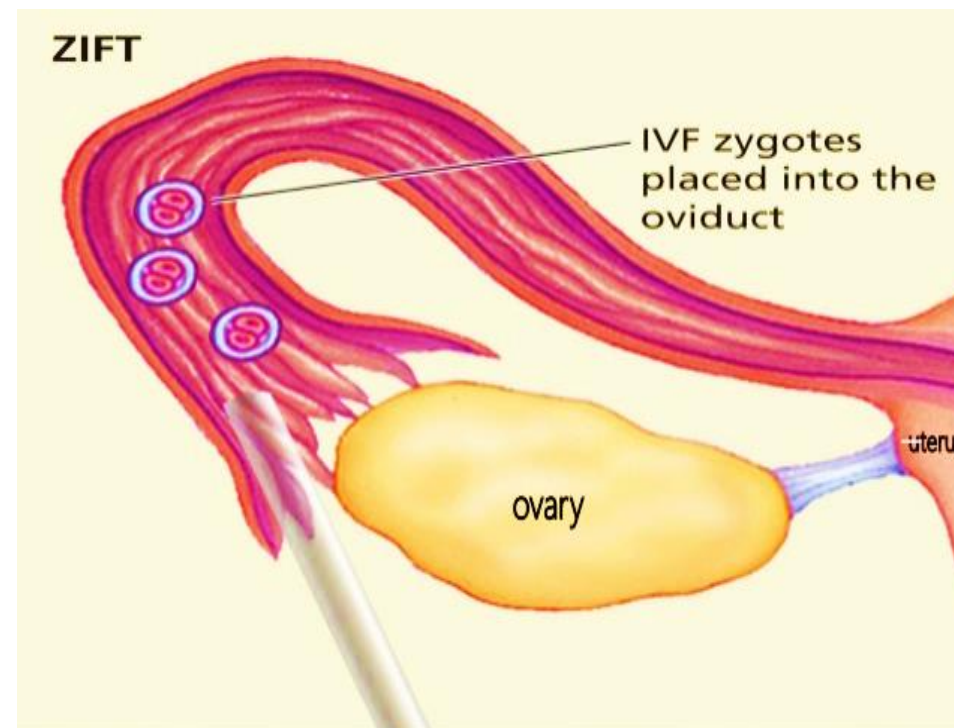
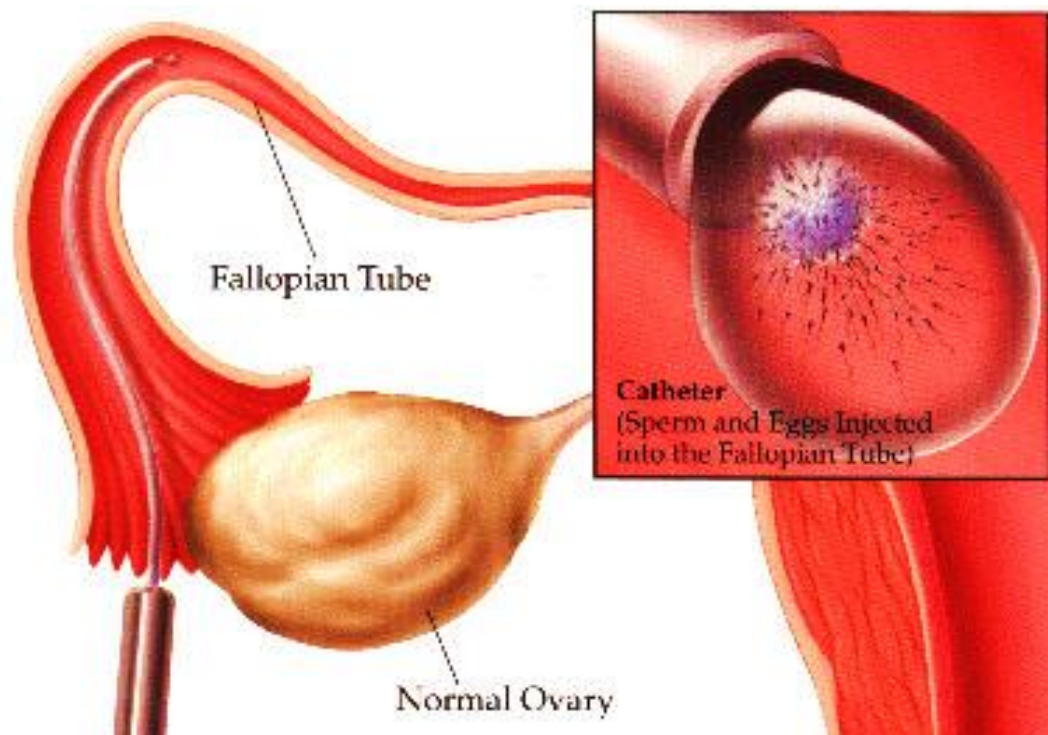
- *ovulation in the IUI cycle,*
- *patency of at least one fallopian tube,*
- *inseminate with an adequate number of motile sperm, and*
- *absence of documented or suspected active cervical, intrauterine, or pelvic infection*



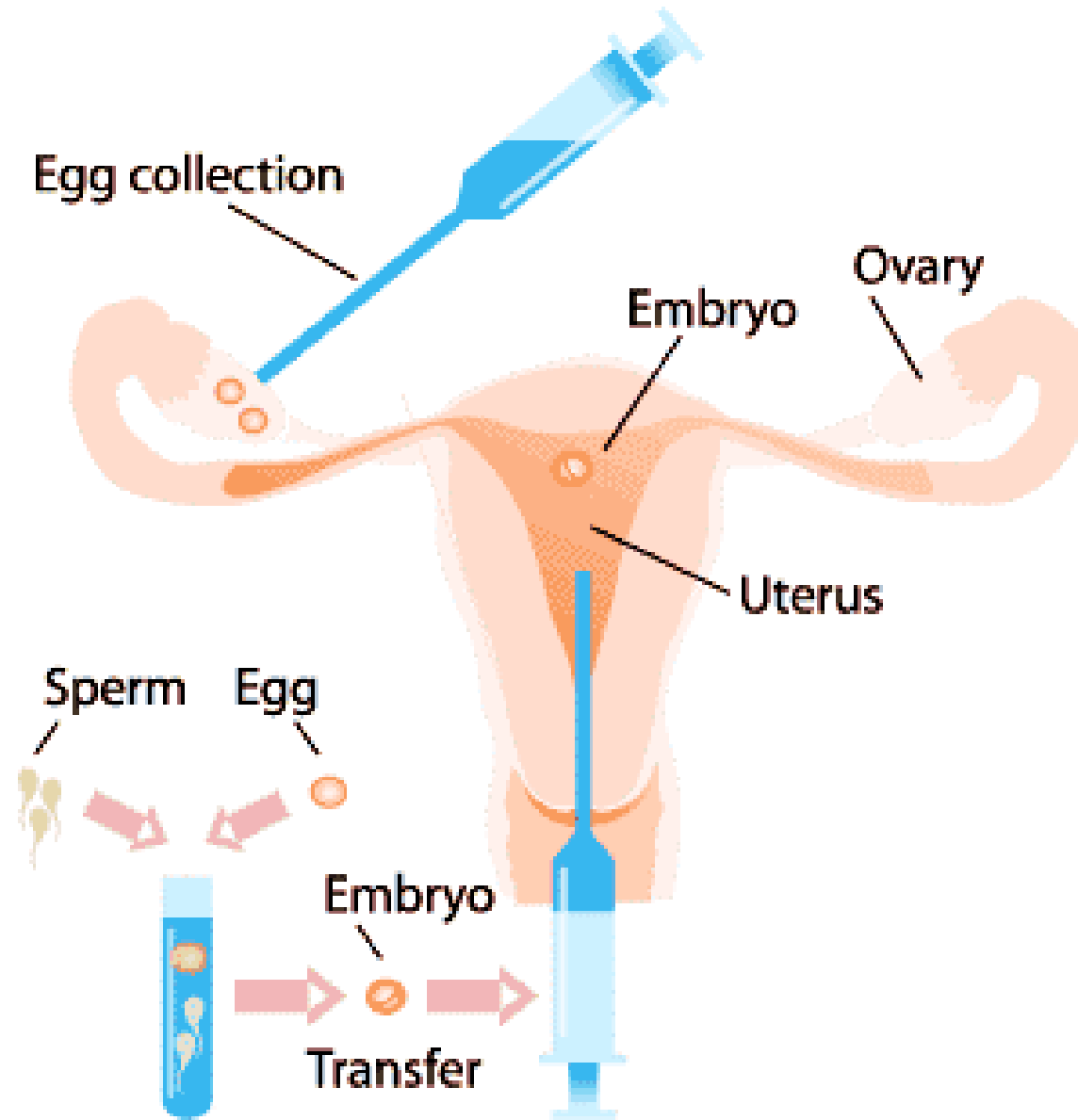




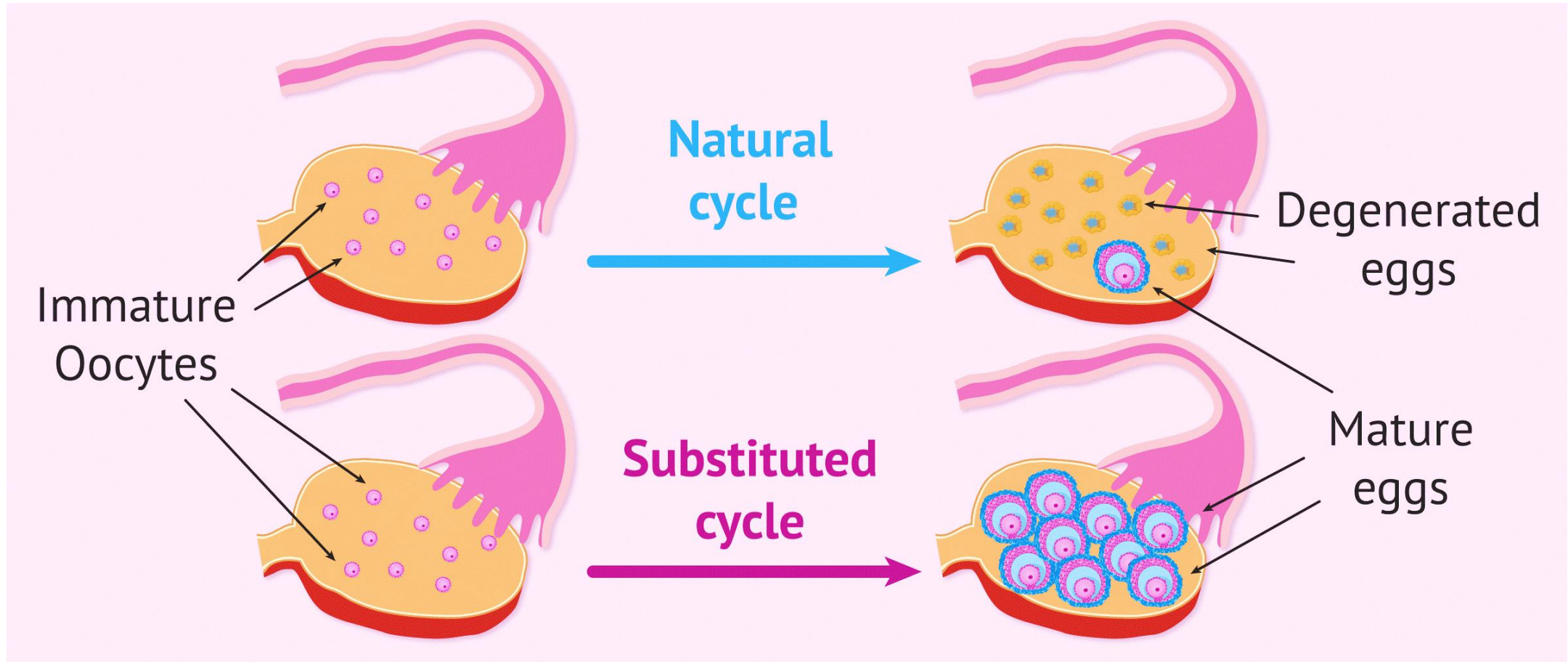
# GIFT and ZIFT



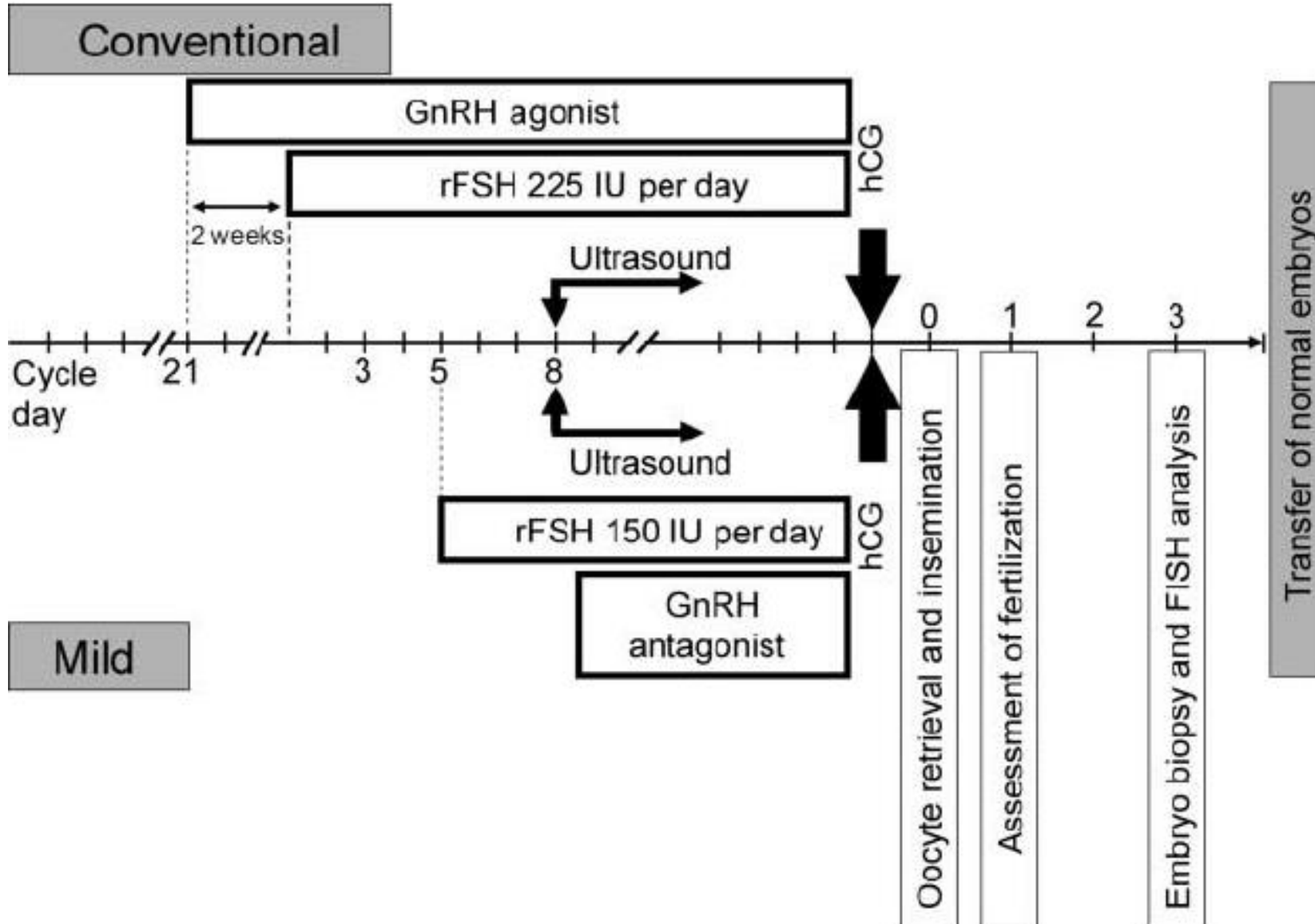
# IVF steps



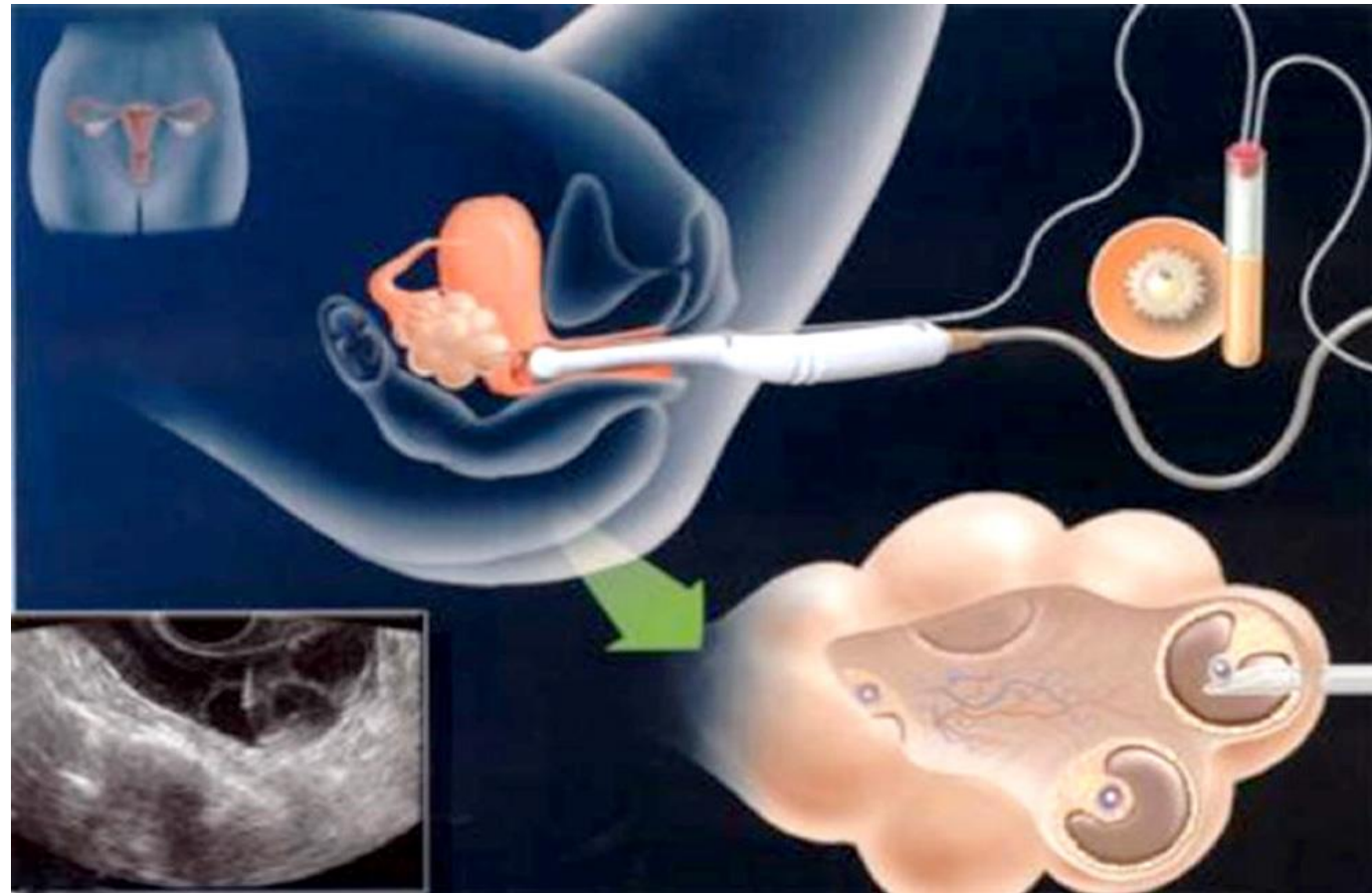
# Ovarian stimulation



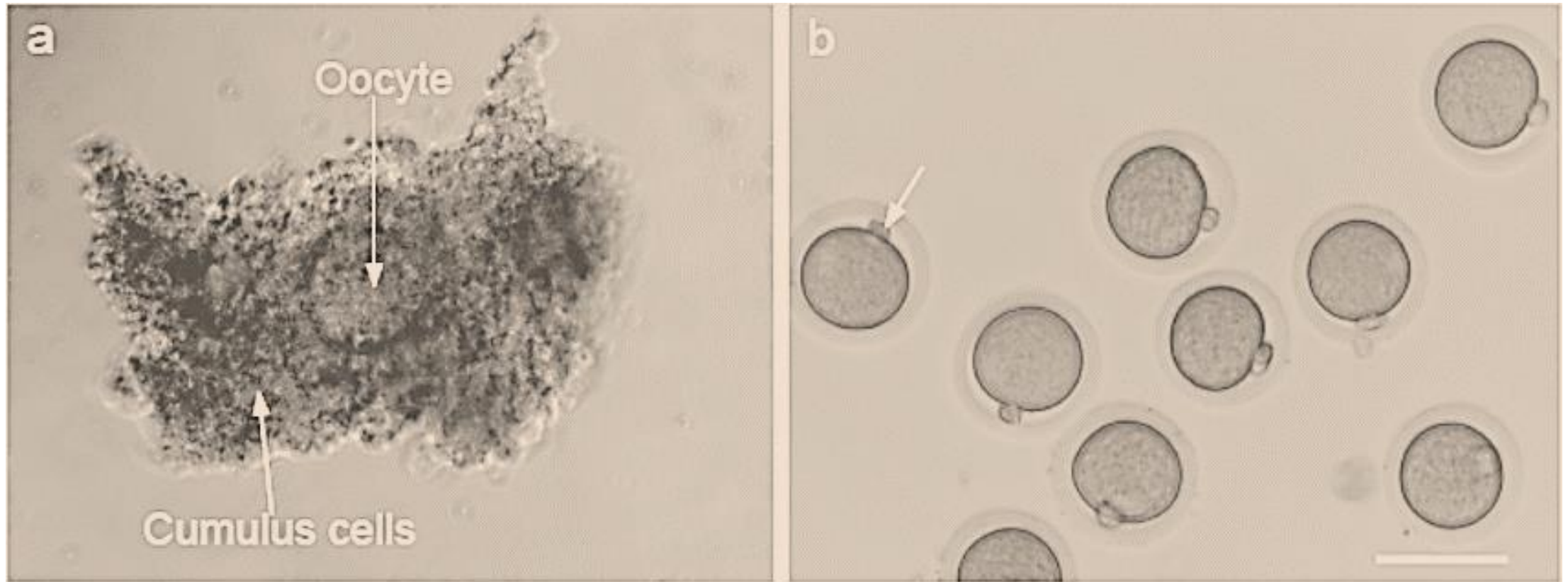




# OPU (Ovum Pick-Up)

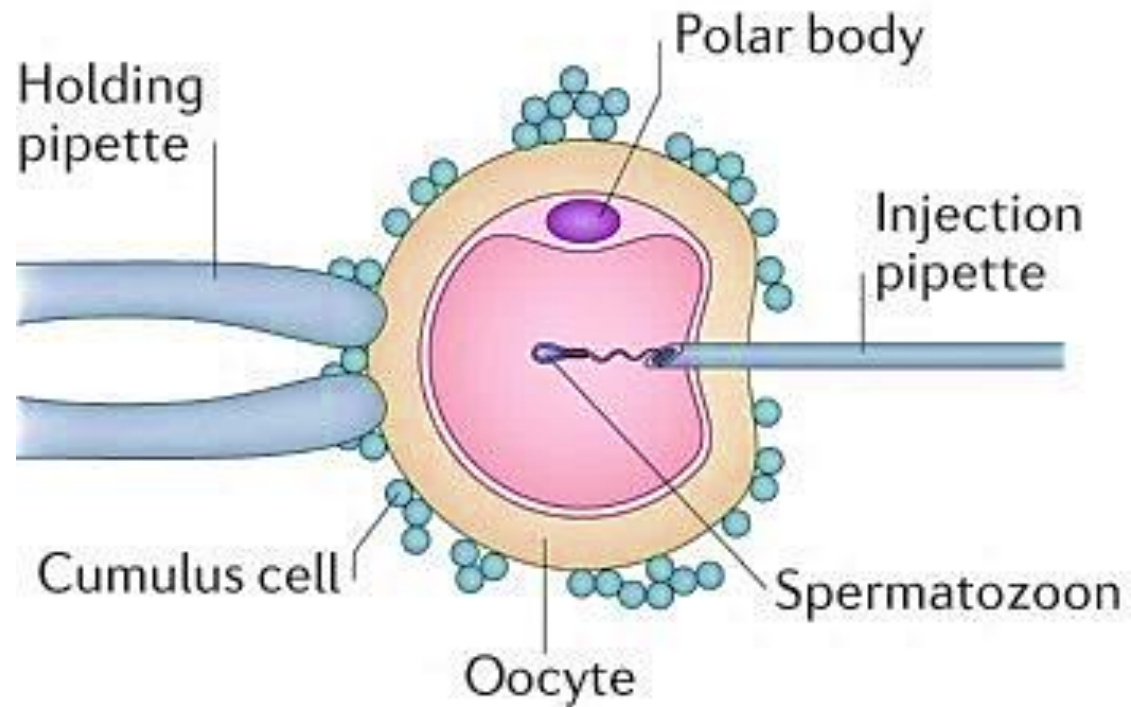


# Cumulus-oocytes complexes

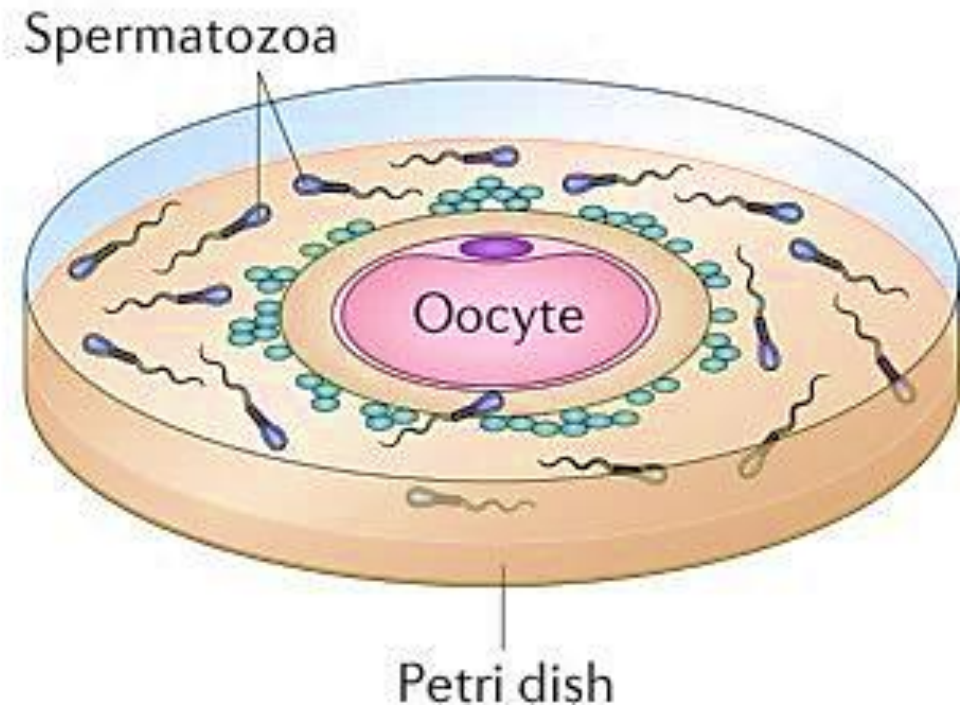


# IVF and ICSI

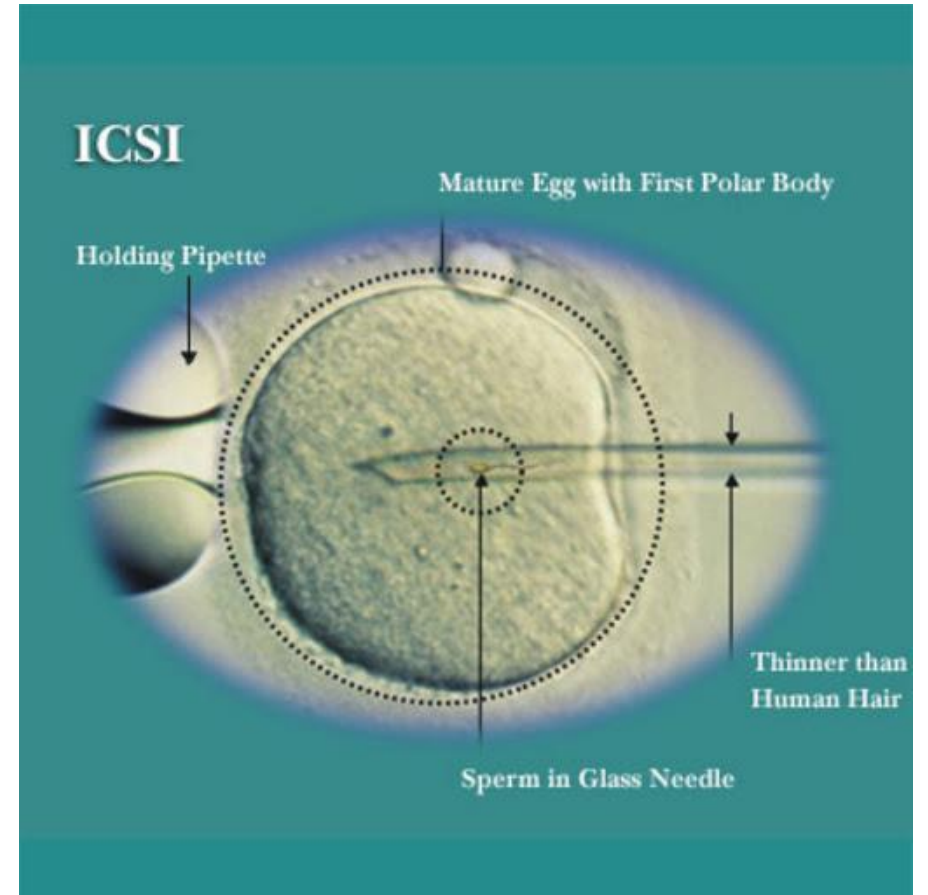
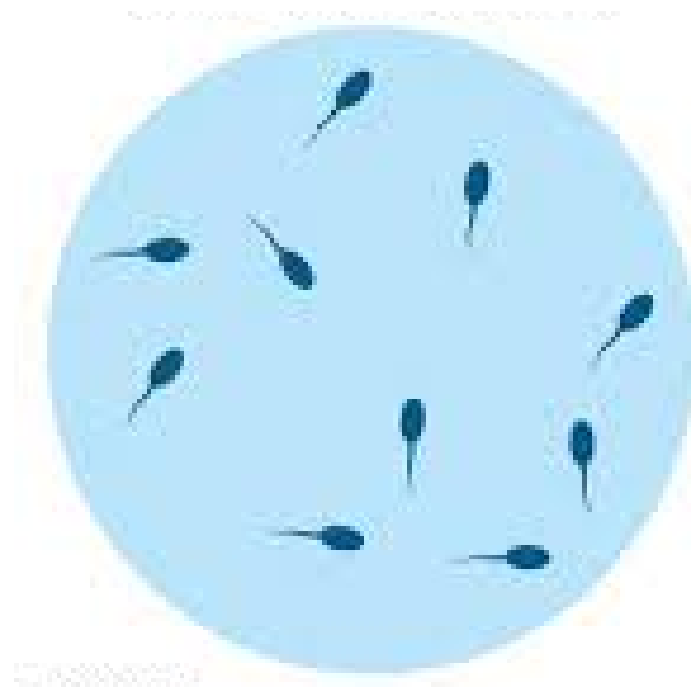
**a ICSI**



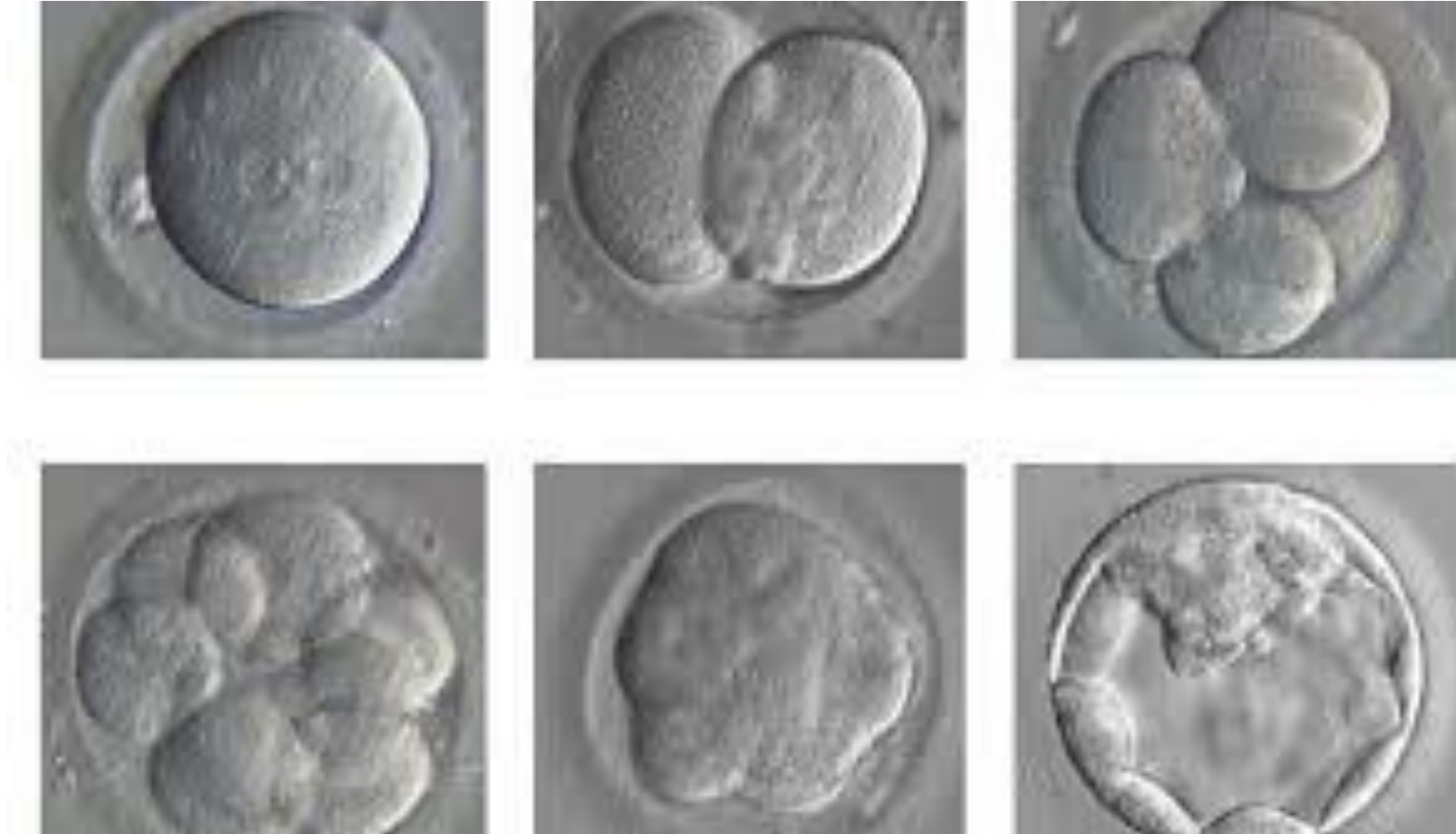
**b Conventional IVF**



# ICSI



# Human pre-implantation embryo



# Embryo transfer



- Age
- Egg and Embryo Quality
- Sperm quality
- Laboratory conditions
- Controlled Ovarian Stimulation (COH) Protocol
- Uterine Receptivity



# Cryopreservation

- *Gamete*
- *Embryo*
- *Reproductive tissues*



- Donor insemination
- Chemotherapy or radiotherapy for malignancies.
- Vasectomy candidates.



# Fertility preservation in cancer patients

- Pre or post pubertal patients: Male and Female
- Married or single



Before  
puberty

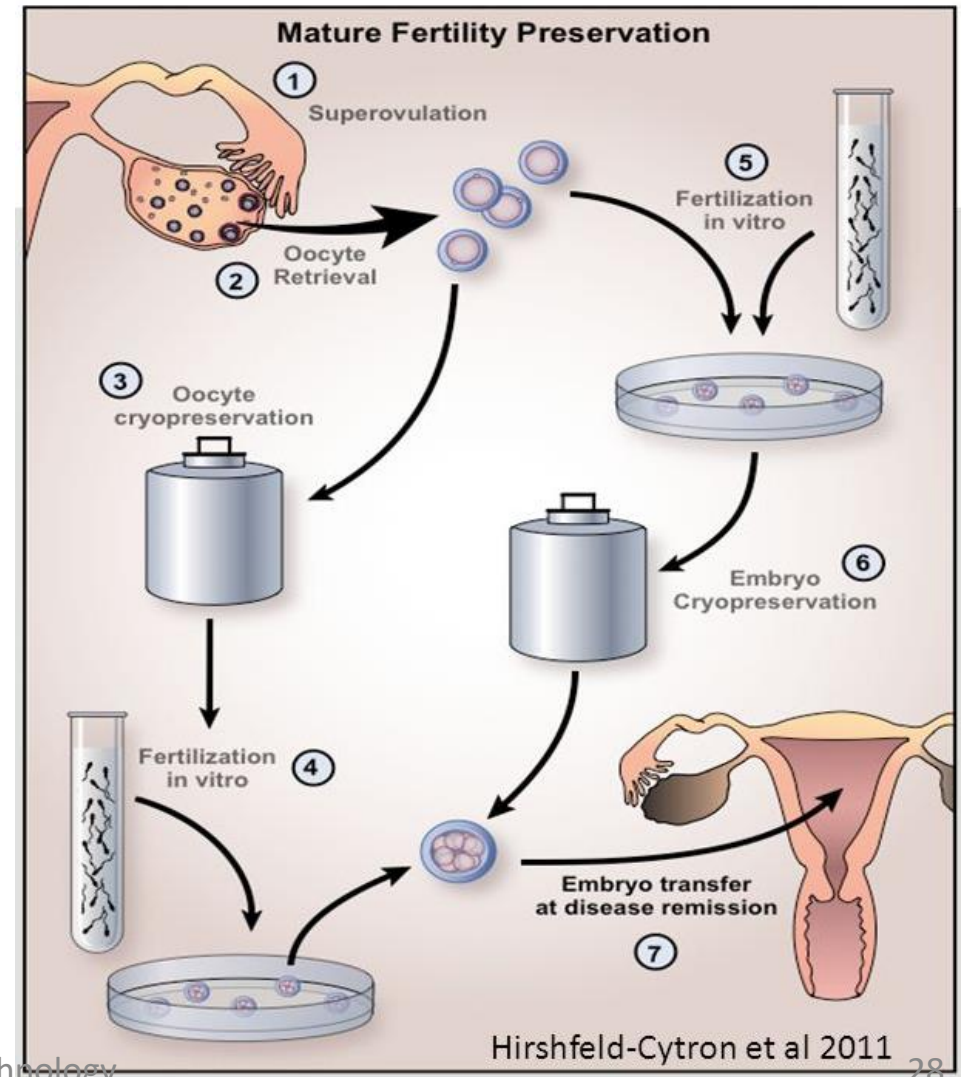
Dr. Ali Talebi, PhD



Adulthood<sup>27</sup>

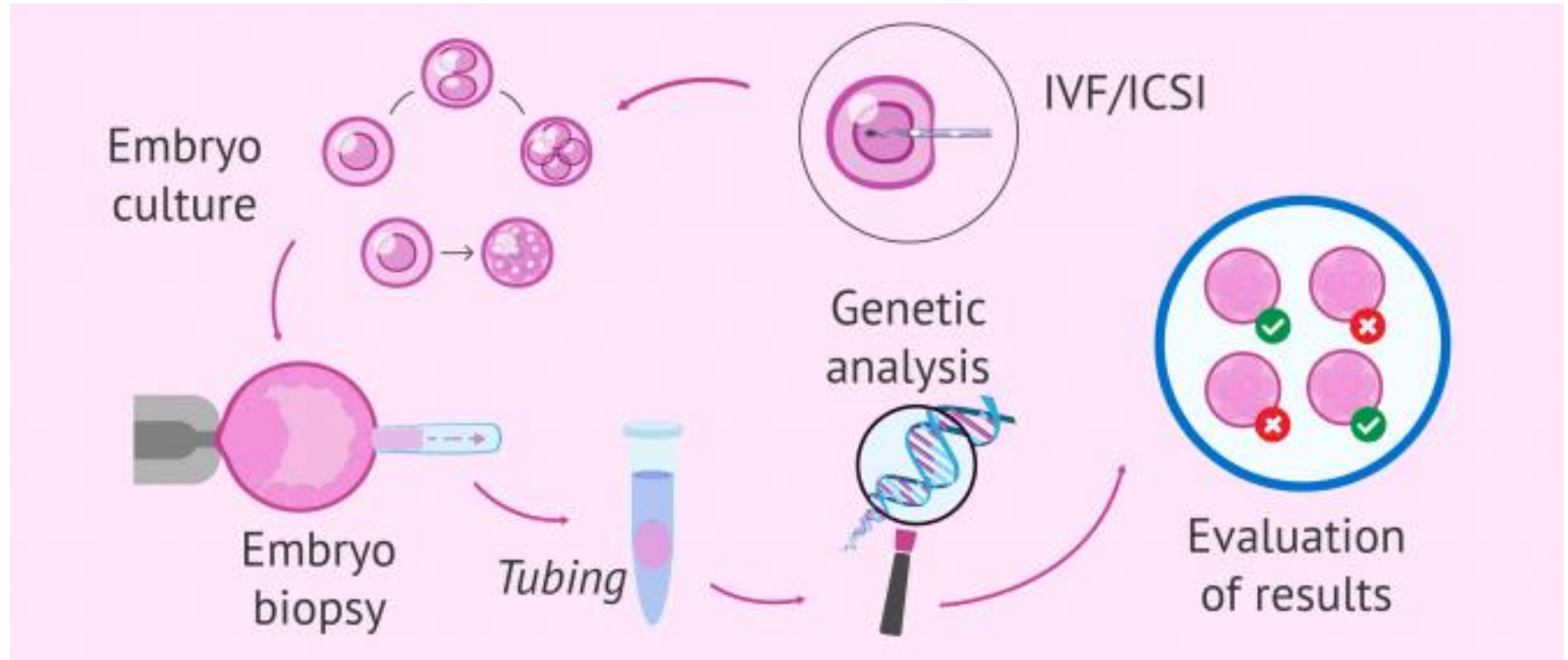
# Cryopreservation

- Egg donation, premature ovarian failure, severe endometriosis, or any gonadotoxic treatment



# PGT

- **PGT-A**
- **PGT-M**
- **PGT-SR**



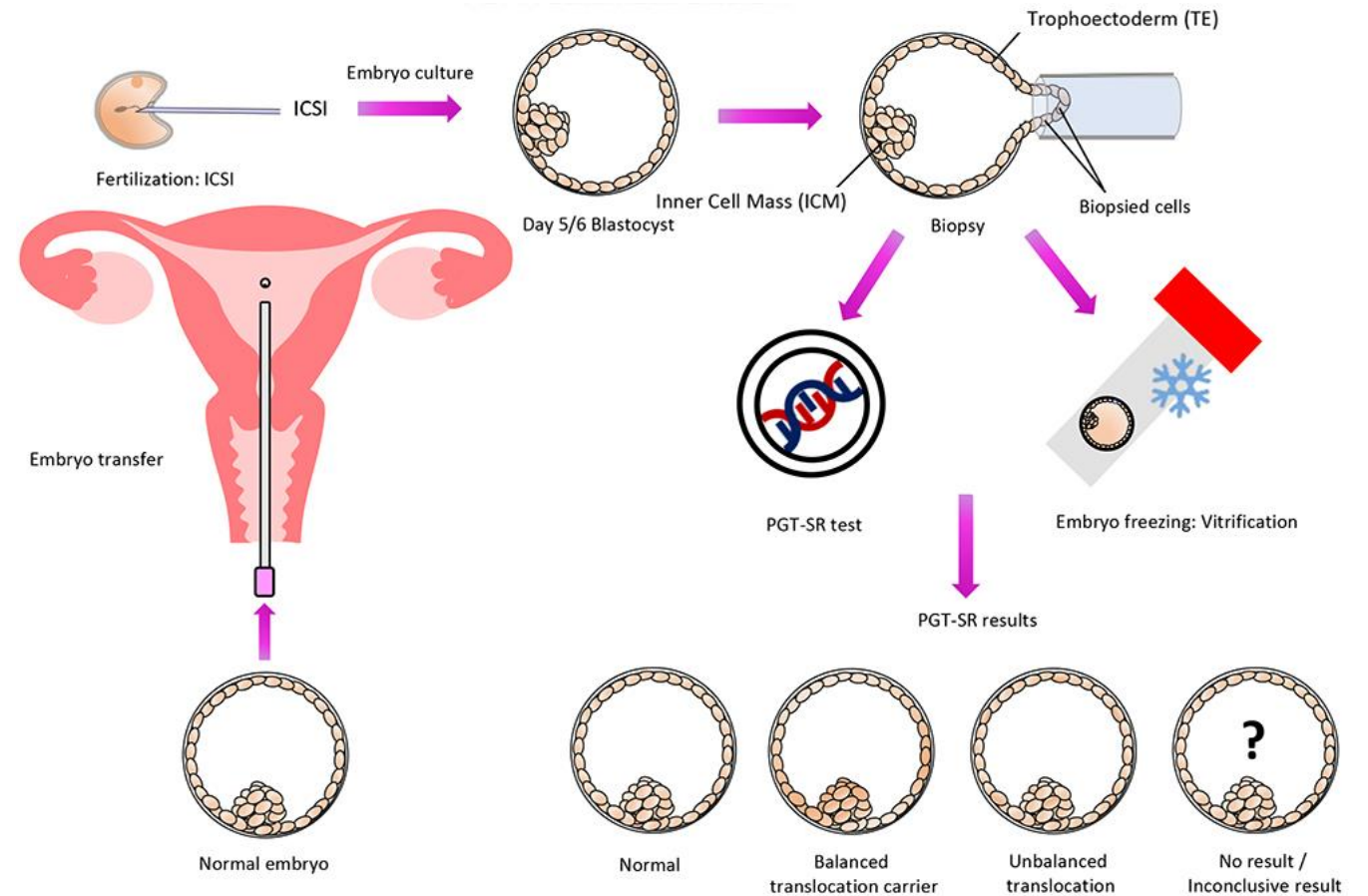
# PGT-A

- Following indications for use of PGT-A :
  - Advanced maternal age;
  - Recurrent implantation failure;
  - Recurrent miscarriage with a genetic cause
  - Severe male factor

- PGT-M refers to testing for DNA pathogenic variant(s) causing (combinations of):
  - **monogenic disorders,**
  - **X-linked,**
  - **autosomal dominantly or recessively inherited**
- Thalassemia, Huntington, Fragile-X, Duchenne muscular dystrophy, Cystic fibrosis

# PGT-SR

- PGT-SR is only recommended if the technique applied is able to detect all expected unbalanced forms of the chromosomal rearrangement.

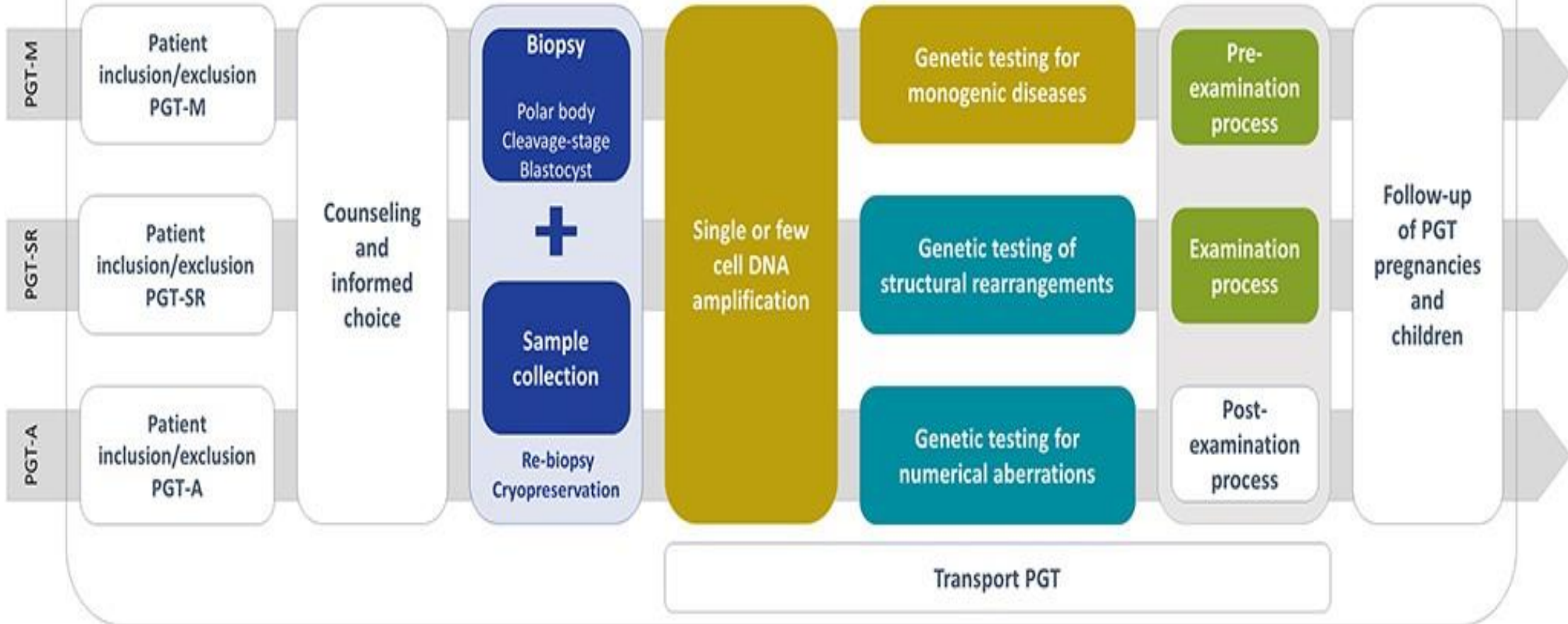




## Basic requirements of an IVF/PGT centre

Infrastructure, equipment, materials, labelling, risk assessment

## Accreditation and quality management



# Semen analysis

- Macroscopic analysis
- Volume, Color, pH, Viscosity
- Microscopic analysis

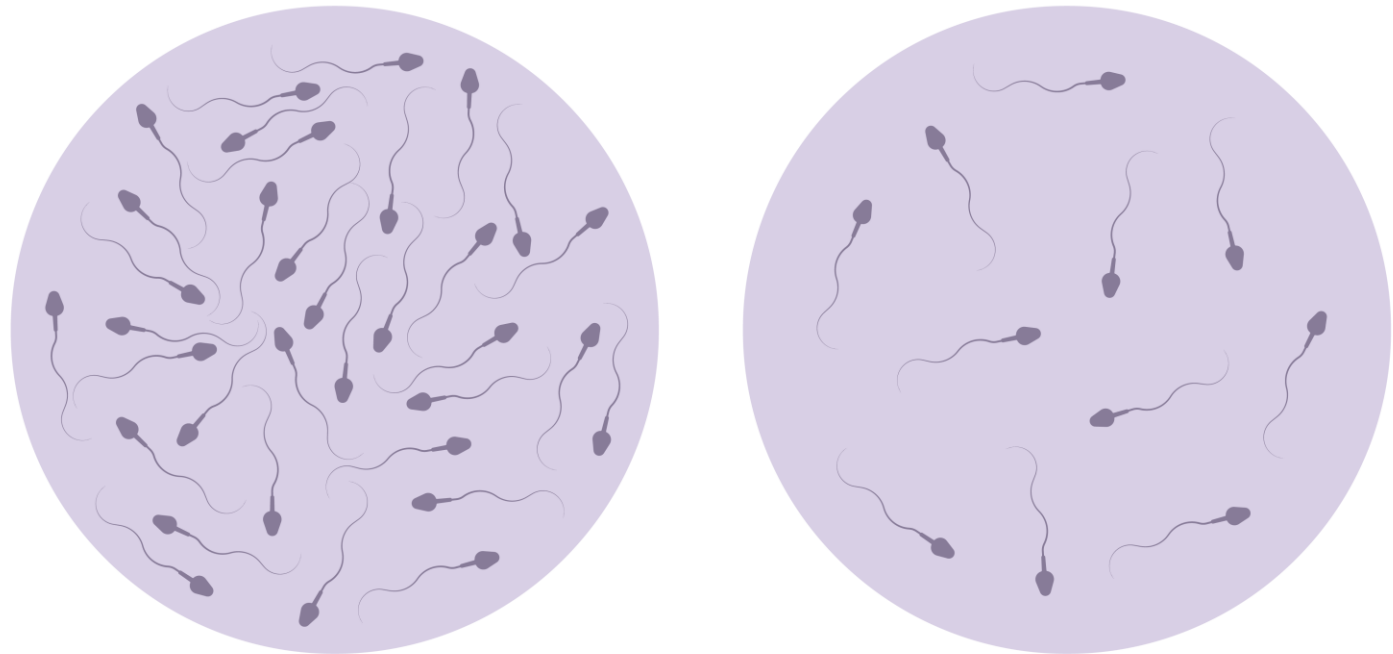


# Macroscopic analysis



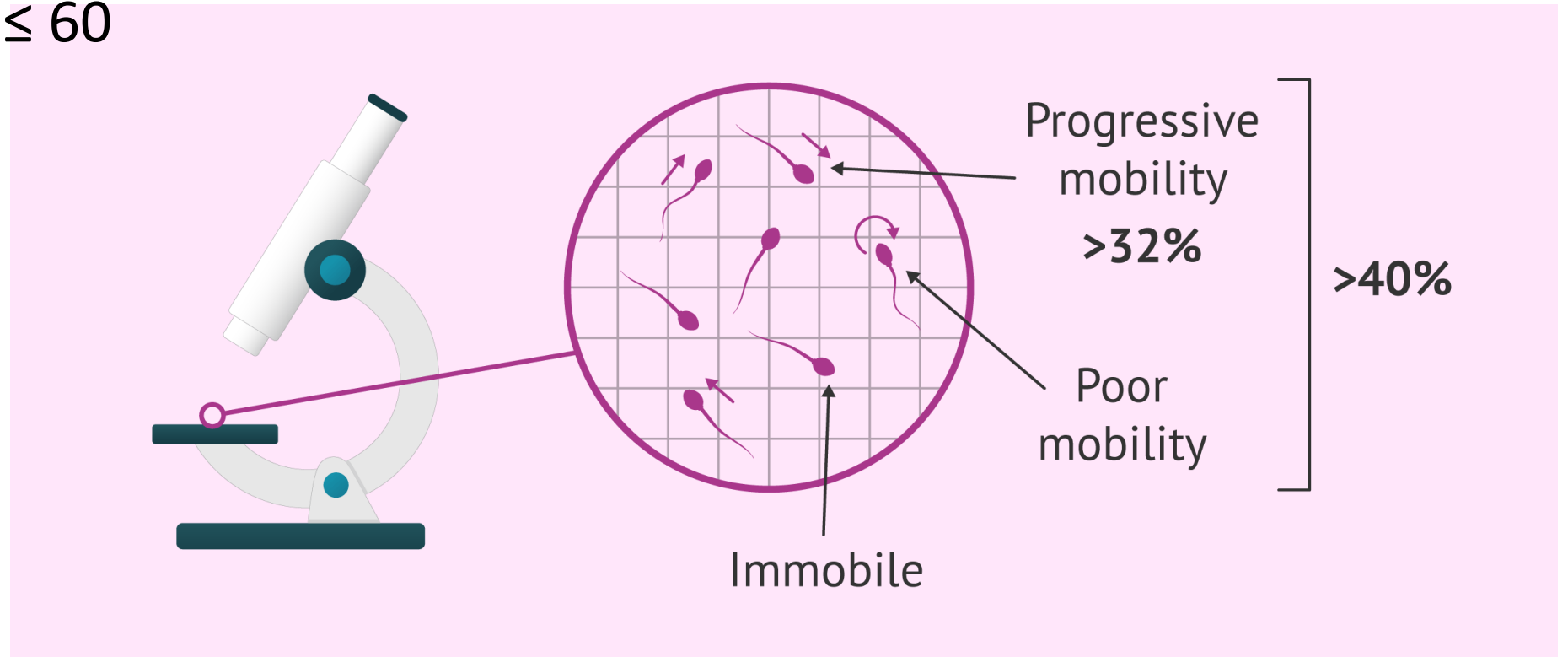
# Sperm count

- $\geq 15$  million/ml
- $\geq 39$  million/ejaculate

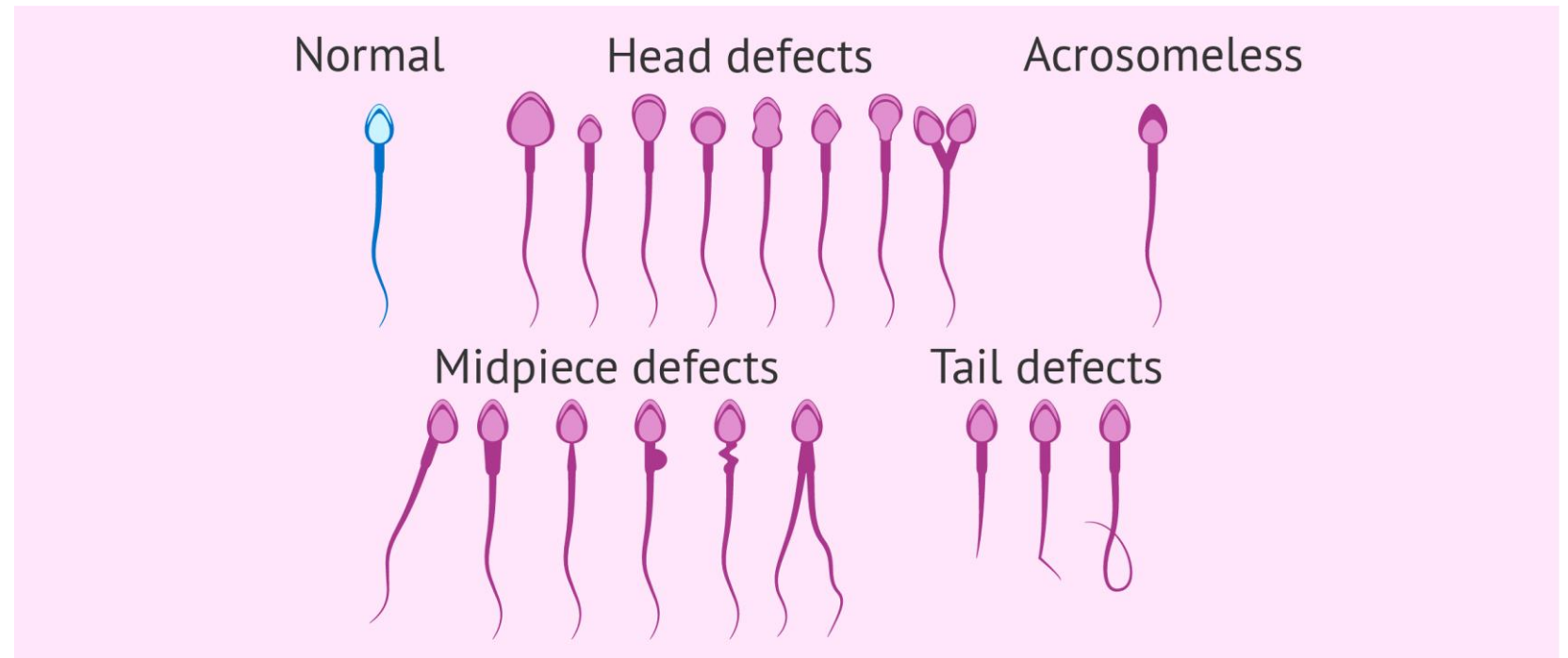


# Motility

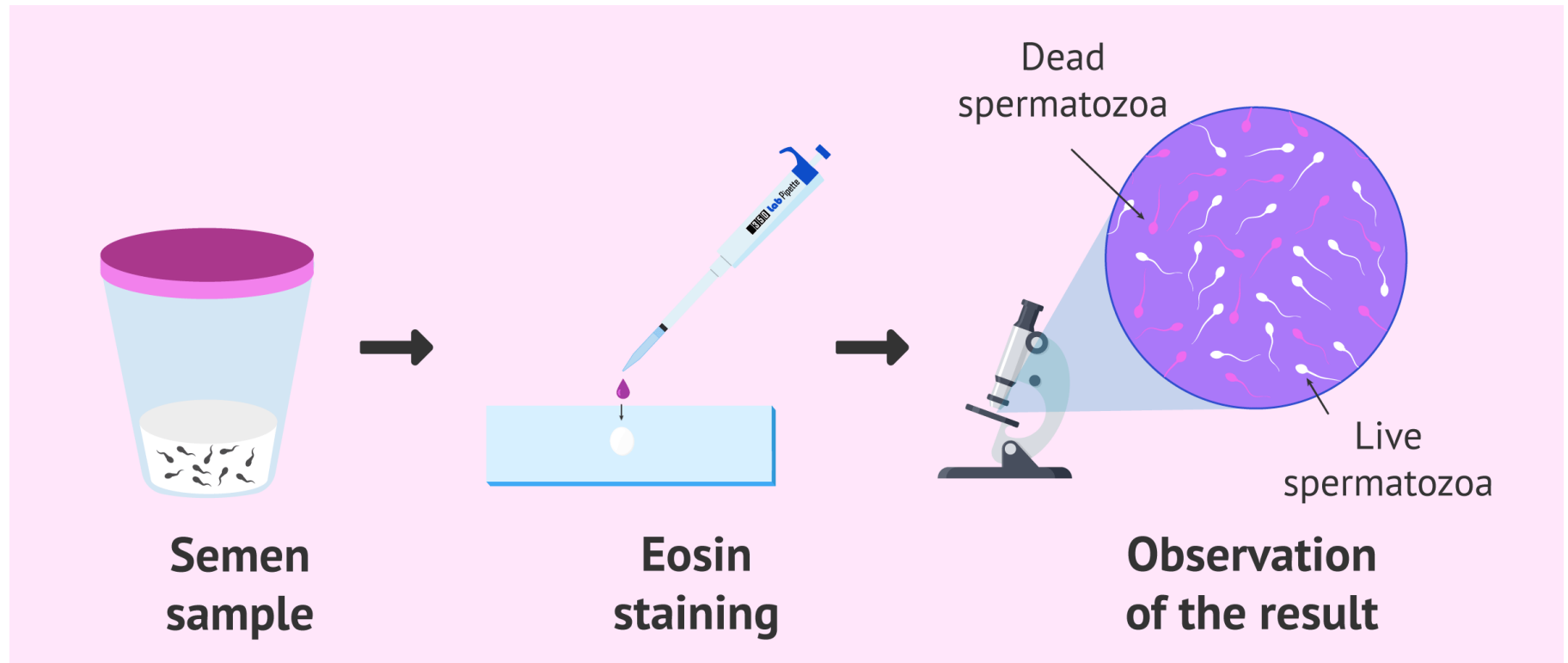
- Total motility  $\geq 40\%$
- immotile  $\leq 60$



# Sperm morphology



# Vitality



# Agglutination & Aggregation

