

**M U N I**  
**M E D**

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# **Infertility**

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**Obstetrics and Gynecology - lectures**

**2020**

## Infertility

- **Fertility** – biological ability to conceive within 6–9 months
- **Infertility** – disability to conceive after 12 months of unprotected sex
- 15–20 % couples, rapidly growing incidence in last decades
- evaluation should begin after 6 months of trying unsuccessfully to conceive

## Fertility – physiology

- Ovulation
- Oocyte migration
- Sperm penetration
- Fertilization
- Embryo migration
- Implantation in uterine cavity

## Infertility causes

### Male factor (40%)

- **Abnormal sperm production or function**
  - undescended testicles, genetic defect, DM, infection, mumps
- **Sperm delivery problems**
  - premature ejaculation, cystic fibrosis, blockage of testicles, damage/injury
- **Damage related to cancer treatment**
  - radiation, chemotherapy
- **Immunological**
  - an autoimmunity to own sperm

## Infertility causes

### Female factor (40%)

- **Uterine:** polyps, shape abnormalities (septum...), fibroids
- **Tubal:** blocking or damage (inflammation, endometriosis, adhesion)
- **Ovulatory:** ovulation disorders, PCO, insufficiency, chemotherapy, hyperprolactinemia
- **Cervical:** polyps, occlusion
- **Immunological:** immunity to sperm, zona pellucida, ovary...
- **Endometriosis:** affect function of ovaries, uterus, fallopian tubes
- **Unexplained:** not diagnosed by any known medical procedure

## Age and fertility

- Female fertility after 35 years of age **decreases 3 times** in comparison to women under 25 years of age
- **Causes:** ovarian dysfunction, endocrinologic factors, hypothalamic – pituitary factors, environmental changes

## Diagnosis

- Always both partners
- Patient/family history
- Sexual habits (intercourse frequency)
- Laboratory tests (hormones)
- Genetic testing
- Semen analysis
- Ovulation testing (LH, P, prolactin)

## Diagnosis

- Ovarian reserve testing (AMH)
- Ultrasound examination
- **Hysterosalpingography (SONO-HSG)**
- Hysteroscopy
- Diagnostic laparoscopy (DGL)
- **Chromopertubation** – blue dye solution introduction
- Other hormone testing (TSH, T3, T4, FSH...)

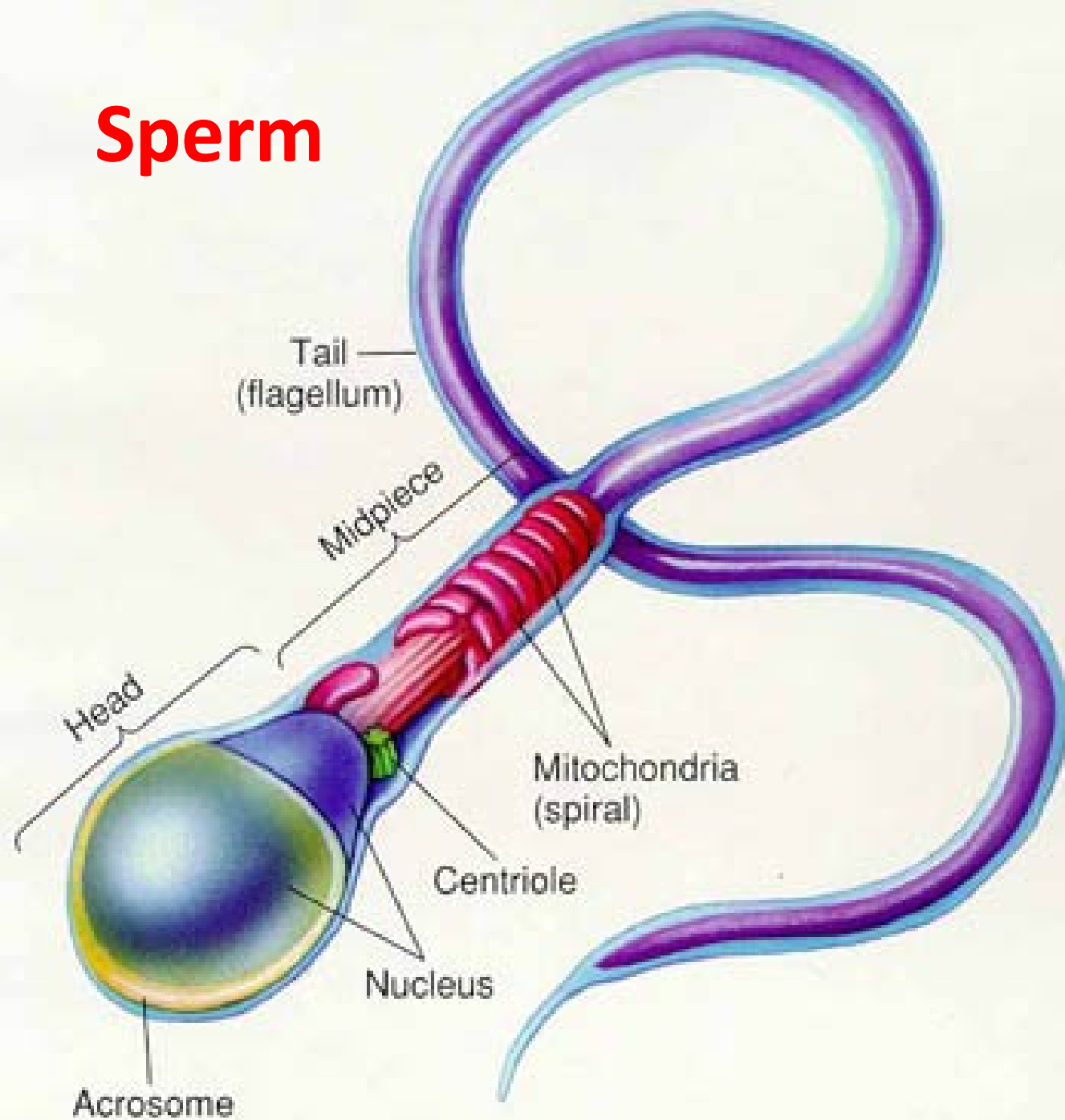


## Sperm analysis

<b>Volume</b>	<b>≥ 1.5 ml</b>
<b>Concentration</b>	<b>≥ 15 millions/ml</b>
<b>Total sperm count</b>	<b>≥ 40 millions</b>
<b>Motility/forward progression</b>	<b>≥ 32 %</b>
<b>Morphology</b>	<b>≥ 4 % normal and more</b>

- **Approximate concentration of total sperm cells:**
  - 1940 ..... 110 mil/ml
  - 1990 ..... 60 mil/ml

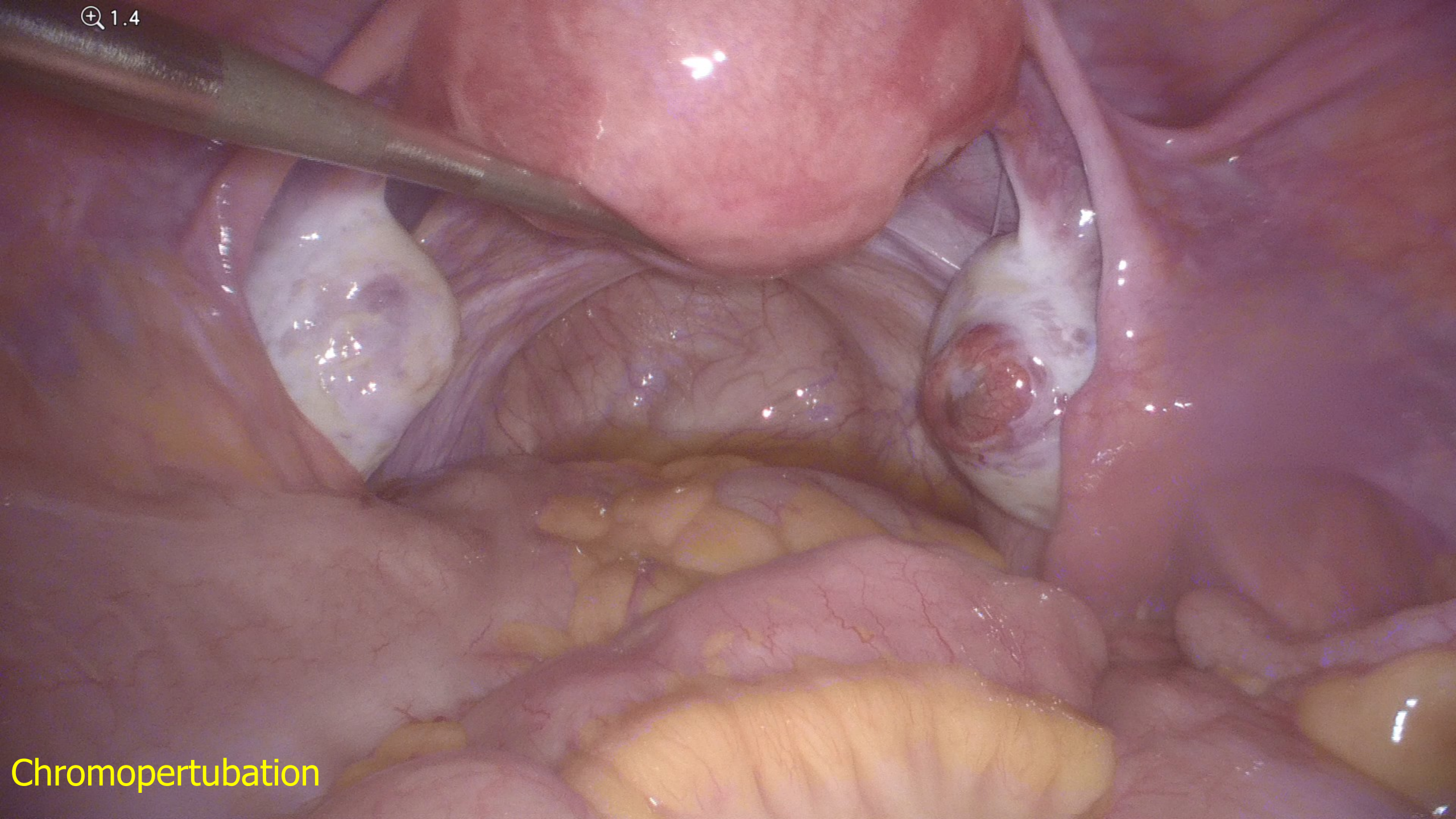
# Sperm



## Semen deficiencies - nomenclature

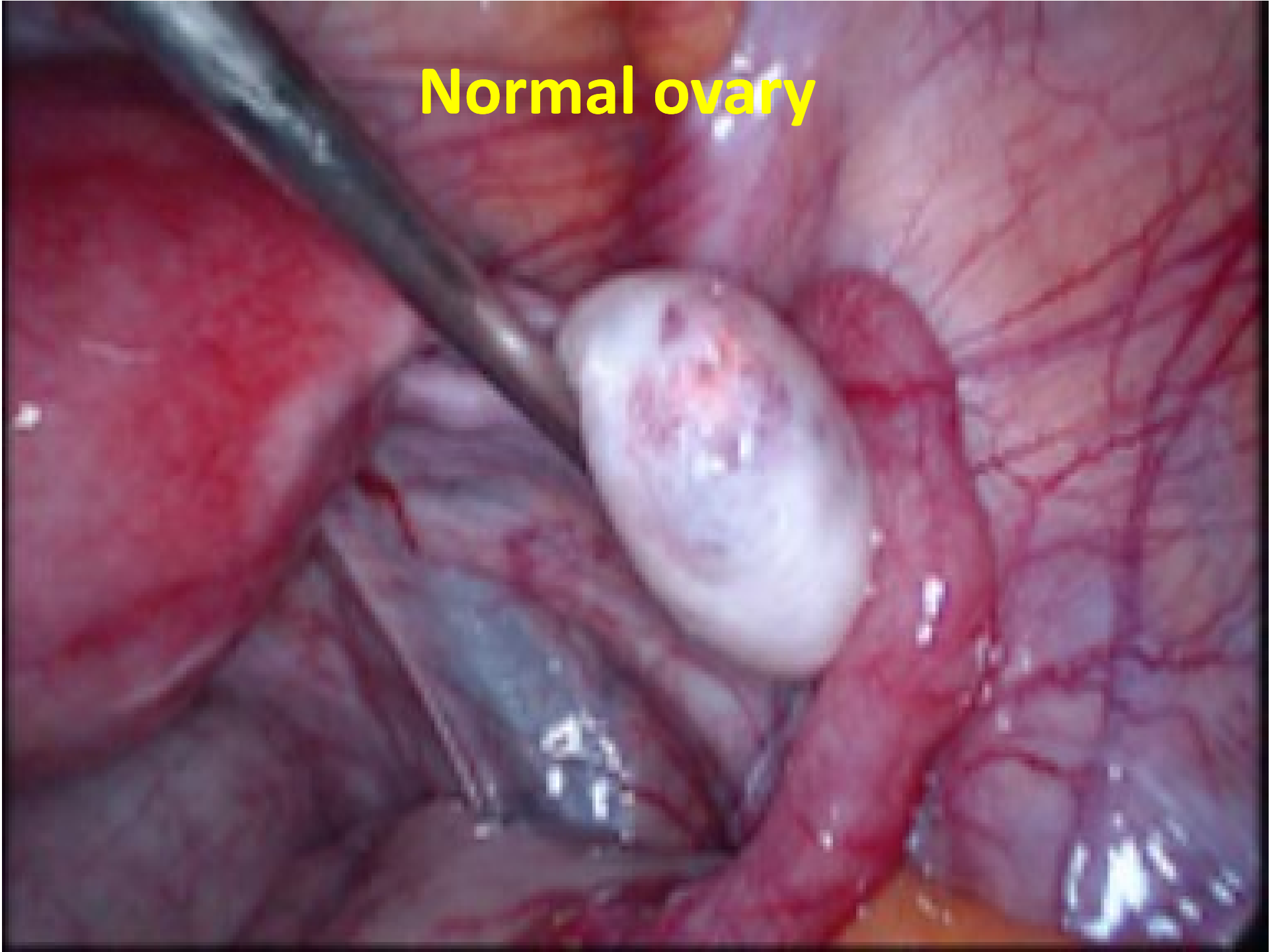
<b>Normozoospermia</b>	<b>normal result</b>
<b>Oligozoospermia</b>	<b>reduced concentration</b>
<b>Asthenozoospermia</b>	<b>reduced sperm motility</b>
<b>Teratozoospermia</b>	<b>abnormal morphology</b>
<b>Azoospermie</b>	<b>absence of spermatozoa</b> (motile sperm cell)
<b>Aspermia</b>	<b>complete lack of semen</b>

⊕ 1.4



Chromopertubation

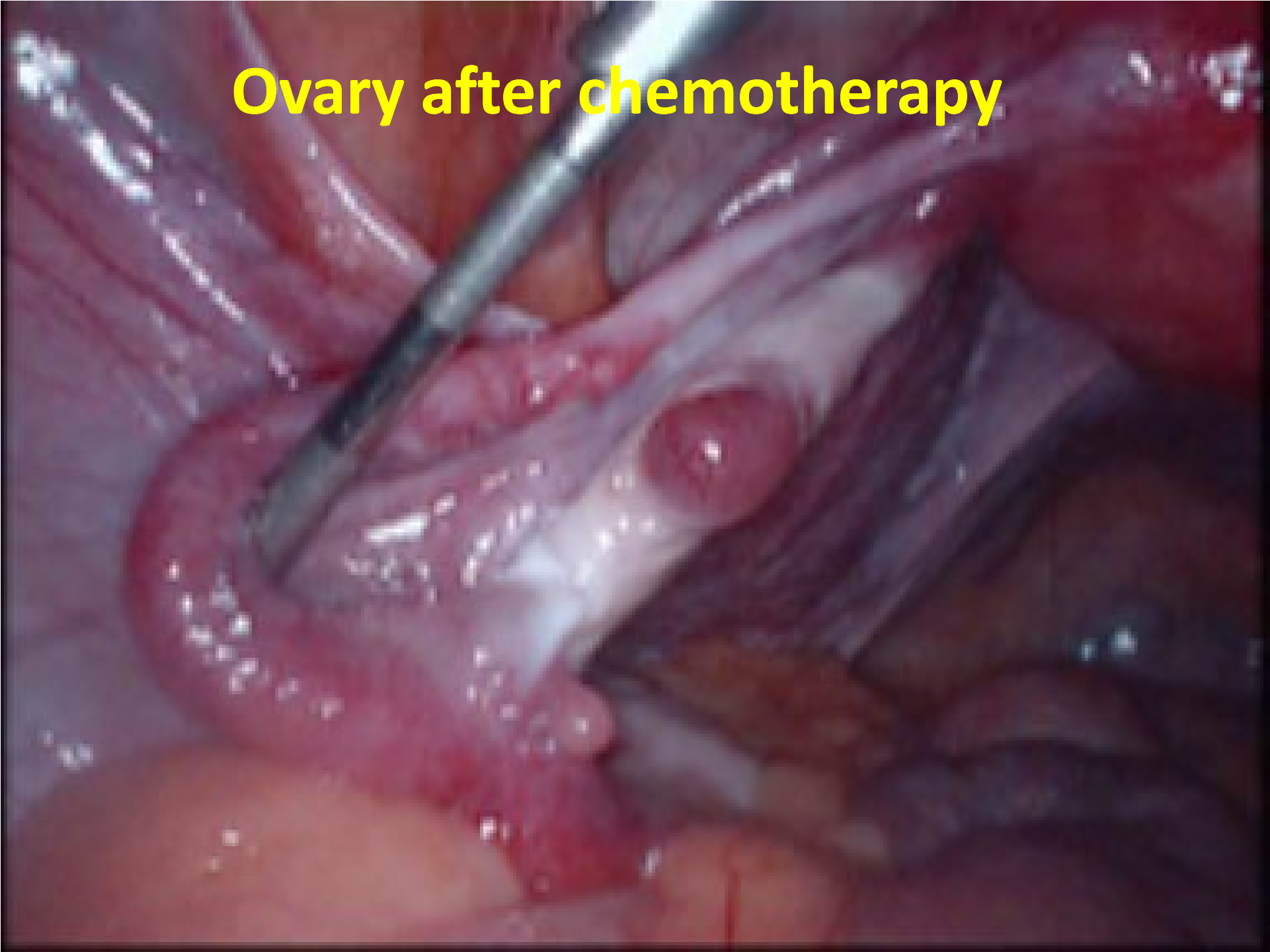
**Normal ovary**



**Streak ovary (Turner sy.)**



# Ovary after chemotherapy



# Ovary after ovarian cyst removal





**Sactosalpinx**



MUM  
MED

RES  
2D  
75%  
Dym R 58  
P Off  
Res

# SONO HSG



5.0cm

**SONO HSG - fimbriae**

M L  
M E

RS  
2D  
38%  
Dym R 58  
P Off  
Res



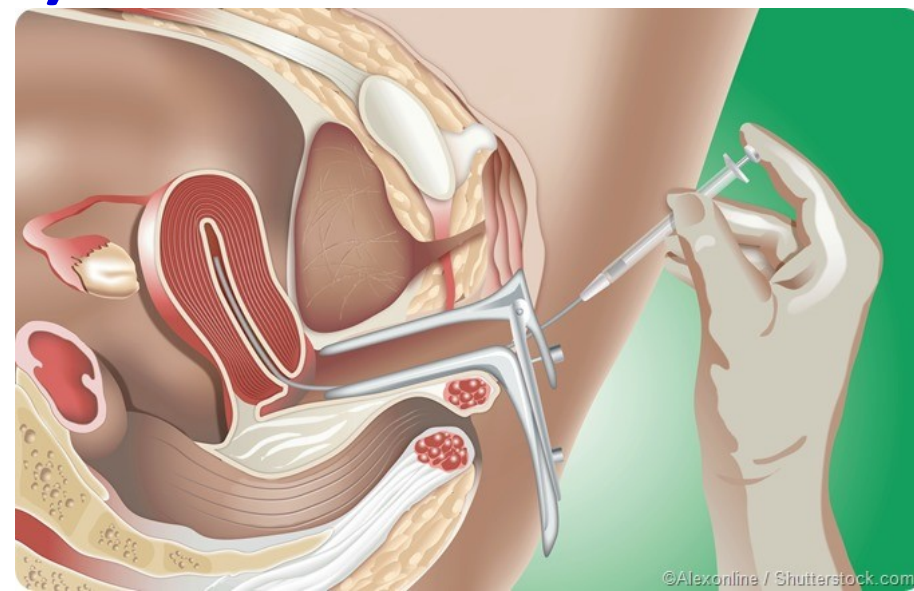
3.0cm

## Assisted reproduction

- medical procedures used primarily to **address infertility**
- any procedure that involves the **handling of eggs, sperm, or both, outside the human body**
- includes artificial insemination, intrauterine insemination, in vitro fertilization, and ovarian stimulation

## Assisted reproduction methods

- **Ovulation induction (stimulation)**
- **Artificial insemination (IUI) – introduction of sperm into uterus**
- **In-vitro fertilisation (IVF)**
- **Preimplantation genetic diagnosis (PGD)**
- **Donor conception**
- **Surrogacy**

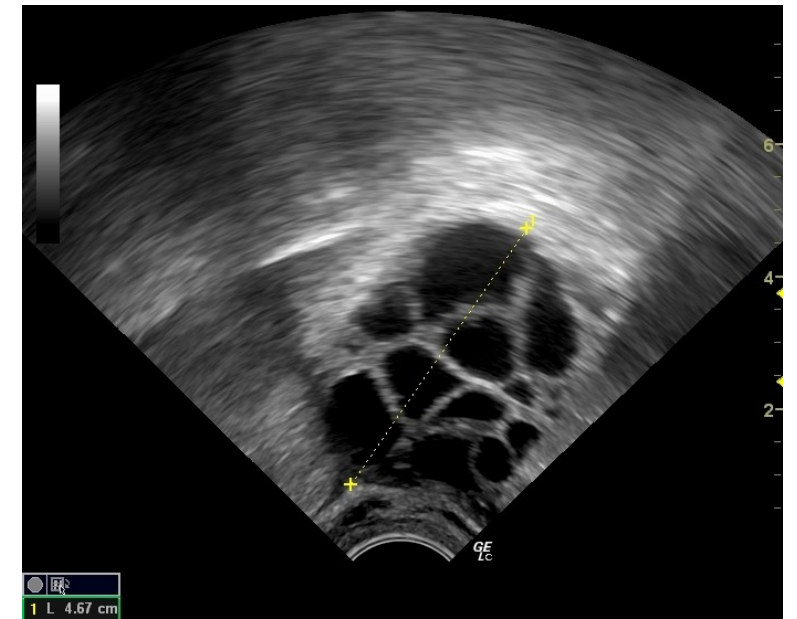


## In vitro fertilisation

- A process of fertilisation outside the body (in vitro/glass)
- **Monitoring and stimulating** a woman's ovulatory process
- **Retrieving oocytes** from ovaries
- **Sperm and oocytes** placed in a liquid culture to **fertilise**
- **Embryo culture** – embryo is growing in an artificial medium
- **Embryo transfer/frozen embryo transfer** (to a uterus)

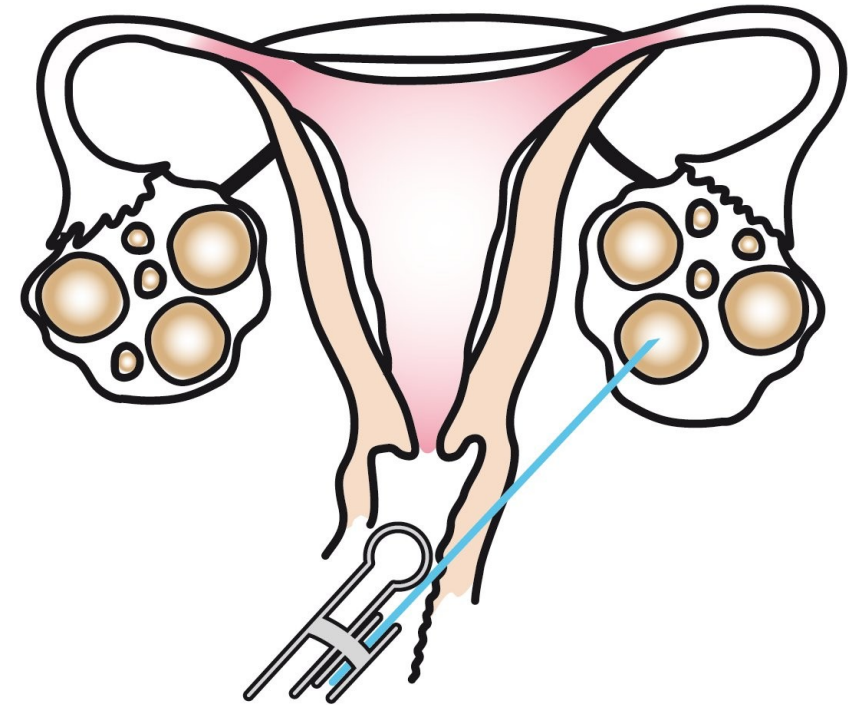
## Ovulation induction (stimulation)

- Woman is not ovulating or not ovulating regularly
- Taking a hormone medication to stimulate ovulation
- Response to hormones is monitored with US
- **Timing of intercourse**
- At the beginning of **every IVF cycle**
- Th: clomifen citrate, FSH, hCG.....
- monitored by US folliculometry



## Oocyte retrieval/egg collection

- transvaginal oocyte retrieval
- removing oocytes from the ovary in order to enable **fertilisation** or to egg freezing (**cryopreservation**)





## Sperm retrieval techniques

**Microsurgical method of sperm extraction MESA, TESE**

### **Obstructive azoospermia**

- microsurgical epididymal sperm aspiration – MESA

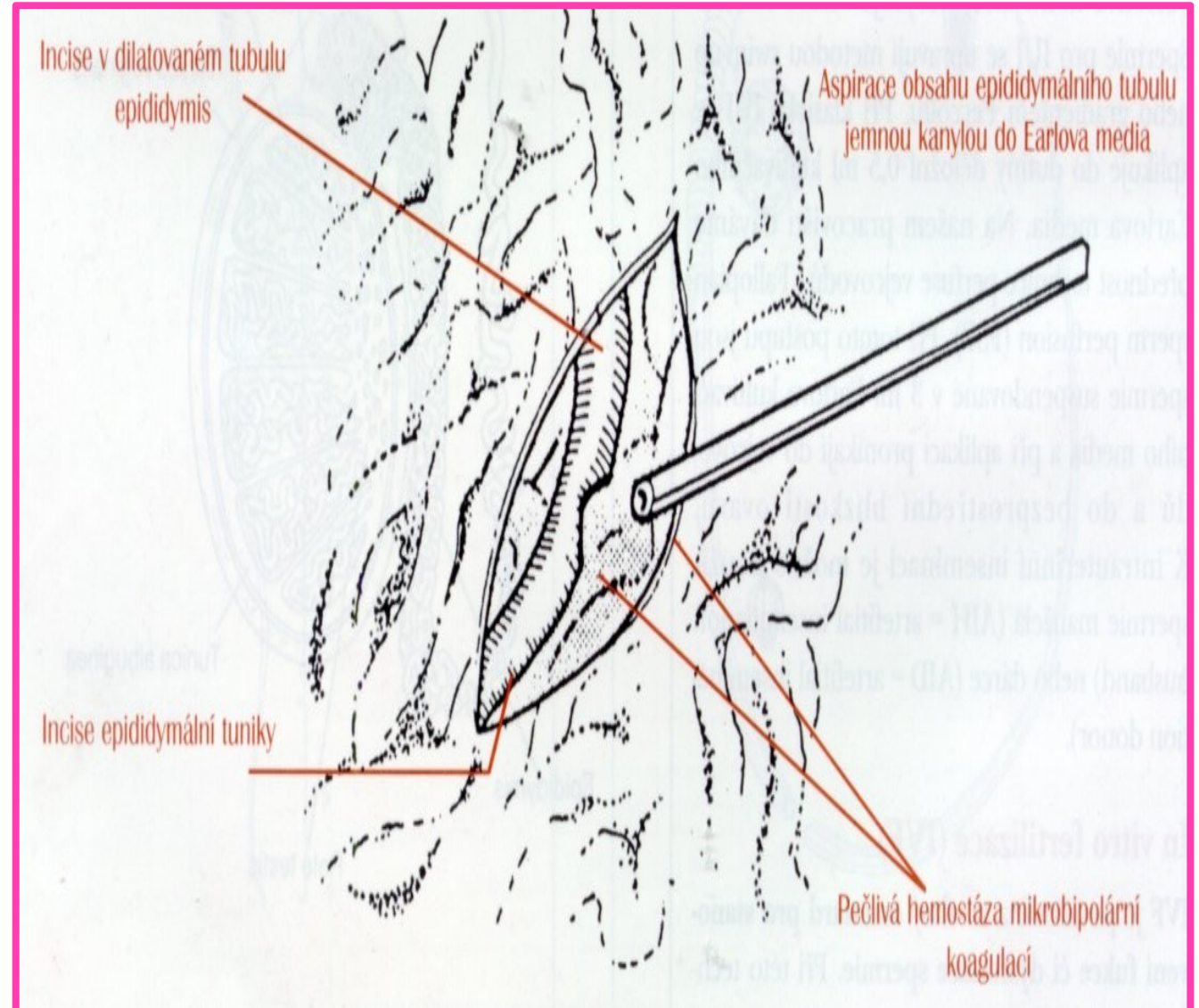
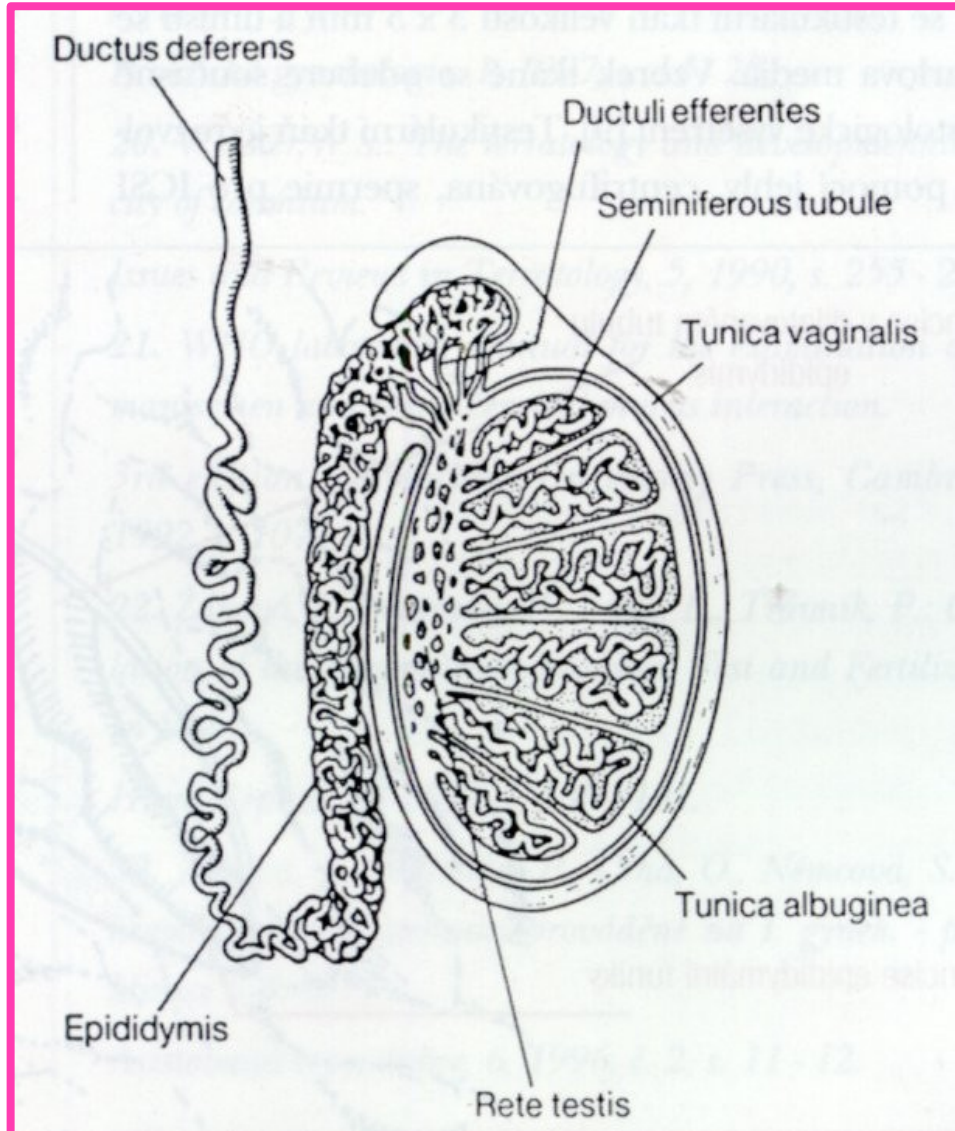
### **Non obstructive azoospermia**

- testicular sperm extraction – TESE

## Microsurgical epididymal sperm aspiration – MESA

- in case of occlusion between epididymis and urethra
- via 3 cm long scrotal incision, under general anesthesia
- liquid is aspirated from the ducts by pipette

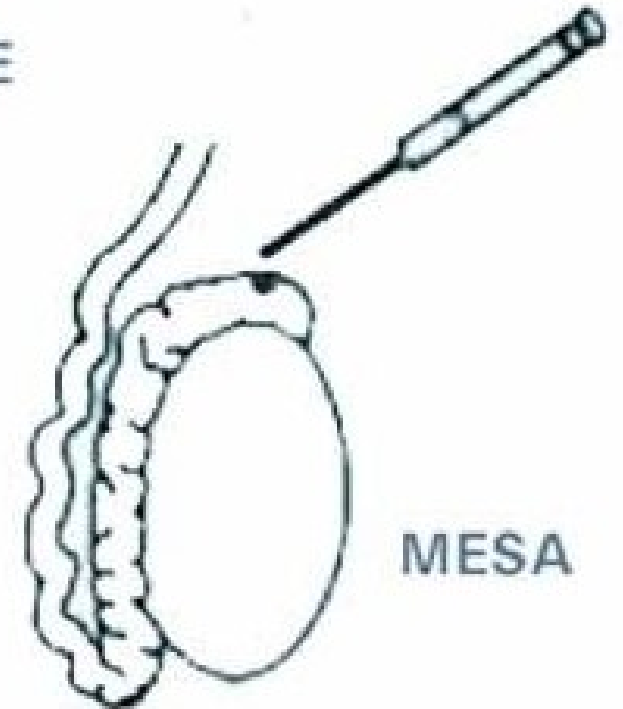
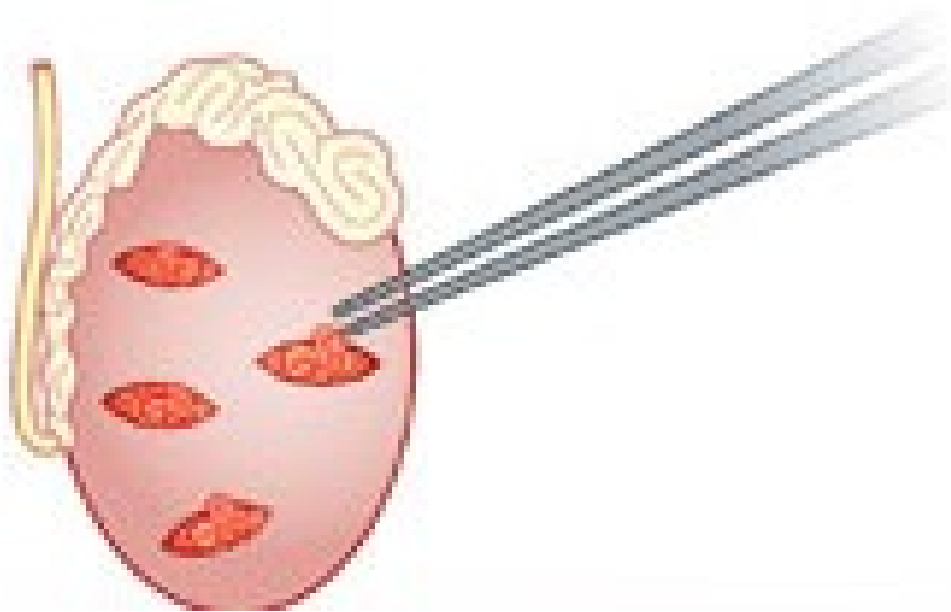
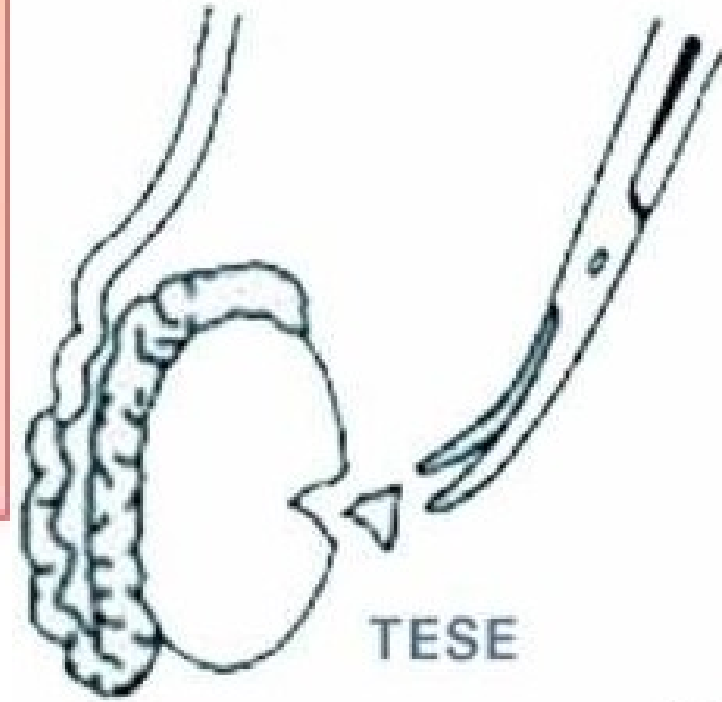
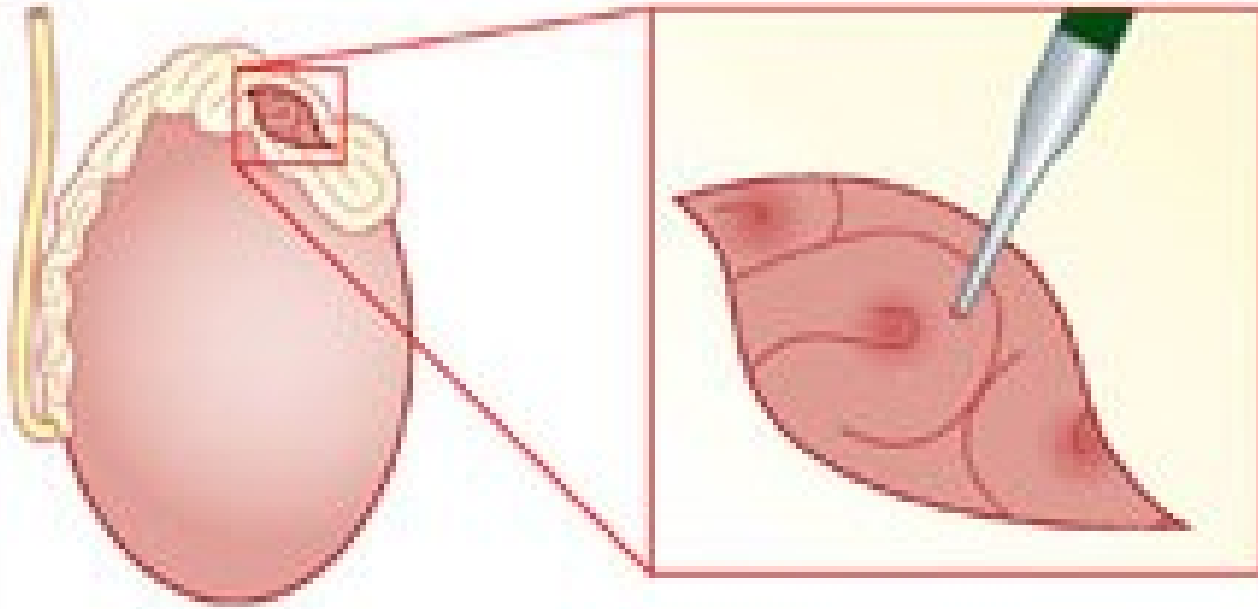
# MESA



## Testicular sperm extraction – TESE

- in case of no sperm was retrieved from MESA technique
- It allows for extracting sperm cells (if they are present) from the ducts of the germinal epithelium
- follows the previous MESA procedure
- small incisions are made in the testicular sheets
- a little of the testicular tissue is retrieved

# MESA/TESE



## In vitro fertilisation – advanced techniques

- **Intracytoplasmic sperm injection (ICSI)**
  - direct injection of a single sperm into each oocyte
- **Preselected Intracytoplasmic sperm injection (PICSI)**
  - transferring specially selected sperm
  - Sperm exhibits positive binding to hyaluronan gel
  - Hyaluronan is an important component of oocyte layer

## In vitro fertilisation – advanced techniques

- **Magnetic activated cell sorting (MACS)**
  - selecting damaged spermatozoas with higher number of fragmented DNA
- **Assisted Hatching (AH)**
  - Embryo is surrounded by a hard layer of cell – zona pellucida
  - Creating small crack in the zona pelludica
  - AH help an embryo implant in the uterus

**Zygote**

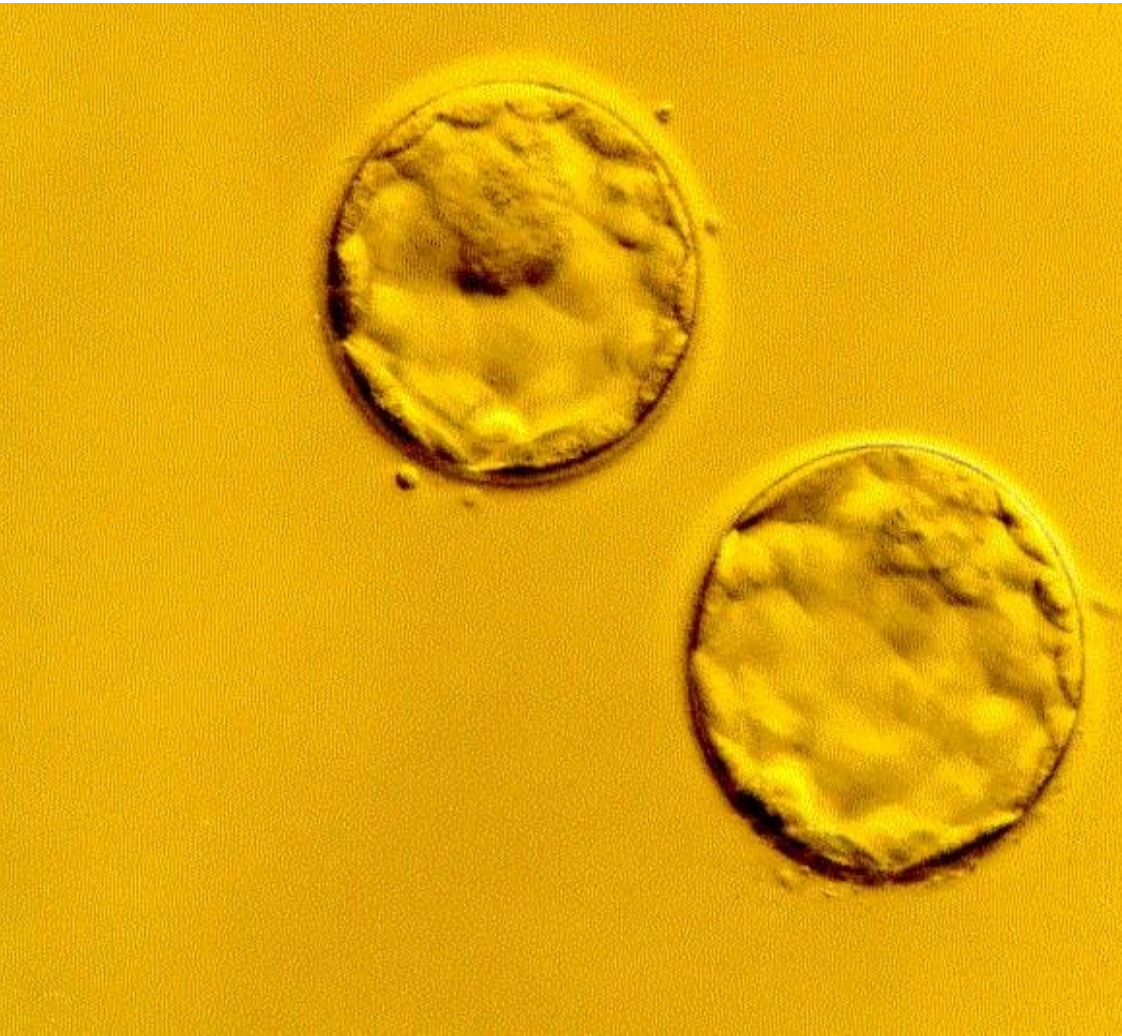


**8-cell embryo after 72-hour-long cultivation**

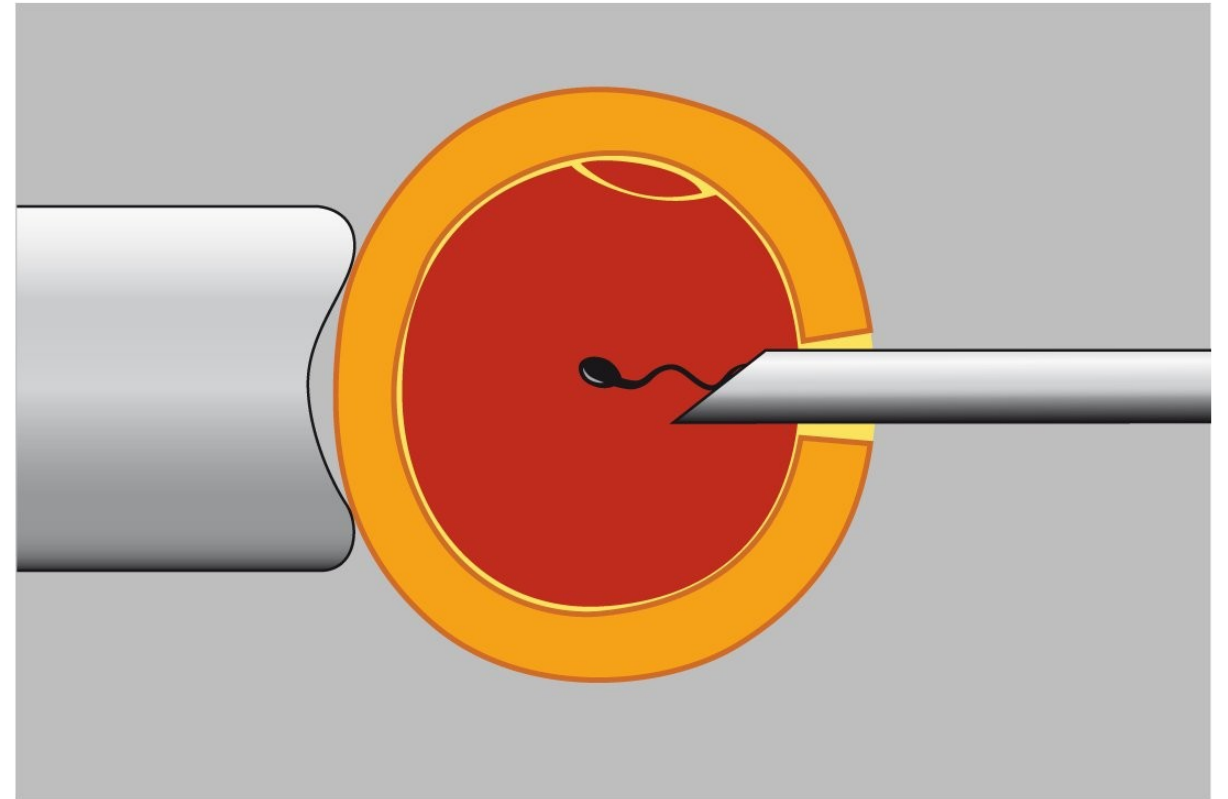




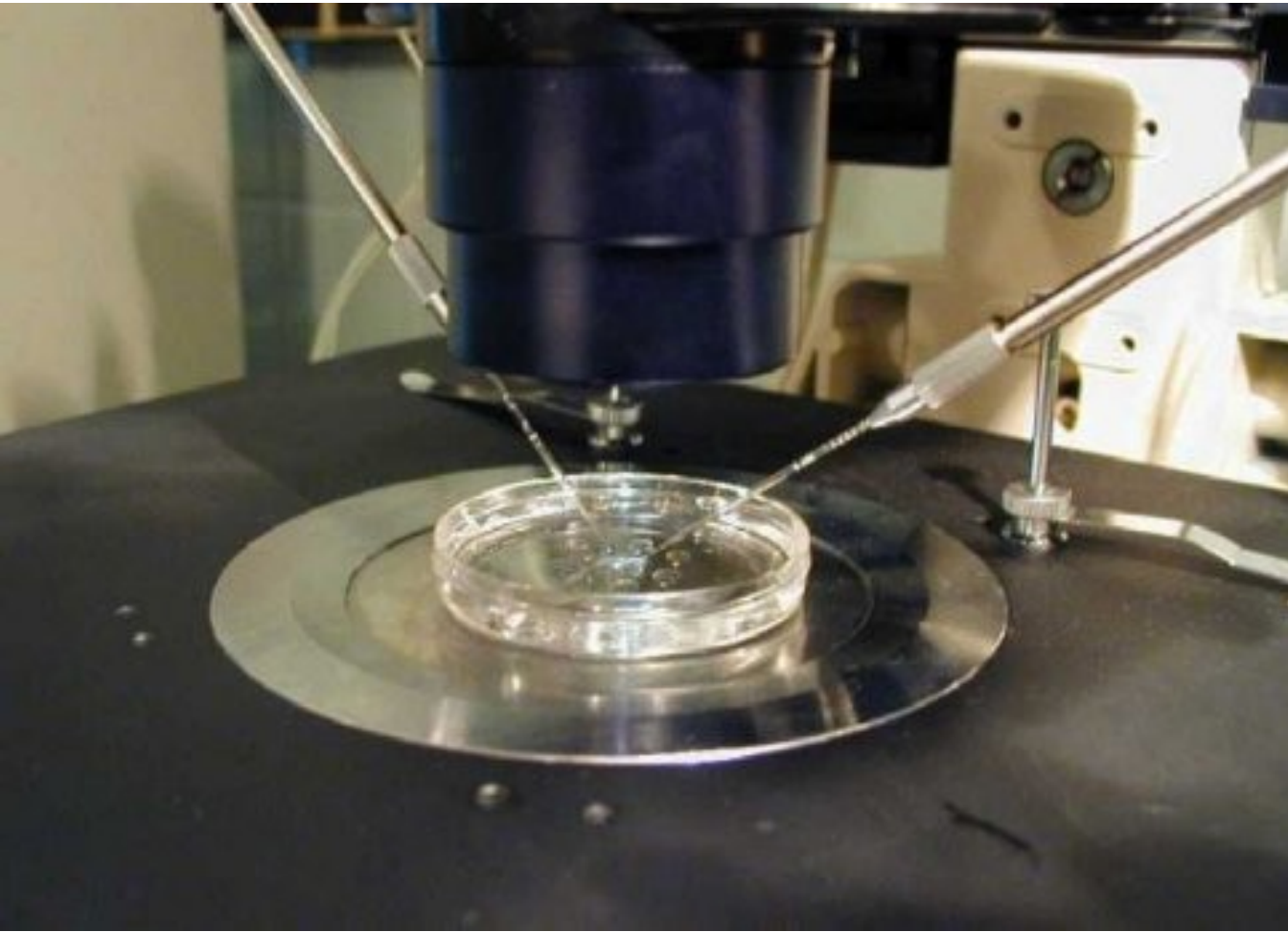
# Blastocyst



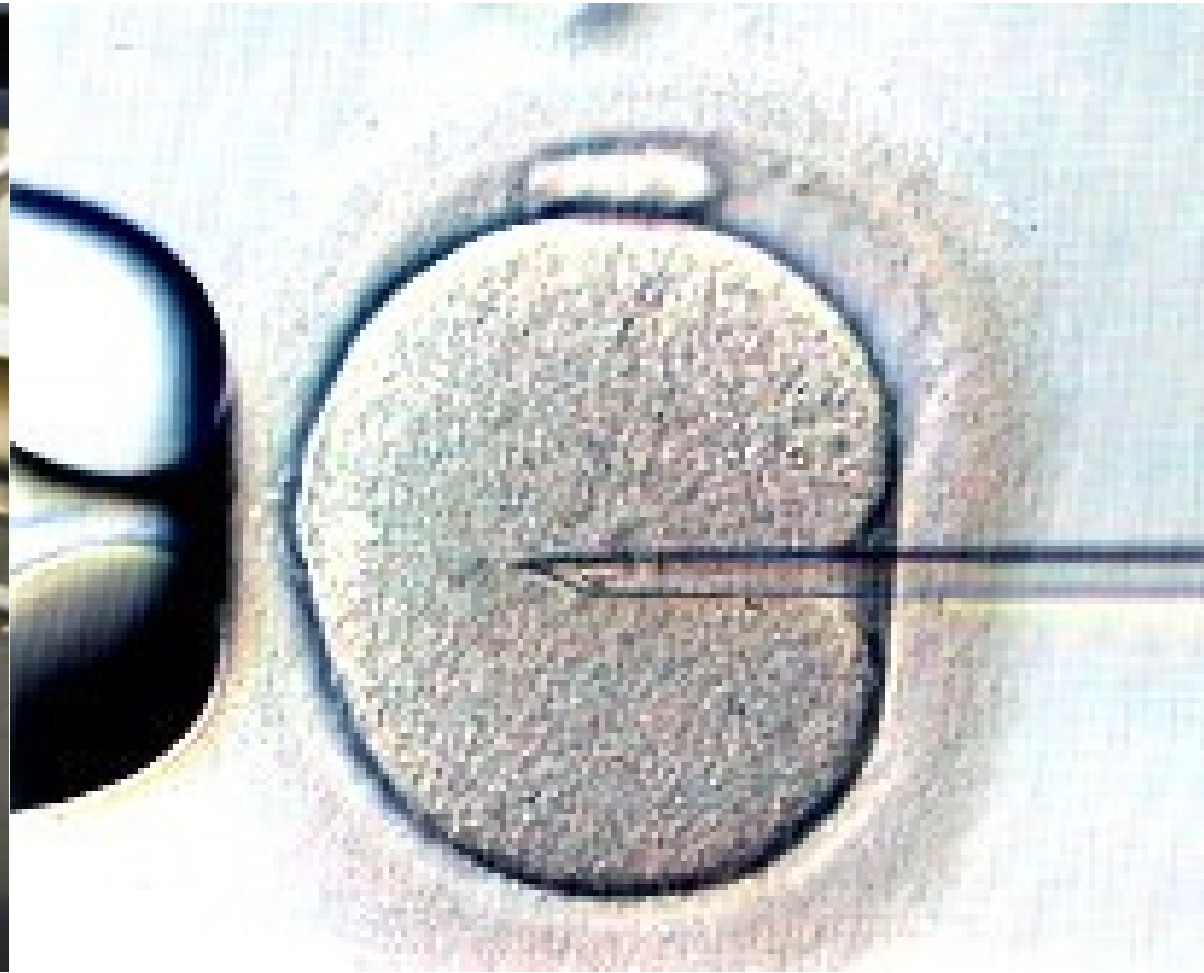
# ICSI



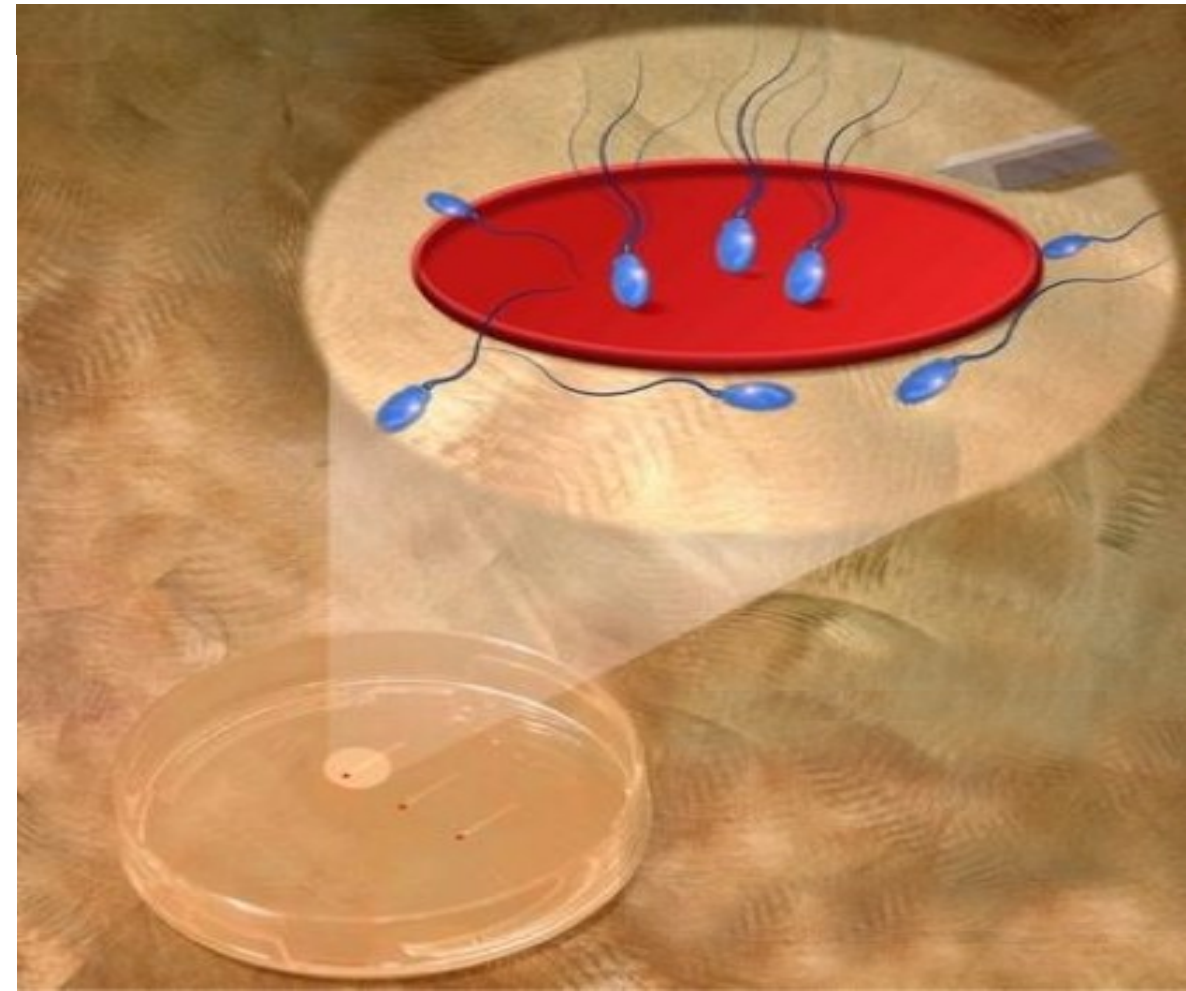
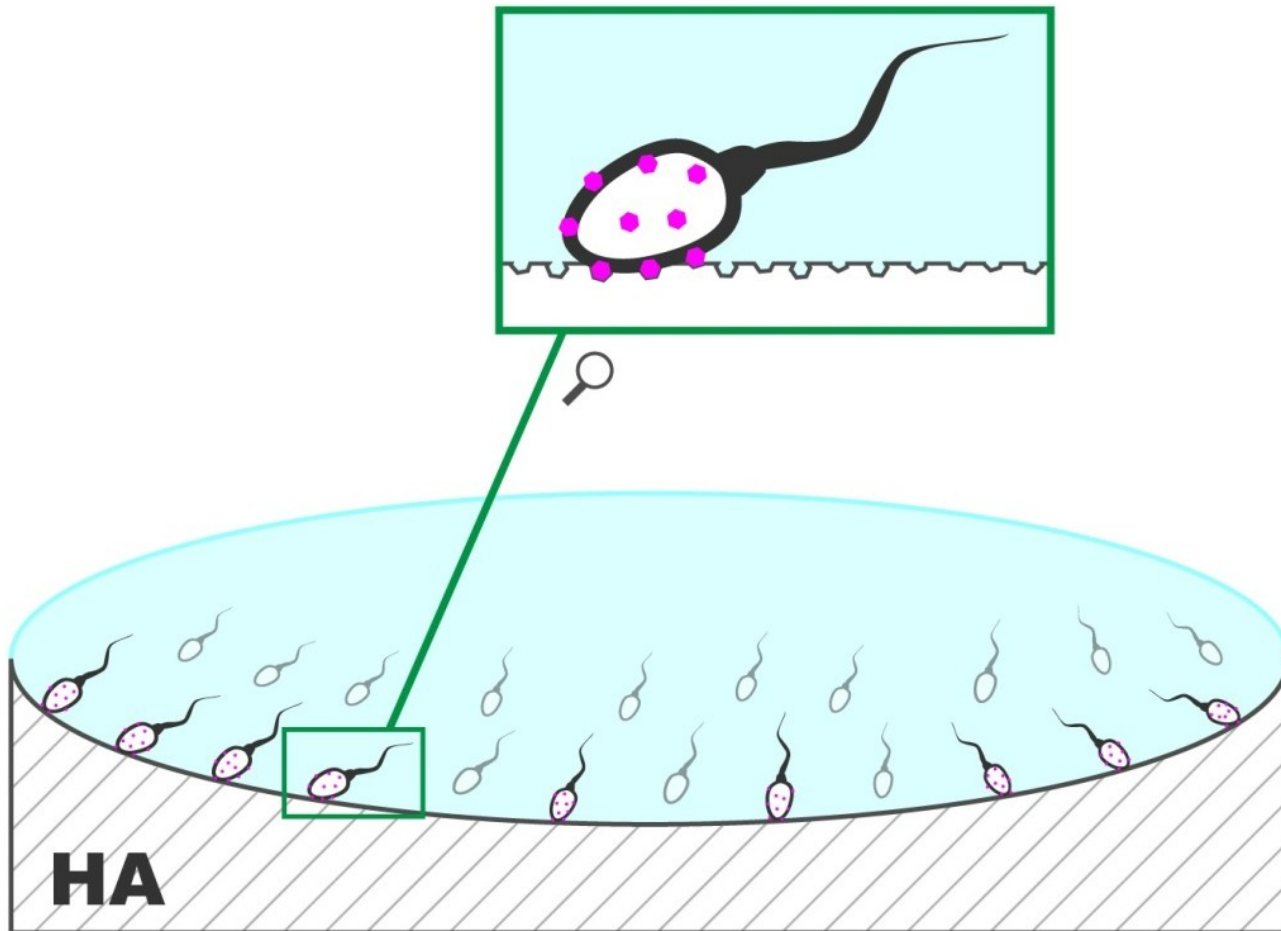
# Micromanipulation pipettes



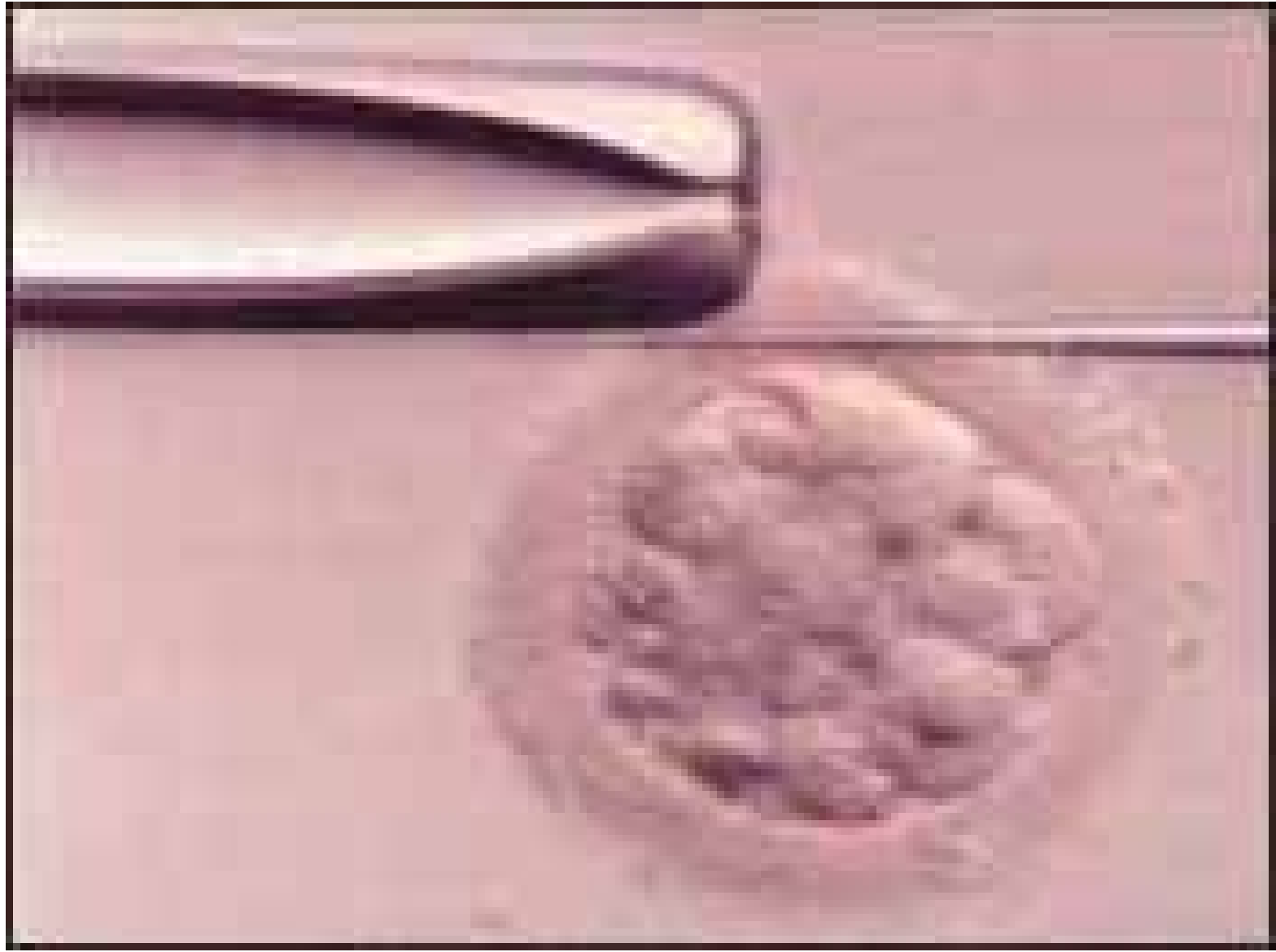
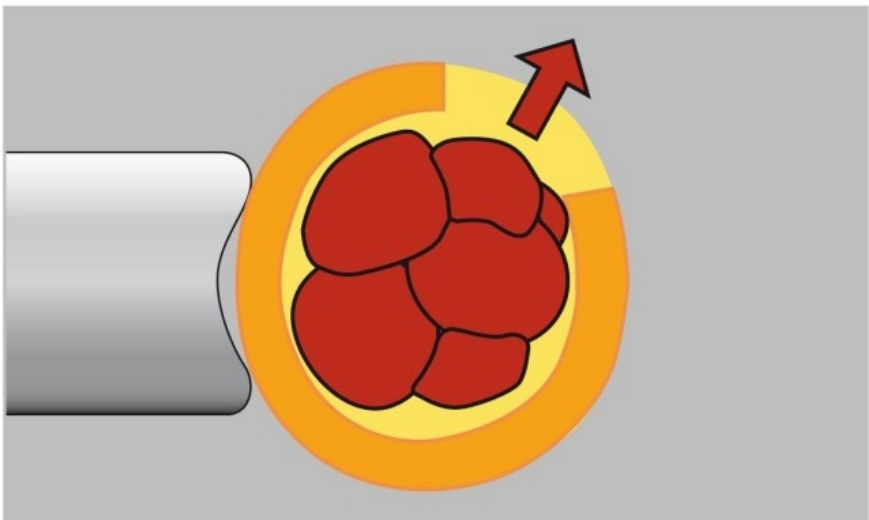
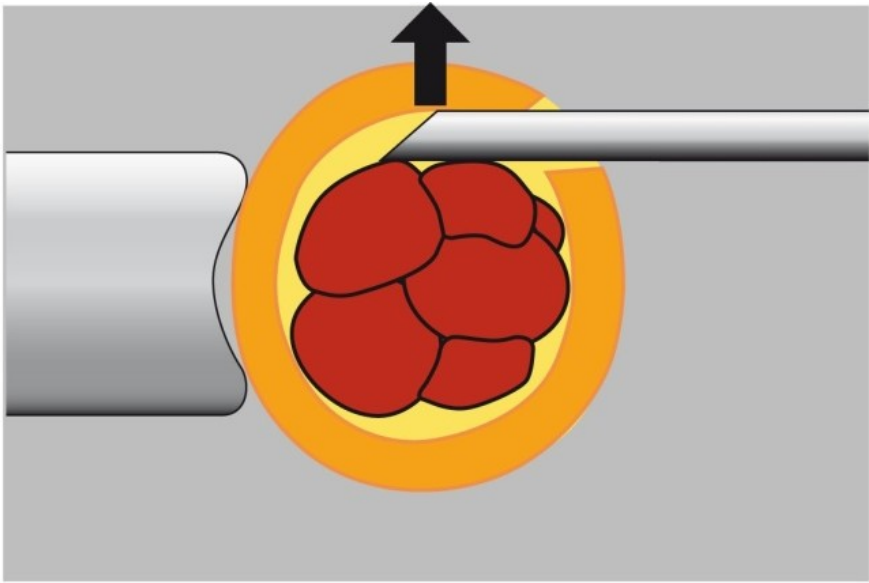
# ICSI



# Sperm selection – hyaluronan acid binding for PICSI

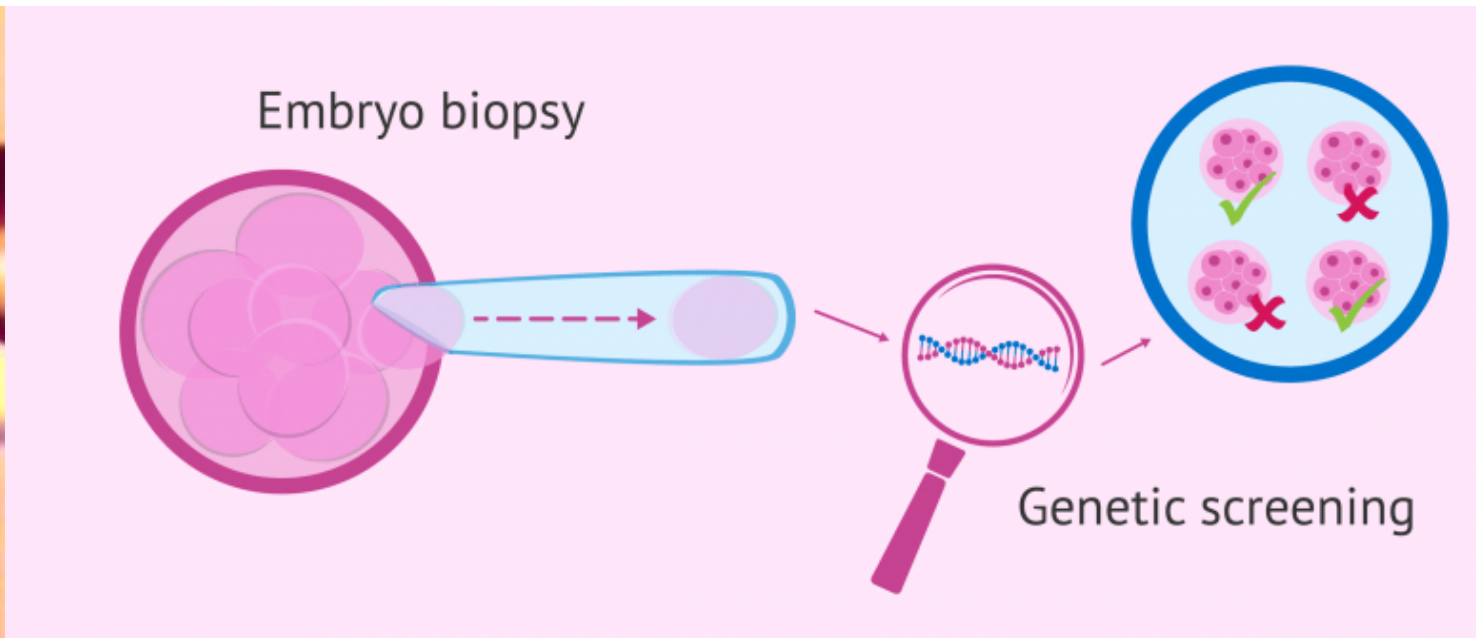
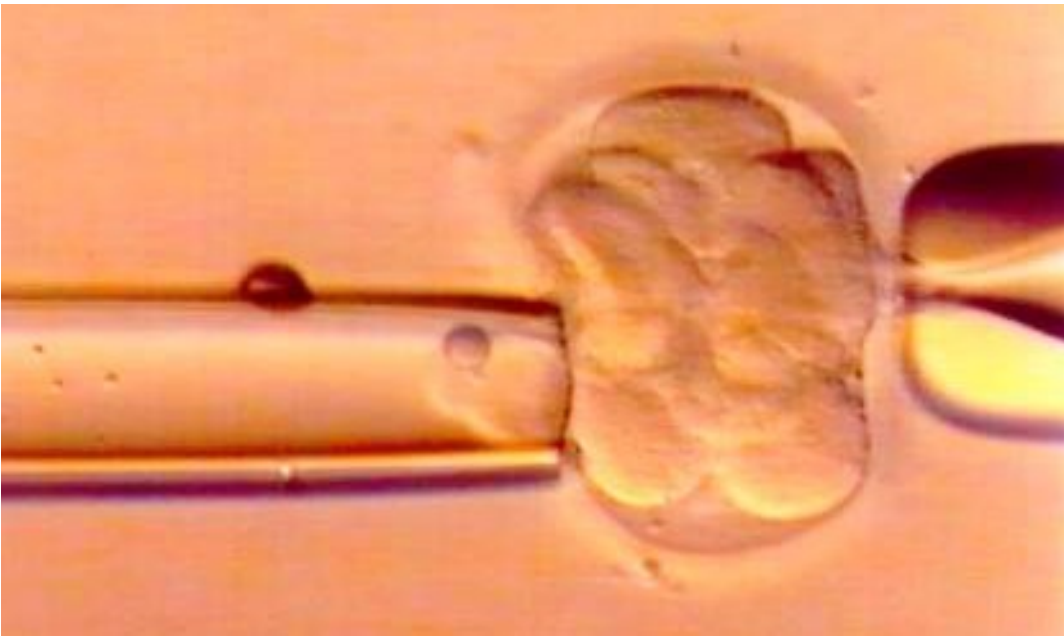


# Assisted hatching (AH)



# Pre-implantation diagnosis (PGD)

- the genetic profiling of embryos prior to implantation
- sampling on single cell taken from developing embryo
- usually takes place on the 5th day of the embryo's development



# Cryoconservation (cryopreservation)

- process of freezing and storing embryos
- providing an additional chance for pregnancy
- saving embryos before certain treatments



## Donor conception

- the eggs, sperm or embryos or both (double donation) from donors are used in order to conceive
- can be used in IUI or IVF
- donation is voluntary and anonymous
- some donor characteristics may be known (skin hair and eye color) – try to find the best match

# Surrogacy

- arrangement, whereby a woman (the surrogate mother) agrees to bear a child for another person or person
- indications: abnormal uterus, post hysterectomy, congenital malformation of uterus, history of multiple miscarriages, (same sex couple)

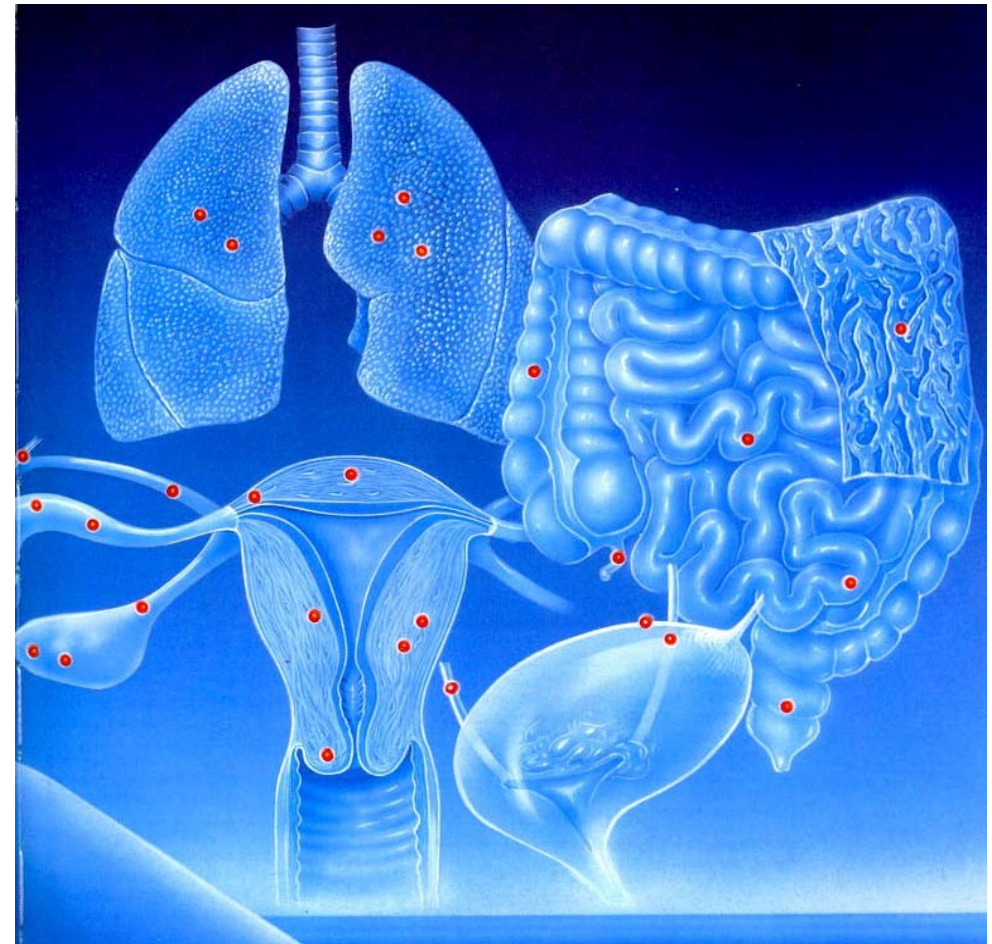


## Endometriosis

- The presence of **endometrial tissue in an abnormal anatomical location** (out of uterus)
- Endometrial tissue **respond to menstrual cycle** hormones, and bleed during the menstrual cycle
- between 6 and 10 percent of women of reproductive age worldwide
- Lot of theories of etiology (metaplastic, Sampson's retrograde menstruation theory, and many others)

## Localisation of endometriosis

<b>Sacrouterine ligg.</b>	<b>63 %</b>
<b>Ovary</b>	<b>56 %</b>
<b>C.Douglasi</b>	<b>25 %</b>
<b>Vesica ur.</b>	<b>20 %</b>
<b>Samps. Cyst</b>	<b>20 %</b>
<b>Broad ligament</b>	<b>8 %</b>
<b>Intestine</b>	<b>6 %</b>



## Risk factors

- **White race**
- **Early menarche**
- **Late menopause**
- **Nulliparity**
- **Obesity**
- **Short menstrual cycle**
- **Family history**

## Symptoms

- 20-25% of women are asymptomatic
- **Pelvic pain/chronic pelvic pain**
- **Dysmenorrhea**
- **Dyspareunia**
- Dysuria
- Mittelschmerz – associated with ovulation
- **Infertility**
- diarrhoea/constipation
- Irregular/heavy period.....

## Diagnosis

- Ultrasound examination / expert US examination
- DGL
- MRI
- Biopsy/histopathology

## Therapy

- depends on: symptoms, age, fertility, stage, former therapy
- **Hormonal therapy:** COC, Progesterone, GnRH modulators
- NSAID
- **Surgery** – excision/resection endometrial endometriomas

**Thank you  
for your  
attention**



## Questions

**1. Normal sperm cell concentration is?**

- A) 20 mil./ml
- B) 40 mil./ml
- C) 15 mil./ml.
- D) 35 mil./ml.

**2. Ashenozoospermia means?**

- A) reduced concentration
- B) reduced sperm motility
- C) abnormal morphology
- D) absence of spermatozoa (motile sperm)
- E) complete lack of semen



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- A) reduced concentration (Oligozoospermia)
- B) reduced sperm motility**
- C) abnormal morphology (Teratozoospermia)
- D) absence of spermatozoa (motile sperm) (Azoospermia)
- E) complete lack of semen (Aspermia)

## Questions

**3. Which of the following does not belong to assisted reproduction methods?**

- A) Ovulation stimulation
- B) In-vitro fertilisation
- C) Surrogacy
- D) Vasectomy

**4. Infertility is ?**

- A) Failure to achieve a pregnancy after two years of regular unprotected intercourse
- B) Failure to achieve a pregnancy after 6 months of regular unprotected intercourse
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- B) SONO-Hysterosalpingography
- C) Curettage
- D) Diagnostic laparoscopy

**6. MESA is indicated for sperm retrieval in case of?**

- A) failure of TESA method
- B) occlusion between epididymis and urethra
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## Questions

**7. Which is the most common symptom of endometriosis?**

- A) missed periods
- B) rapid weight loss
- C) chronic pelvic pain
- D) vomiting

**8. Which of the following is not a risk factor for Endometriosis?**

- A) long menstrual cycle
- B) nulliparity
- C) late menopause
- D) early menarche

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