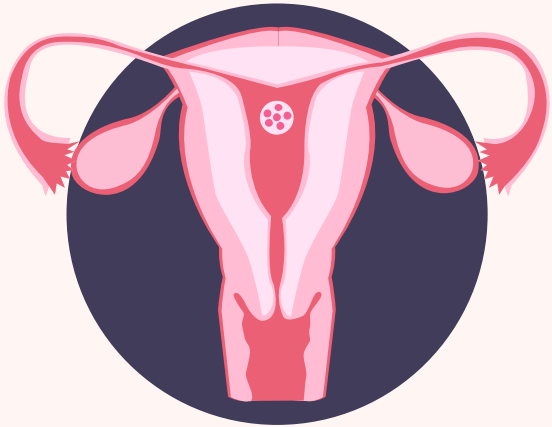
Varastegan Institute

Infertility and Its Treatment Methods



Presenter: Maedeh Zakeri
Supervisor: Dr. Hossein Javid

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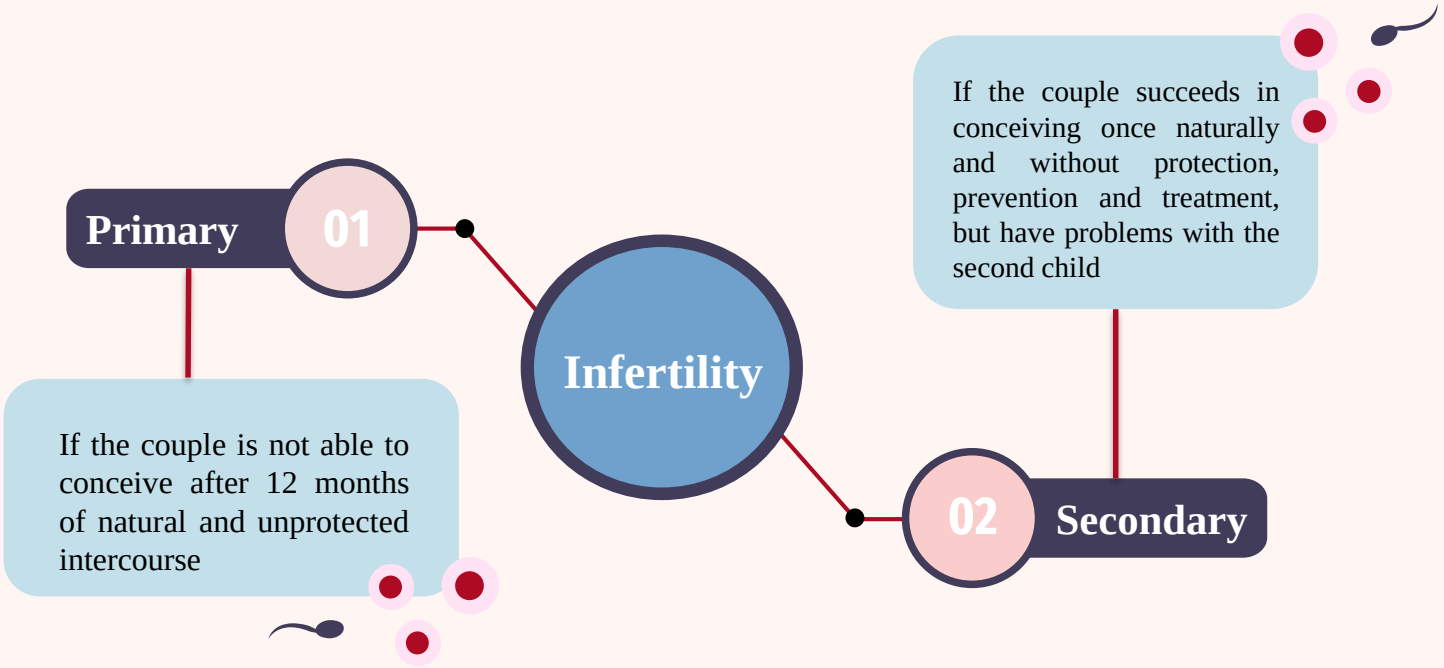
Abbreviations

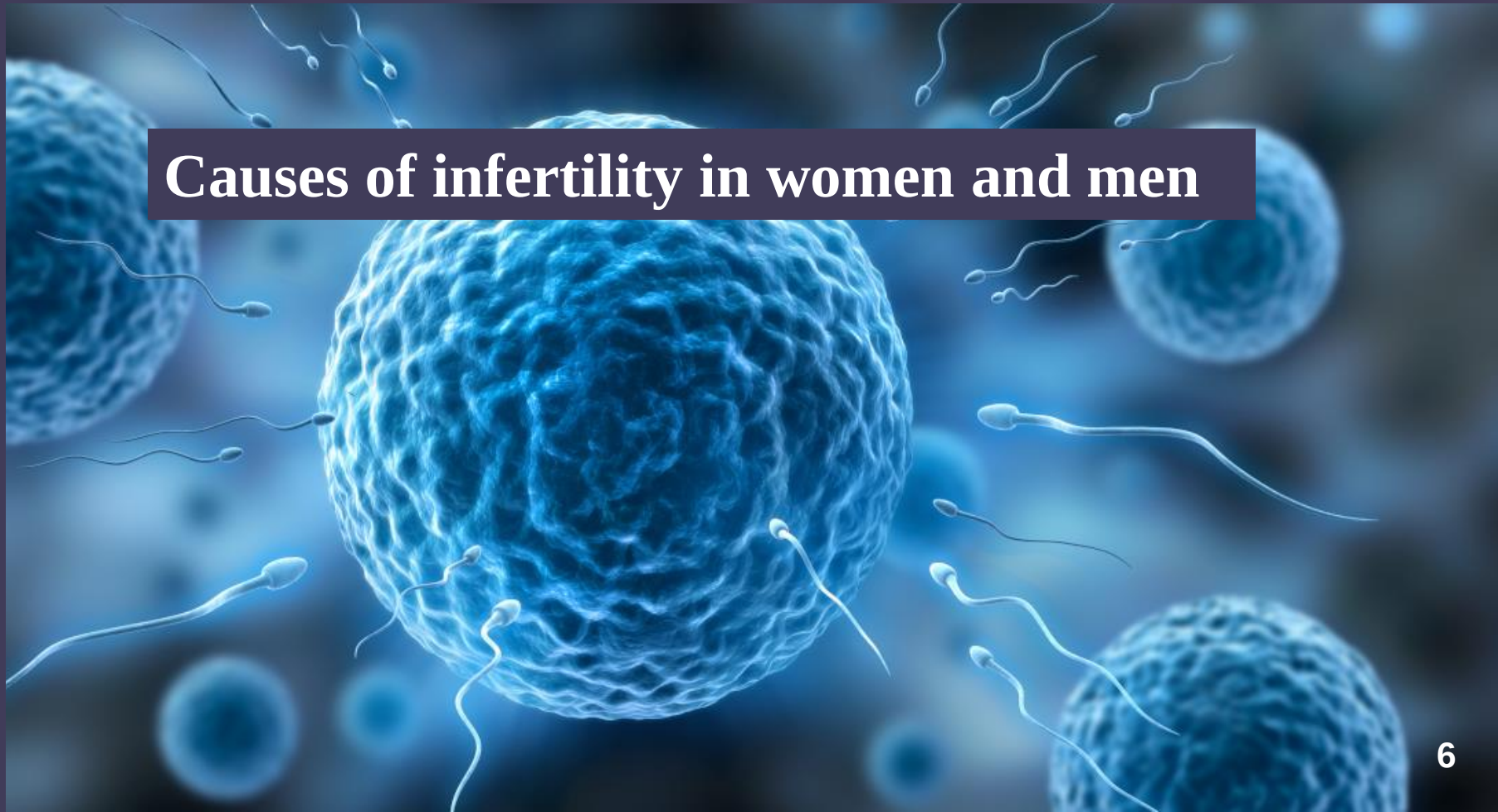
- **PCOS:** Polycystic Ovary Syndrome
- **CAH:** Congenital adrenal hyperplasia
- **IUI:** Intrauterine insemination
- **IVF:** In Vitro Fertilization
- **ICSI:** Intracytoplasmic sperm injection
- **GIFT:** Gamete intrafallopian transfer
- **ZIFT:** Zygote intrafallopian transfer
- **PCT:** Post coital test
- **GnRH:** Gonadotropin-releasing hormone

- **IVM:** In vitro maturation
- **MAR:** Mixed Antiglobulin Reaction
- **IBT:** Immunobead Binding Test
- **ELISA:** Enzyme-Linked Immunosorbent Assay
- **TAT:** Tray Agglutination Test
- **FCM:** Flow Cytometry
- **OHSS:** Ovarian hyperstimulation syndrome
- **LH:** Luteinizing Hormone
- **FSH:** Follicle-stimulating hormone

Introduction


Primary
01
If the couple is not able to conceive after 12 months of natural and unprotected intercourse
Infertility
If the couple succeeds in conceiving once naturally and without protection, prevention and treatment, but have problems with the second child
02
Secondary

Causes of infertility in women and men



Female

01 Age: >35

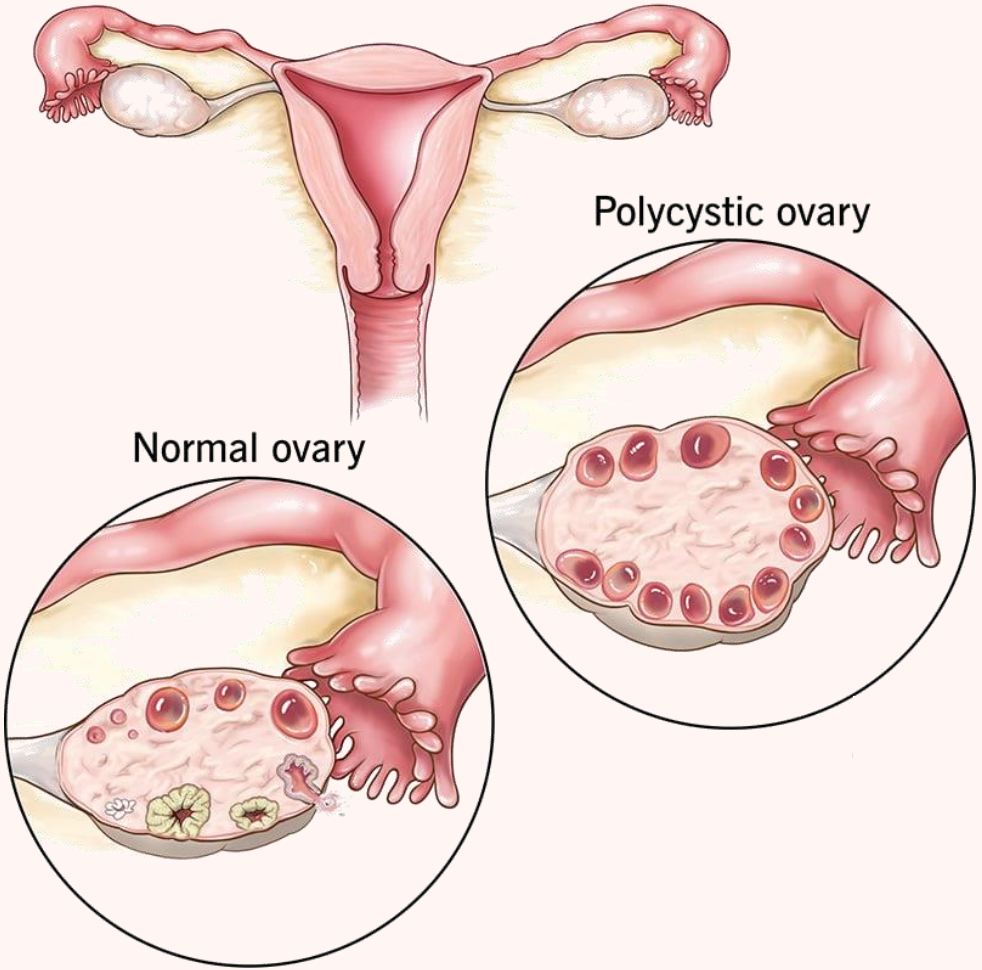
02 Ovulation disorders
PCOS

03 Hormonal disorders

04 Uterine abnormalities

05 Endometriosis

06 Premature ovarian failure


Polycystic ovary
Normal ovary

Female

01 Age: >35

02 Ovulation disorders
PCOS

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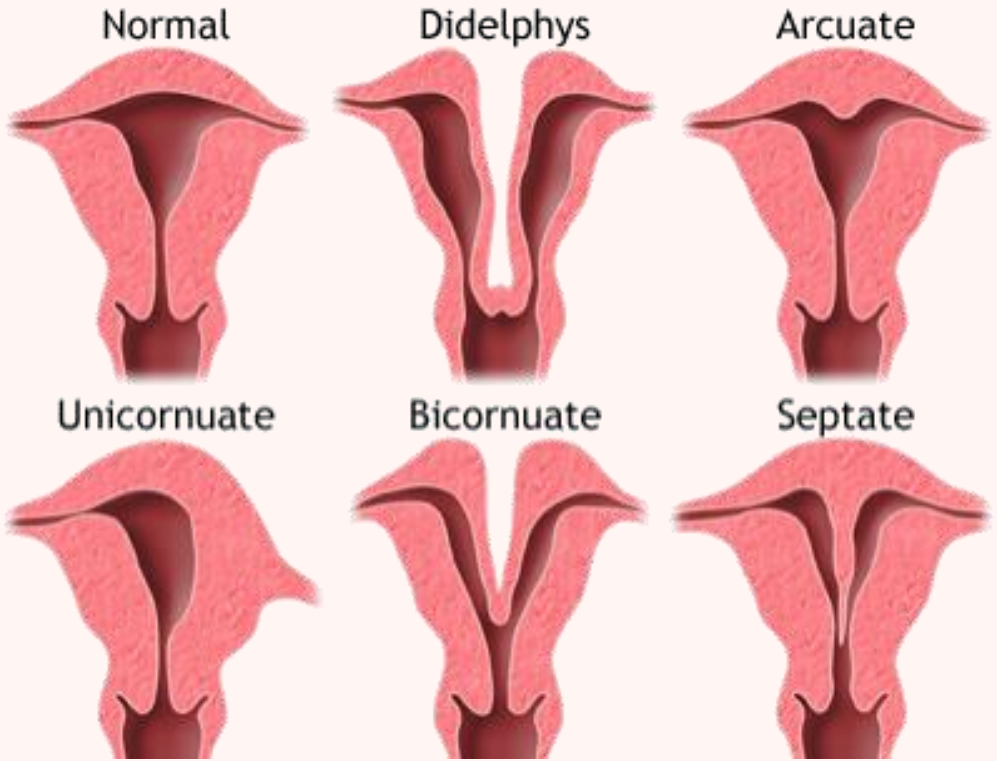
04 Uterine abnormalities

05 Endometriosis

06 Premature ovarian failure


Normal
Didelphys
Arcuate
Unicornuate
Bicornuate
Septate

Female

01 Age: >35

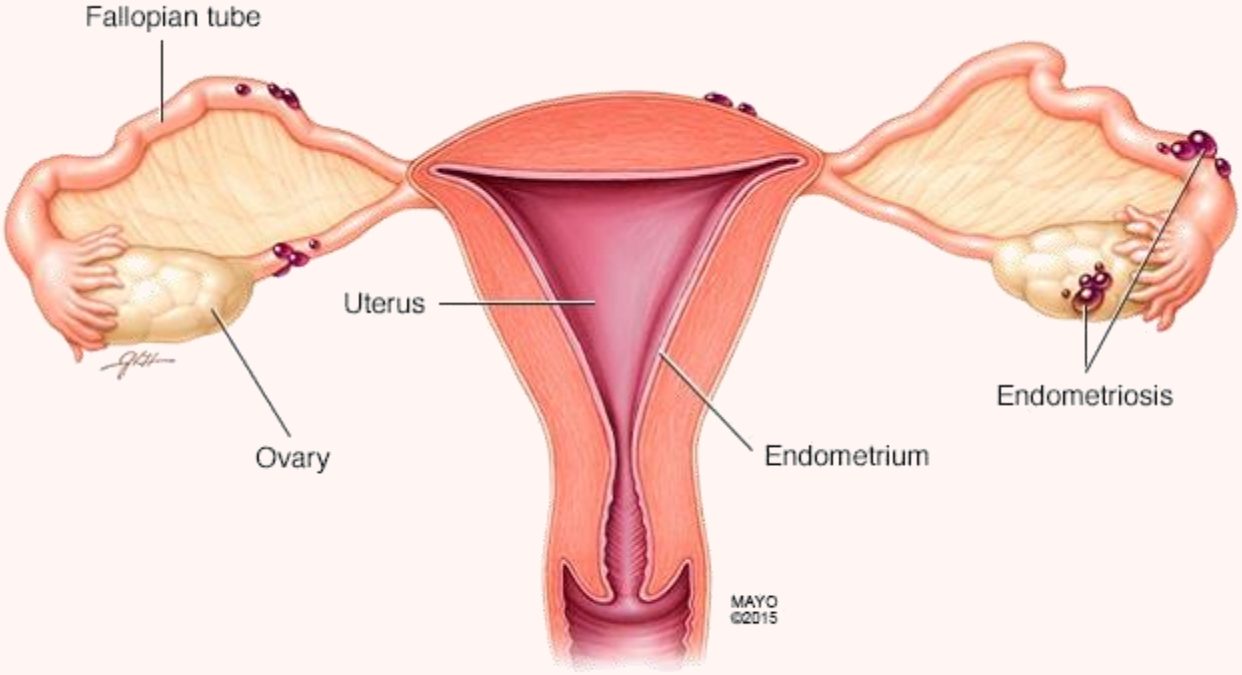
02 Ovulation disorders
PCOS

03 Hormonal disorders

04 Uterine abnormalities

05 Endometriosis

06 Premature ovarian failure


Fallopian tube
Uterus
Ovary
Endometrium
Endometriosis
MAYO
©2015

Female

01 Age: 35<

02 Ovulation disorders
PCOS

03 Hormonal disorders

04 Uterine abnormalities

05 Endometriosis

06 Premature ovarian failure

Male

Hormonal disorders

GnRH
LH, FSH
Testosterone
Prolactin
CAH

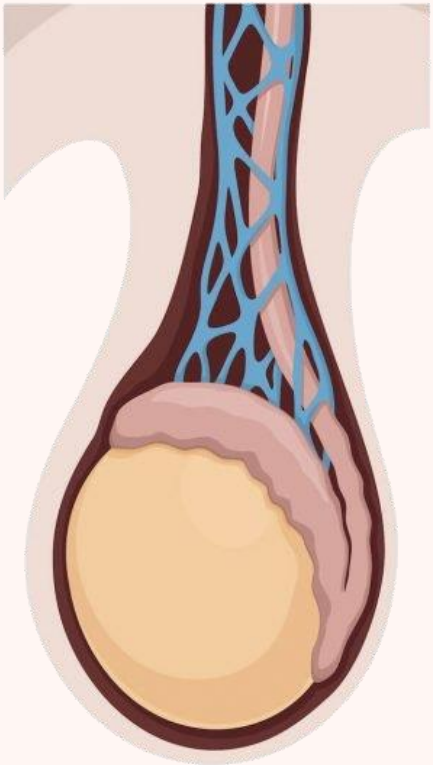
Psychological behavioral problems

erectile dysfunction
premature ejaculation
Incompetence of ejaculation

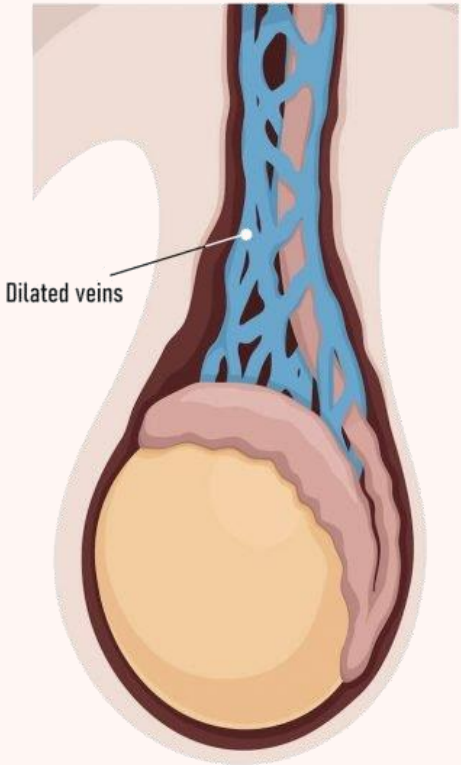
Physical problems

Age
obesity
Smoking
varicocele
Damaged sperm duct
Testicular torsion
retrograde ejaculation

NORMAL



VARICOCELE



Male

Hormonal disorders

GnRH
LH, FSH
Testosterone
Prolactin
CAH

Psychological behavioral problems

erectile dysfunction
premature ejaculation
Incompetence of ejaculation

Physical problems

Age
obesity
Smoking
varicocele
Damaged sperm duct
Testicular torsion
retrograde ejaculation

Infertility treatment methods

01

drug therapy

The first line of treatment

02

IUI

Intrauterine Insemination

03

IVF

In Vitro Fertilization

04

IVM

In Vitro Maturation

05

GIFT

Gamete Intrafallopian Transfer

06

ZIFT

Zygote Intrafallopian Transfer

07

ICSI

Intracytoplasmic Sperm Injection

08

Hatching

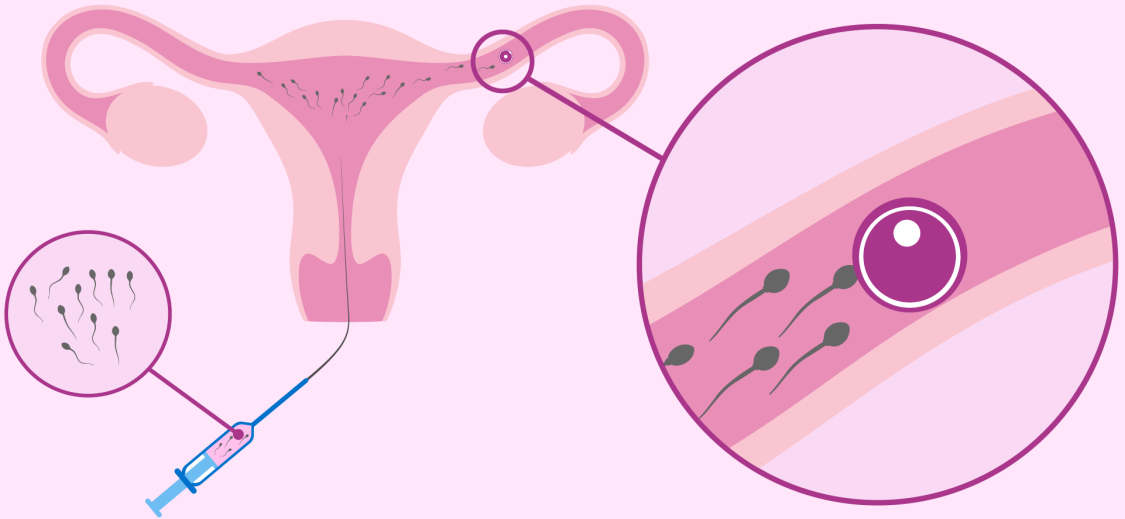
Assisted Hatching

drug therapy

1. The first line of infertility treatment
2. Hormonal imbalance or reduction of body hormones
3. Clomiphene citrate, Letrozol, Menotropin, Metformin, Bromocriptine, L-Carnitine, L-Arginine

IUI

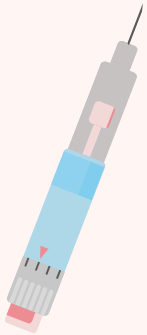
Intrauterine Insemination

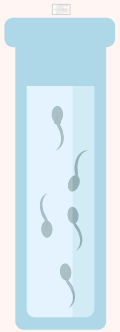


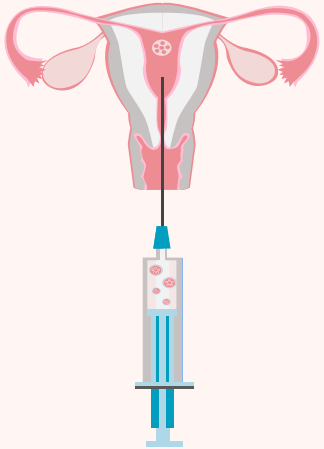
Who is IUI for?

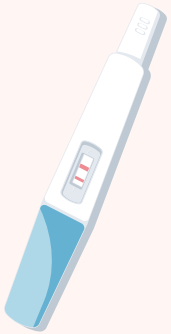
- Unexplained Infertility
- Cervical mucus problem → PCT (post coital test)
- Problems with ovulation
- Anti sperm Antibodies → IgA →
  - ✓ **IBT:** Immunobead Binding Test
  - ✓ **MAR:** Mixed Antiglobulin Reaction
  - ✓ **ELISA:** Enzyme-Linked Immunosorbent Assay
  - ✓ **TAT:** Tray Agglutination Test
  - ✓ **FCM:** Flow Cytometry
  - ✓ Radioactive agglutinin
  - ✓ Immobilization of sperm
- Male subfertility
- Erectile dysfunction
- Retrograde ejaculation

Intrauterine Insemination

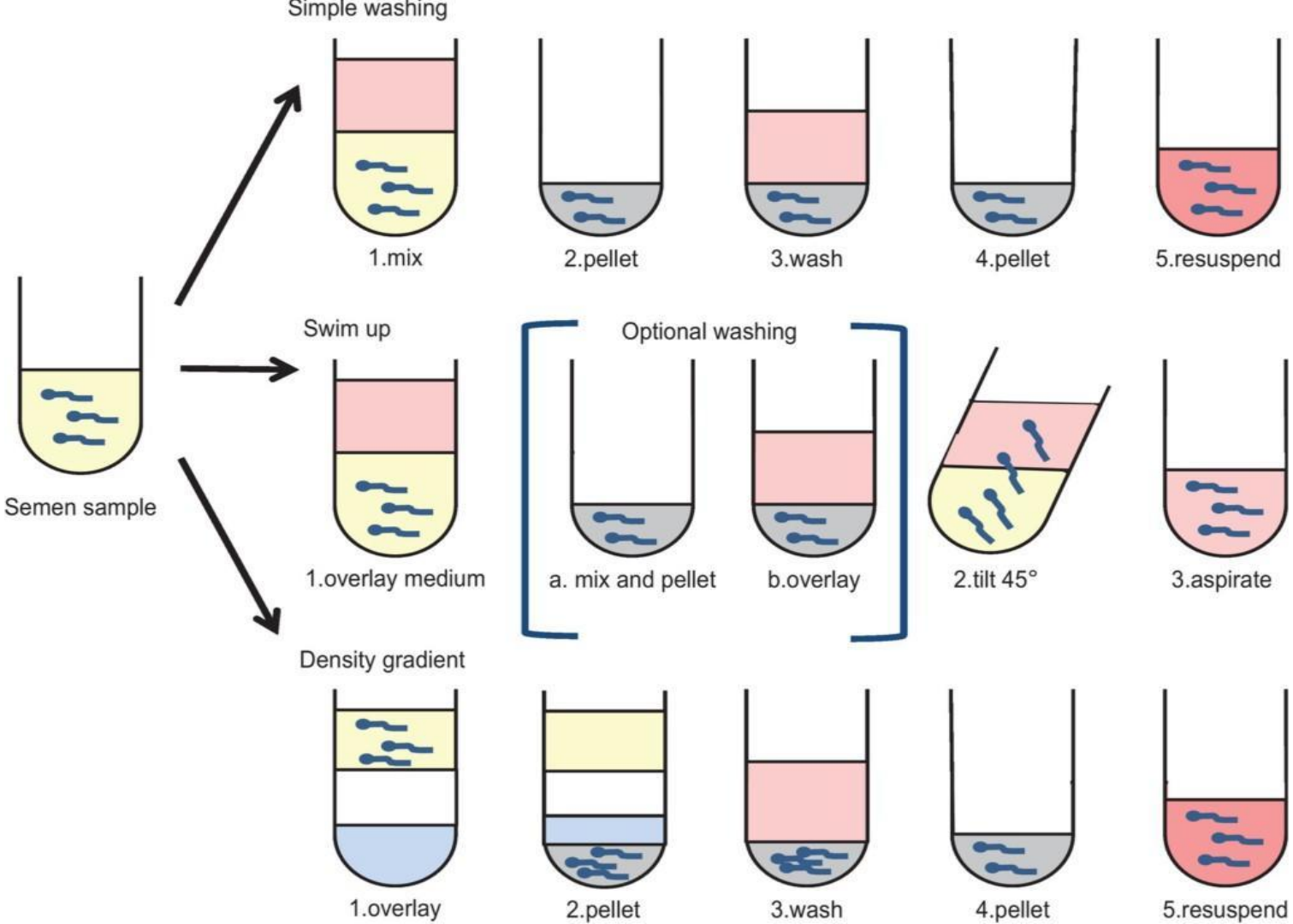




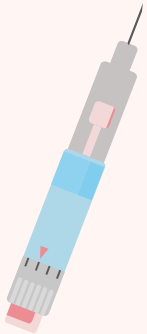


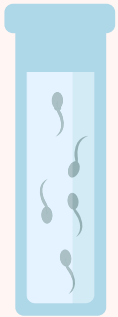


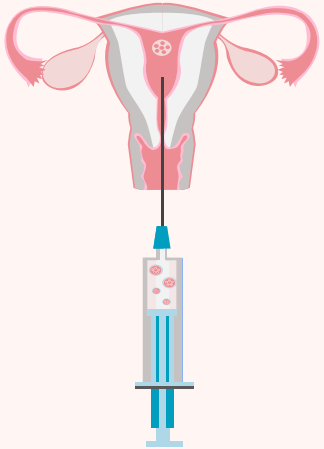
Step1	Step2	Step3	Step4	Step5
Ovarian stimulation hormone therapy	Determine the time of ovulation	Sperm preparation	Sperm insemination	pregnancy test

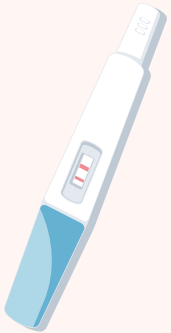

Simple washing
1.mix
2.pellet
3.wash
4.pellet
5.resuspend
Semen sample
Swim up
1.overlay medium
Optional washing
a. mix and pellet
b.overlay
2.tilt 45°
3.aspirate
Density gradient
1.overlay
2.pellet
3.wash
4.pellet
5.resuspend

Intrauterine Insemination

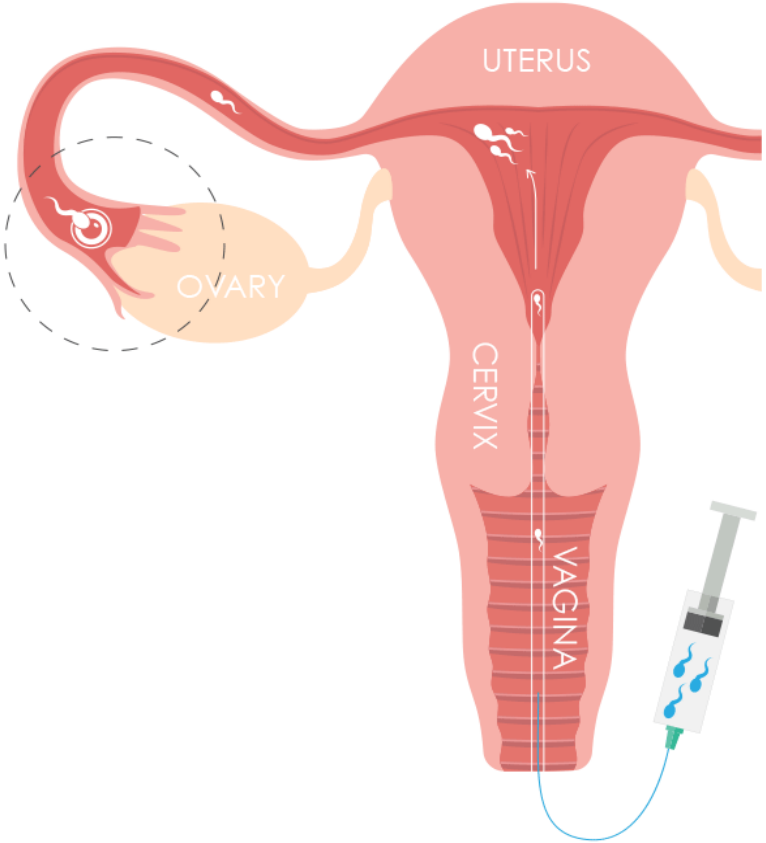


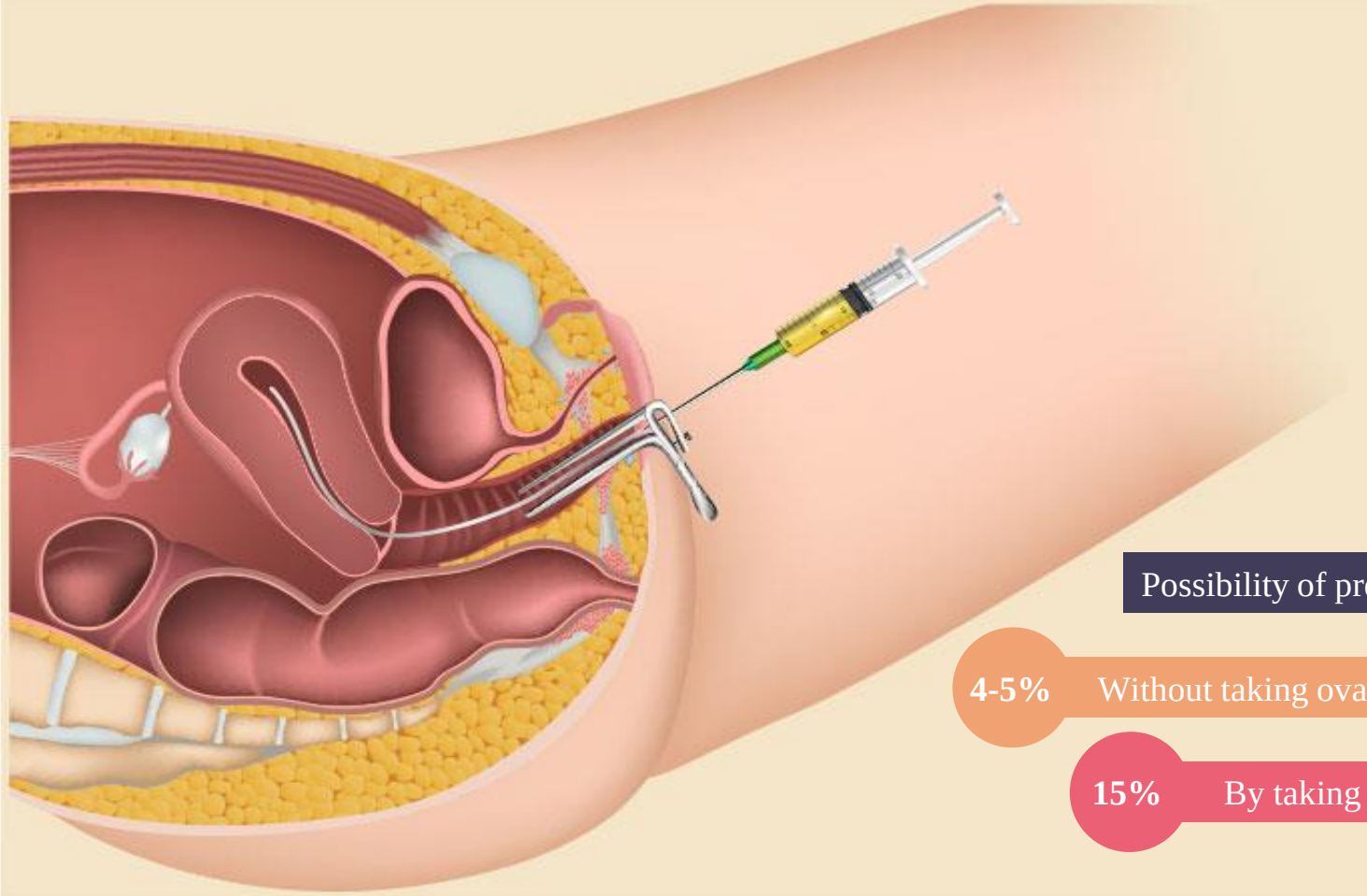






Step1	Step2	Step3	Step4	Step5
Ovarian stimulation hormone therapy	Determine the time of ovulation	Sperm preparation	Sperm insemination	pregnancy test


UTERUS
OVARY
CERVIX
VAGINA



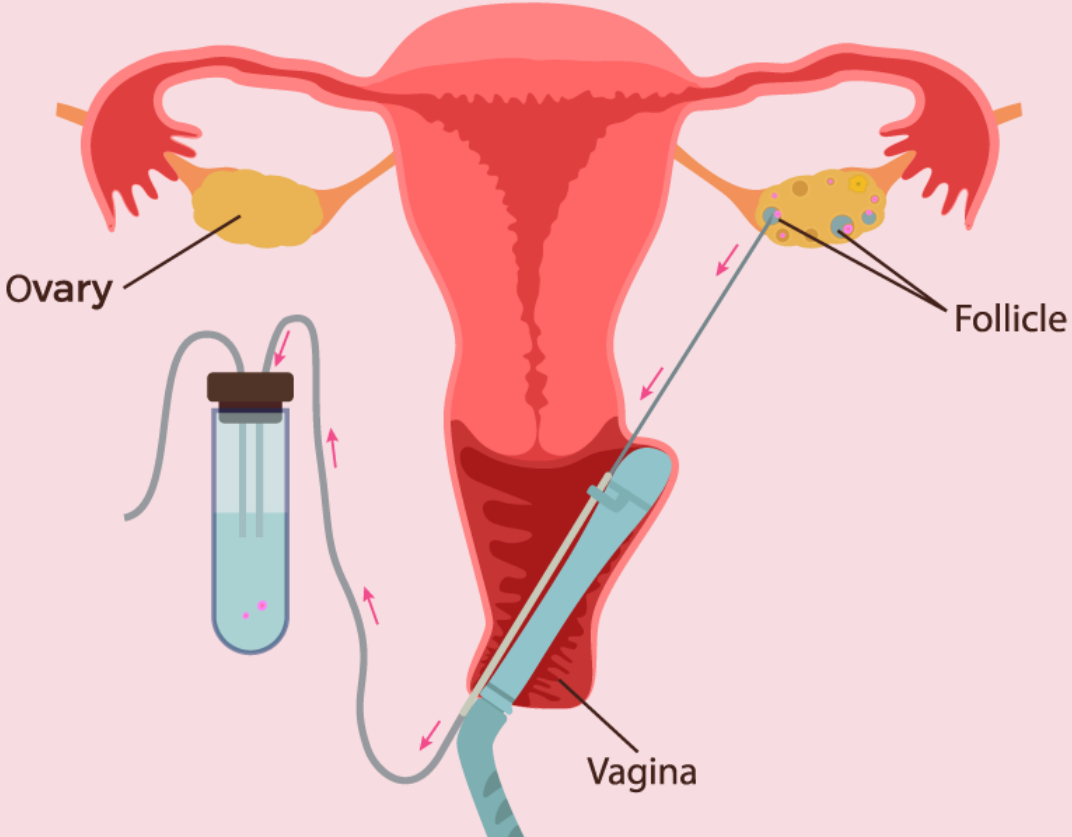
Possibility of pregnancy with IUI:

4-5% Without taking ovarian stimulating drugs

15% By taking ovarian stimulating drugs

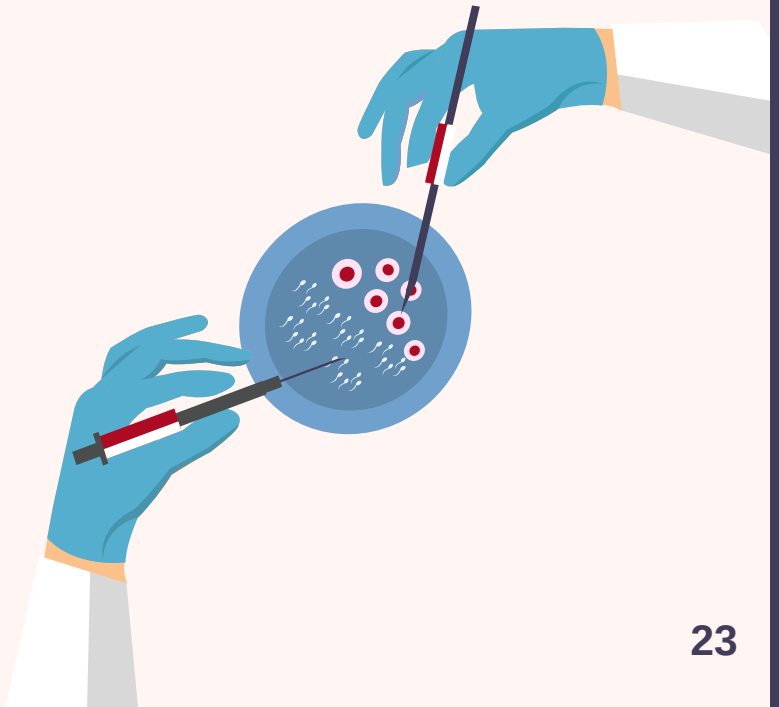
IVF

In Vitro Fertilization

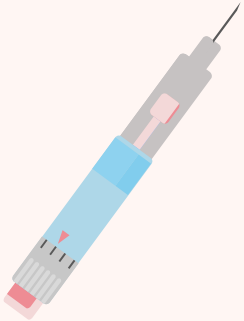


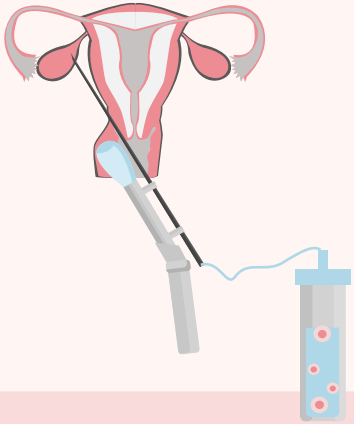
Who is IVF for?

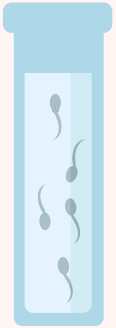
- Endometriosis
- Genetic abnormalities
- Drainage and removal of fallopian tubes
- Presence of antibodies against egg or sperm
- Obstruction or damage to the fallopian tubes
- The inability of sperm to survive inside the cervix
- Ovulation disorders due to premature menopause



In Vitro Fertilization - Part I







Step1

Ovarian stimulation
hormone therapy

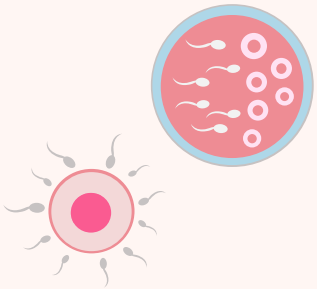
Step2

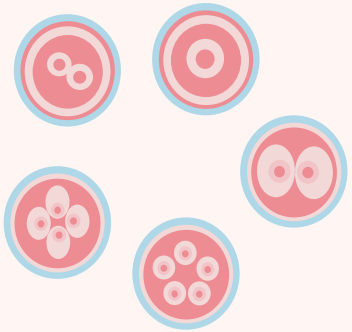
Egg pick up

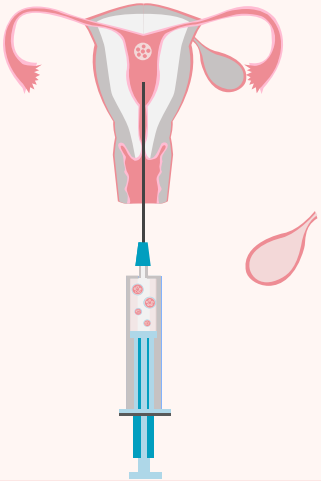
Step3

Sperm preparation

In Vitro Fertilization - Part II







Step 4

Egg fertilization

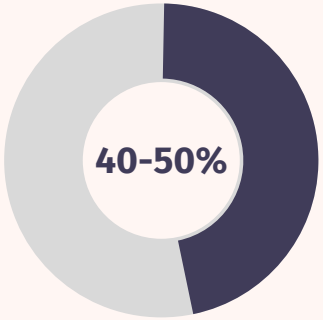
Step 5

Embryo development

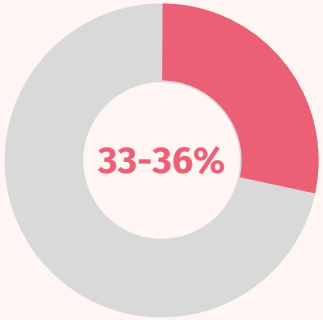
Step 6

Embryo transfer

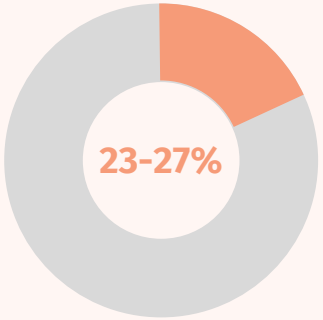
Probability of IVF success:



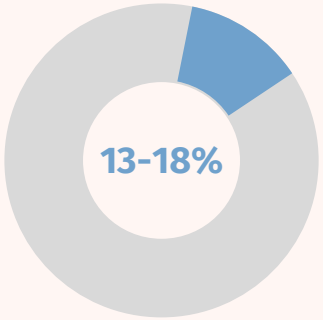
Age: <35



Age: 35-37



Age: 38-40

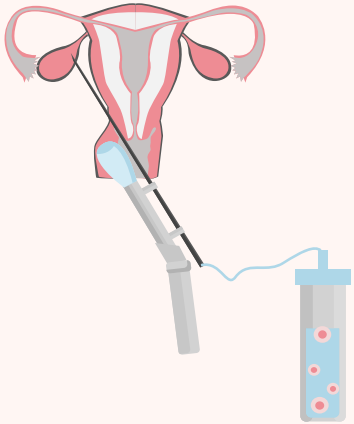


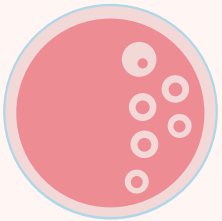
Age: >40

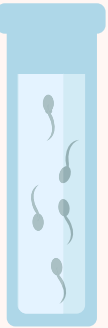
IVM

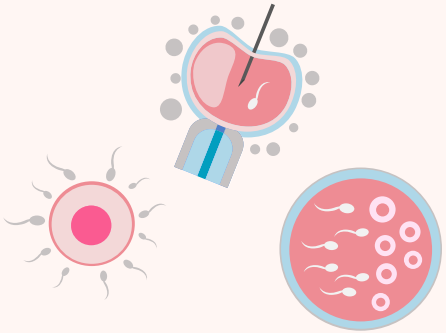
In Vitro Maturation

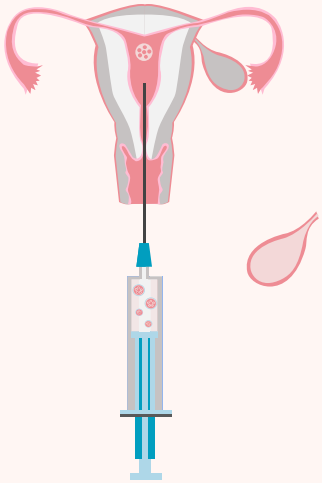
In Vitro Maturation



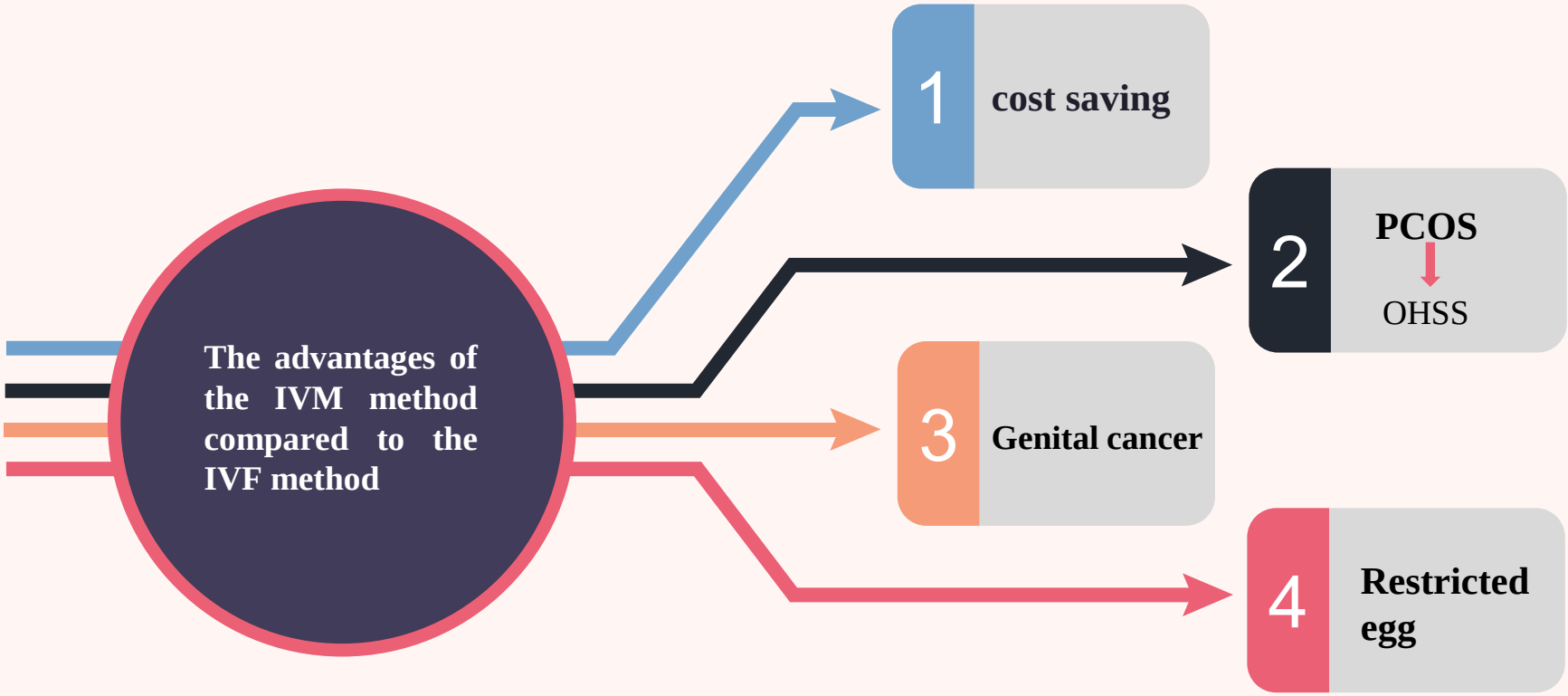


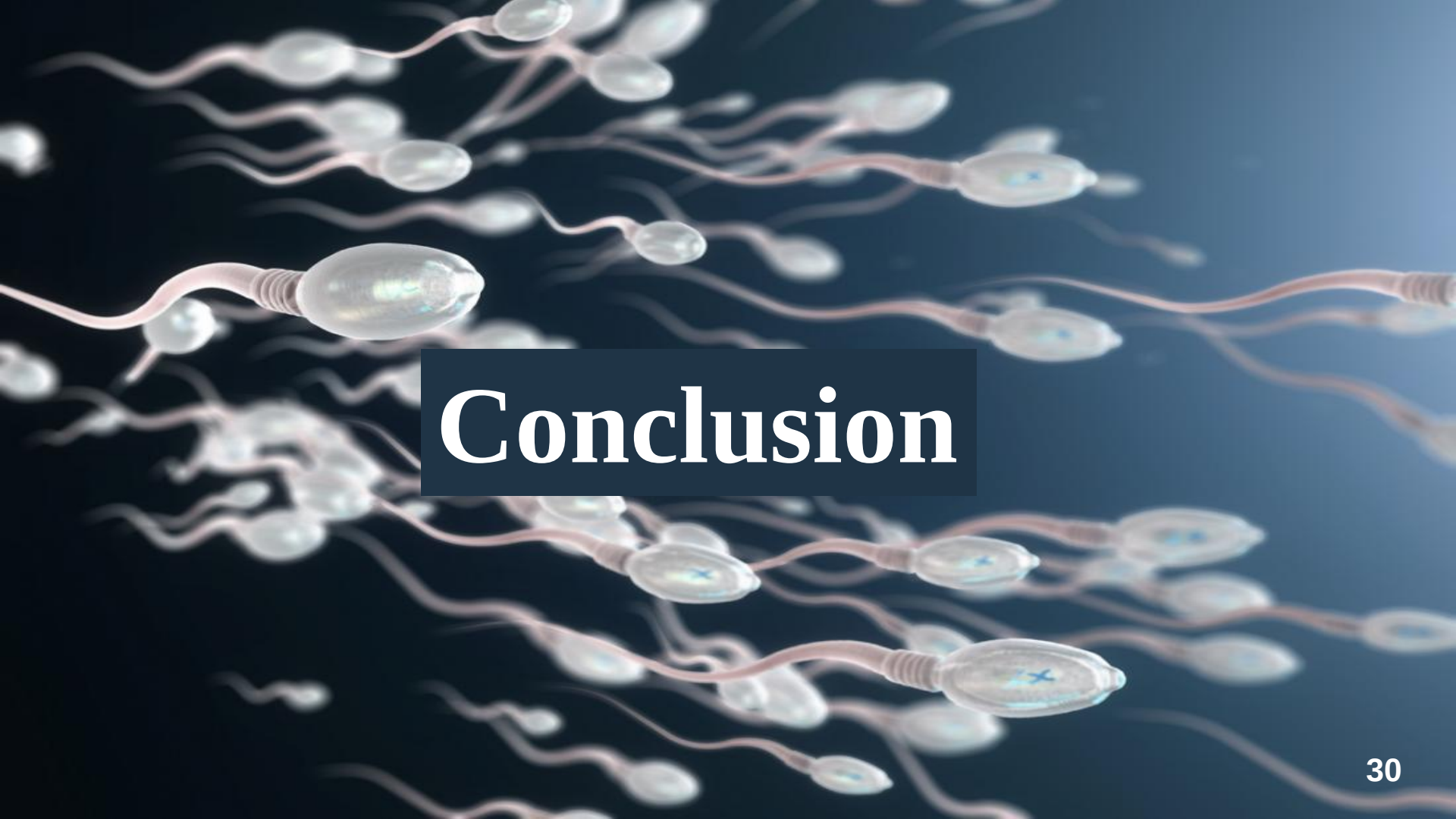






Step1	Step2	Step3	Step4	Step5
Immature egg pick up	Maturation of eggs	Sperm preparation	Egg fertilization	Embryo transfer


The advantages of the IVM method compared to the IVF method
1
cost saving
2
PCOS
OHSS
3
Genital cancer
4
Restricted egg



Conclusion

Alternative methods for treating infertility:

1. Donated embryo
2. Egg donation
3. Donated sperm
4. Surrogate uterus

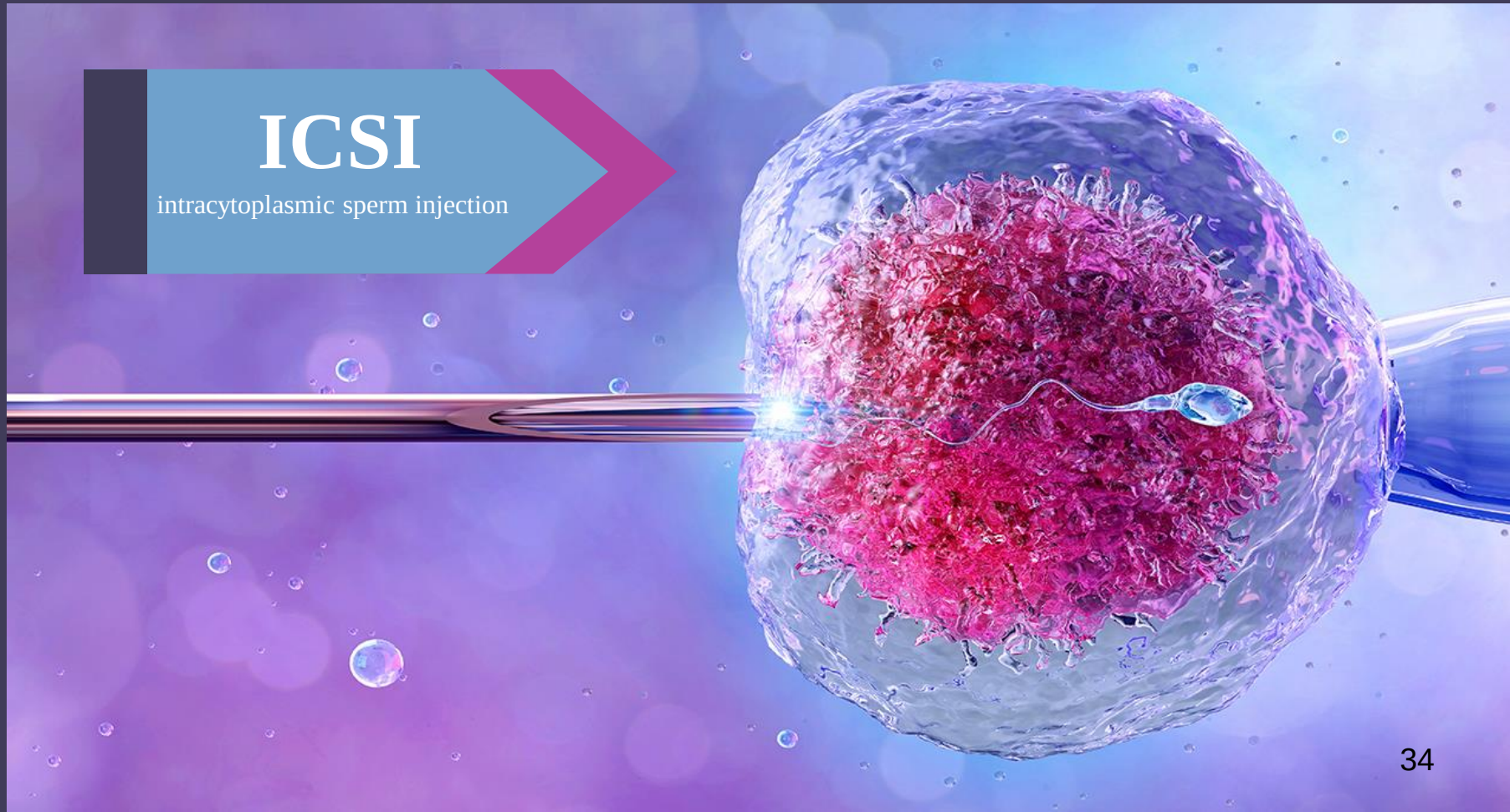
Refrences

- Abdullah KA, Atazhanova T, Chavez-Badiola A, Shivhare SB. Automation in ART: paving the way for the future of infertility treatment. Reproductive Sciences. 2022 Aug 3:1-1.
- Costello M, Garad R, Hart R, Homer H, Johnson L, Jordan C, Mocanu E, Qiao J, Rombauts L, Teede HJ, Vanky E. A review of first line infertility treatments and supporting evidence in women with polycystic ovary syndrome. Medical Sciences. 2019 Sep 10;7(9):95.
- Carson SA, Kallen AN. Diagnosis and management of infertility: a review. Jama. 2021 Jul 6;326(1):65-76.
- Lu X, Liu Y, Cao X, Liu SY, Dong X. Laser-assisted hatching and clinical outcomes in frozen-thawed cleavage-embryo transfers of patients with previous repeated failure. Lasers in Medical Science. 2019 Aug;34(6):1137-45.

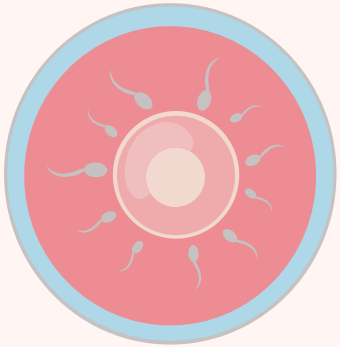

Thank you

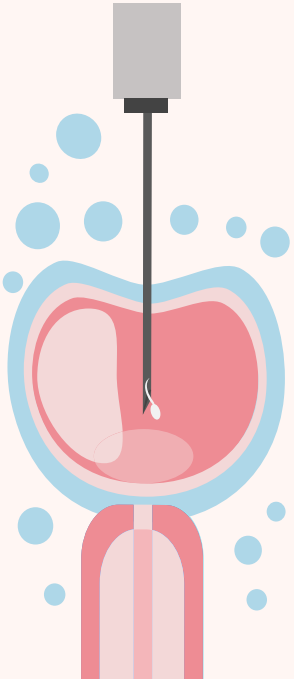
ICSI

intracytoplasmic sperm injection



The difference between IVF and ICSI:



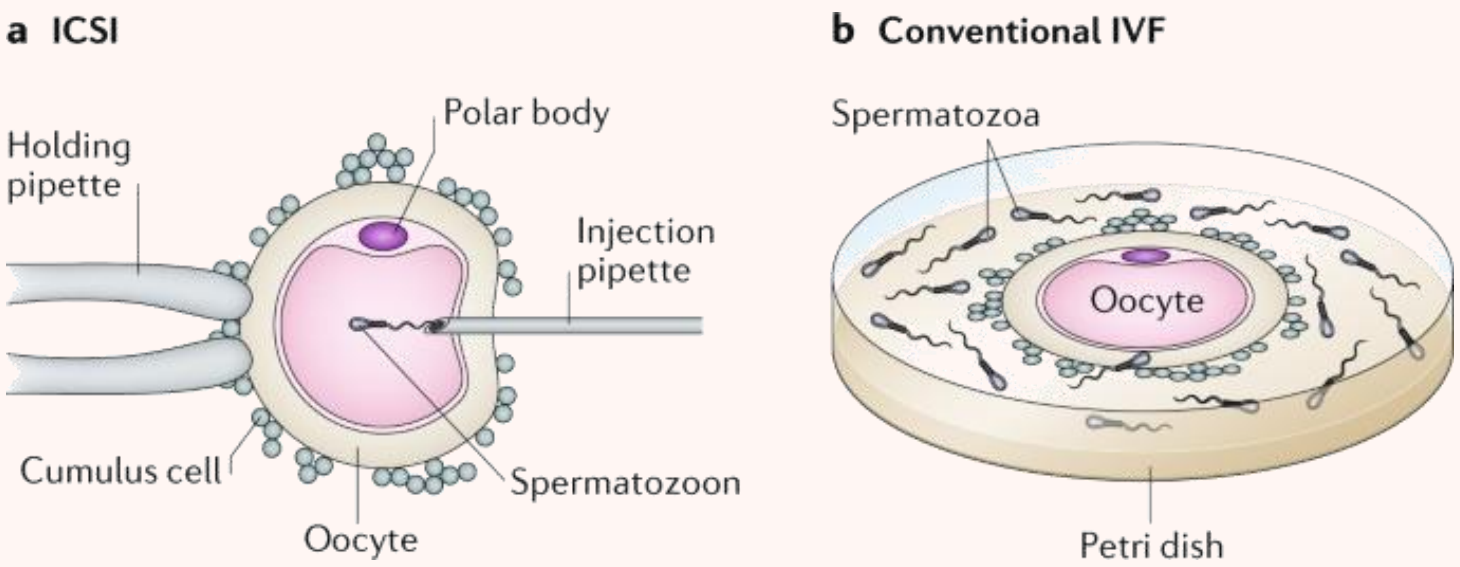


1

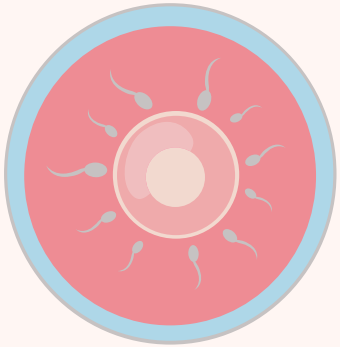
Fertilization type

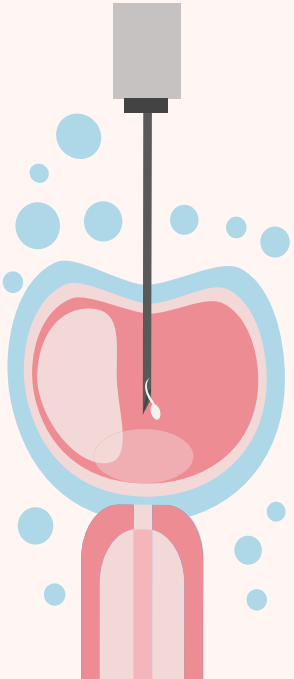
Sperm preparation method

2


a ICSI
Holding pipette
Polar body
Injection pipette
Cumulus cell
Spermatozoon
Oocyte
b Conventional IVF
Spermatozoa
Oocyte
Petri dish

The difference between IVF and ICSI:





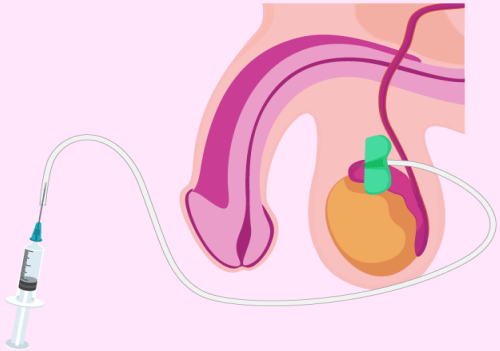
1

Fertilization type

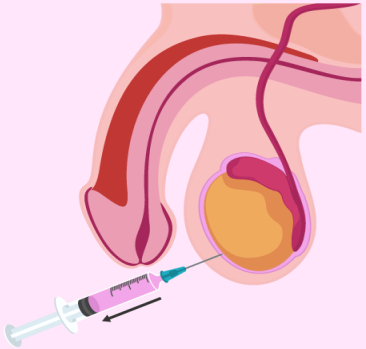
Sperm preparation method

2

Testicular biopsy

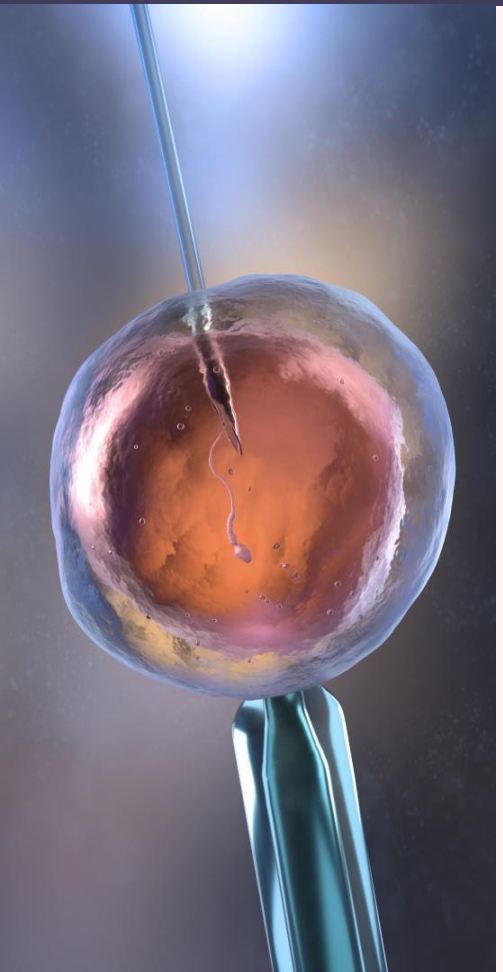


Epididymal aspiration



Testicular aspiration

Advantages



01

The possibility of using this method if there is even one healthy sperm in the man

02

Suitable for treating men with severe infertility and lack of sperm production

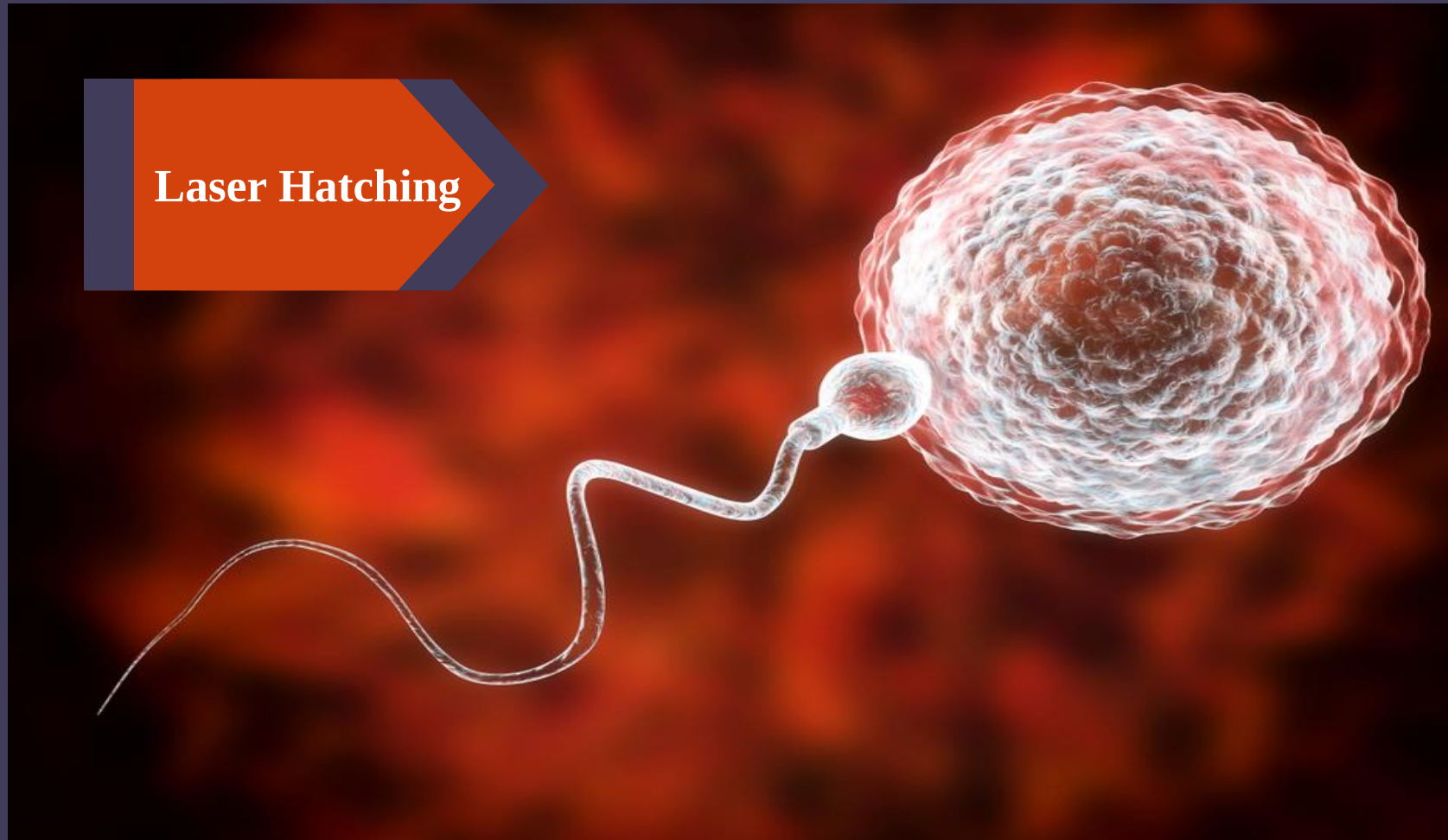
03

The possibility of microinjection in women without fallopian tubes

04

Increased chance of conception compared to IVF method

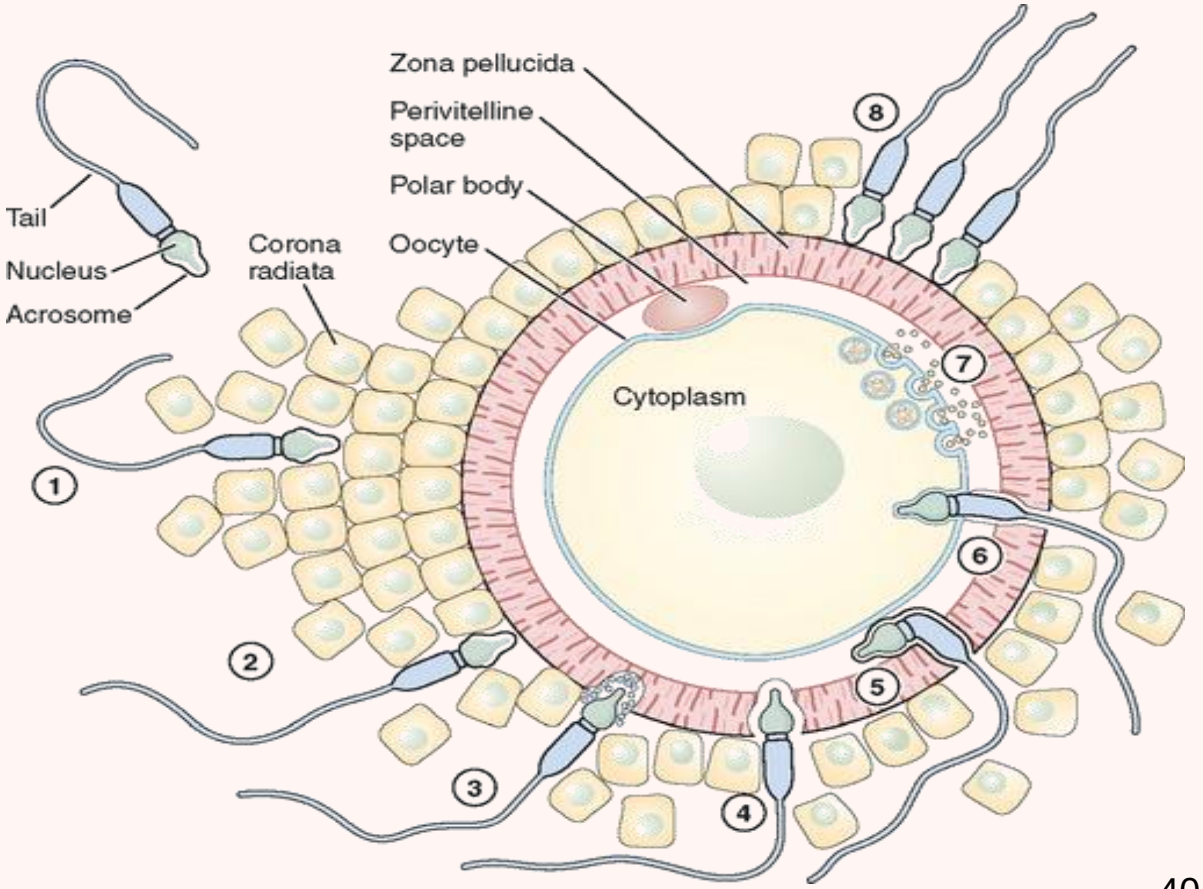
Laser Hatching

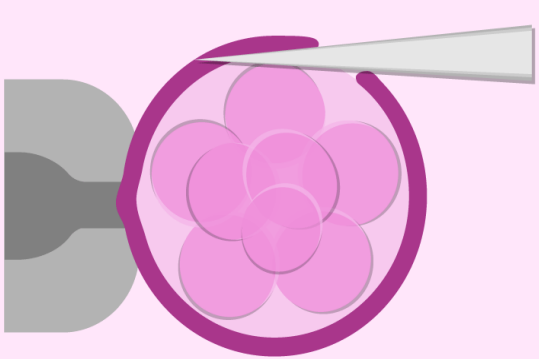


Age ↑

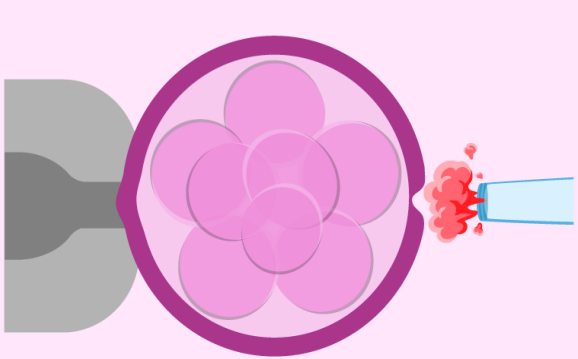
FSH ↑

The conditions of the cultivation environment

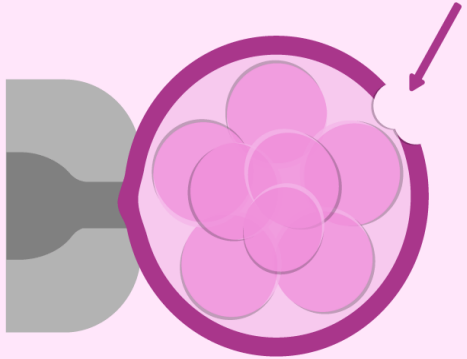




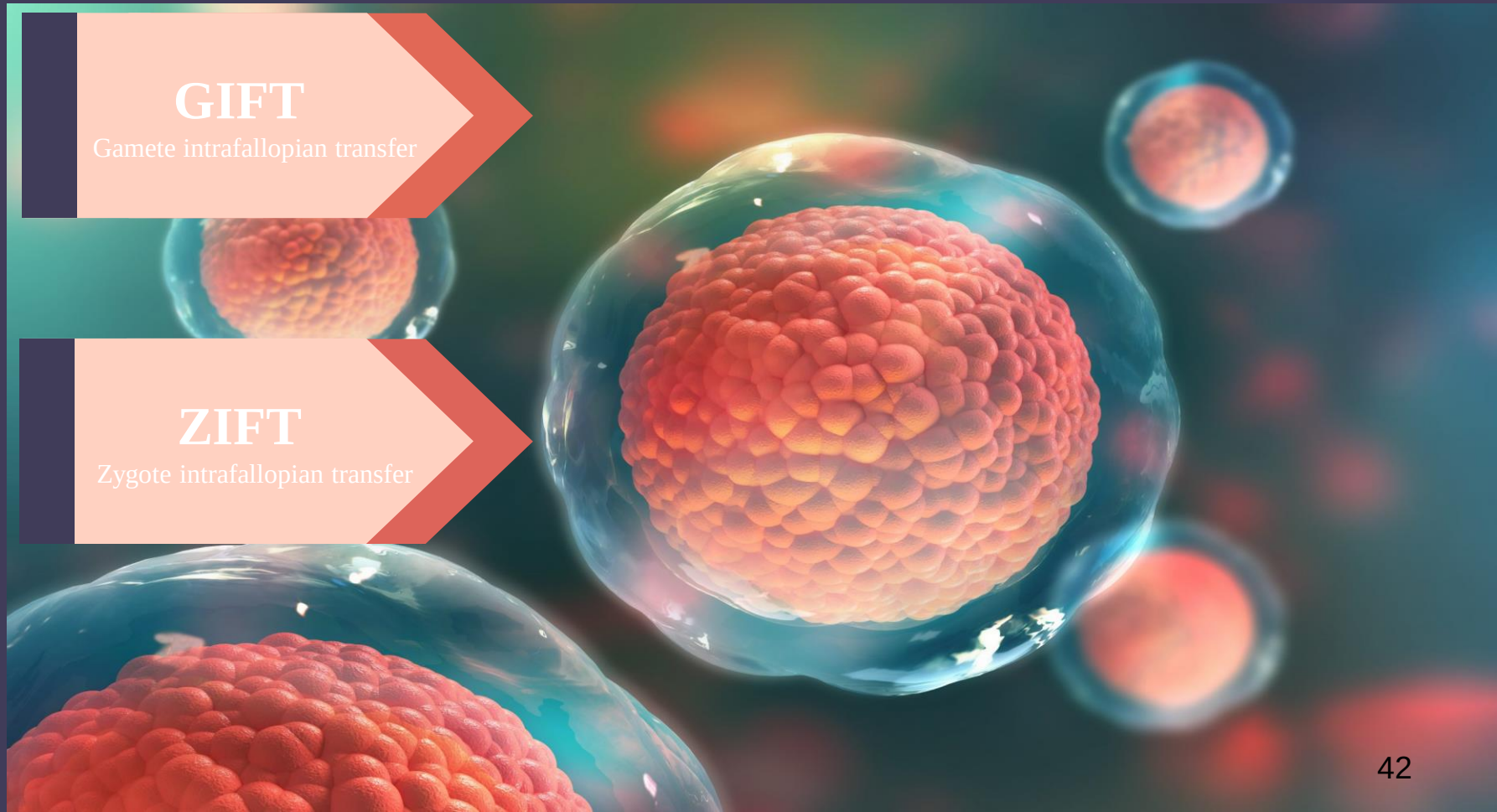
Mechanical hatching



Chemical hatching



Laser-assisted hatching


GIFT
Gamete intrafallopian transfer
ZIFT
Zygote intrafallopian transfer

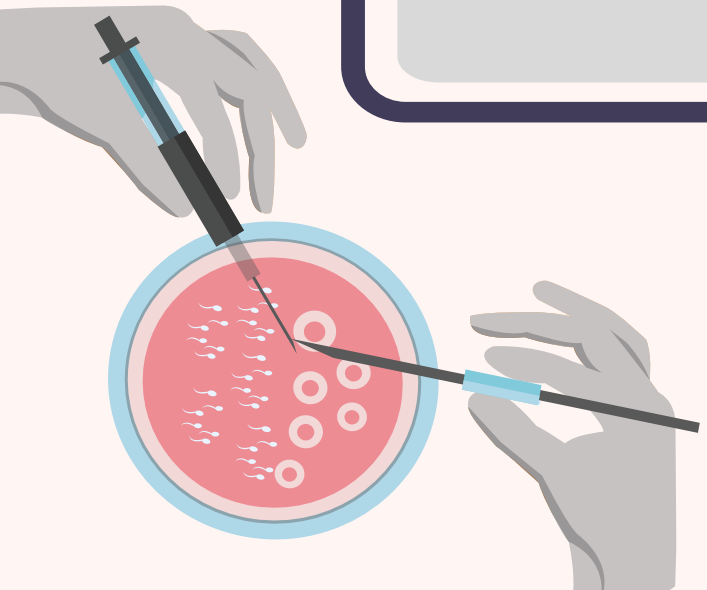
1

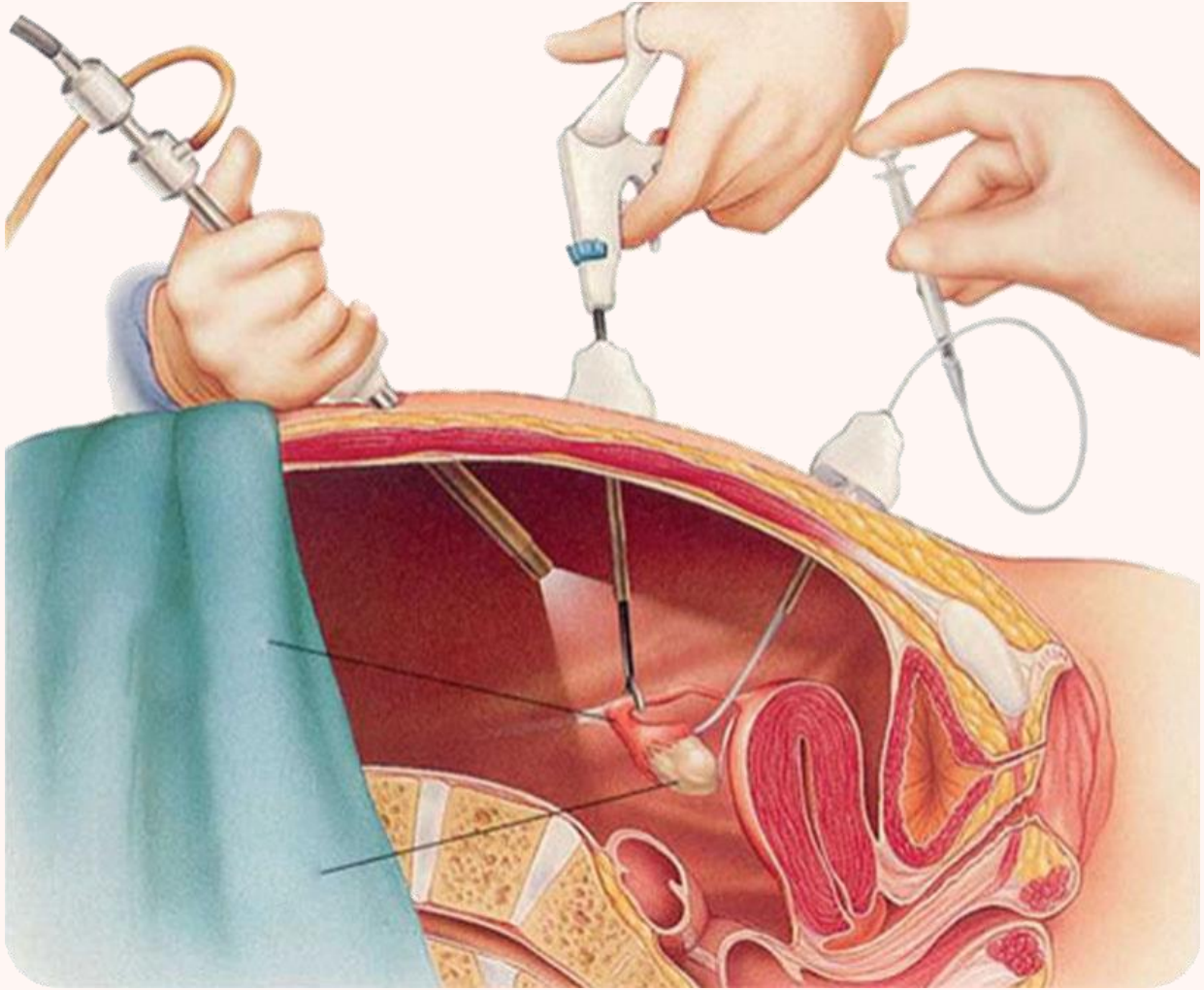
Mix sperm and oocytes in prewarmed petri dish

2

Transfer the oocytes and sperm by laparoscopic procedure to the fallopian tube with minimum delay, to prevent exposing them to temperature fluctuations

GIFT





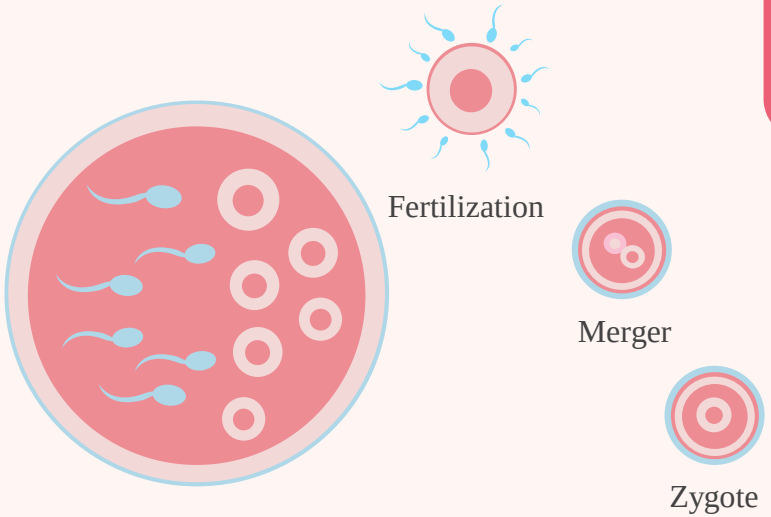
1

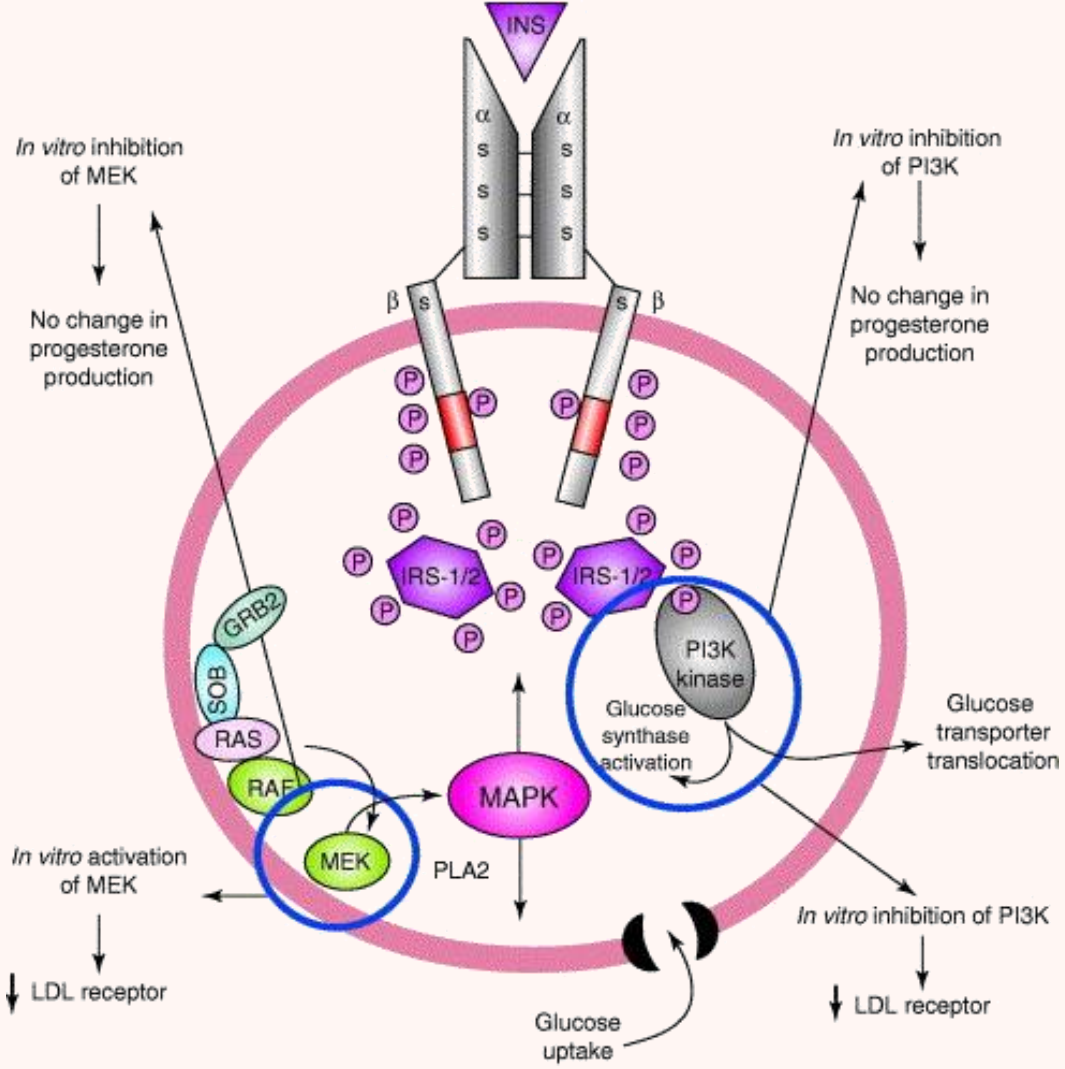
Mix sperm and ovum are to form zygote (where by cells begin to split and multiply)

2

Plant zygote in the fallopian tube by laparoscopic procedure

ZIFT




INS
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s
α
s
s
s
s
β
s
s
β
P
IRS-1/2
IRS-1/2
GRB2
SOB
RAS
RAF
MEK
MAPK
PLA2
PI3K
kinase
Glucose
synthase
activation
Glucose
transporter
translocation
Glucose
uptake
In vitro inhibition
of MEK
No change in
progesterone
production
In vitro activation
of MEK
LDL receptor
In vitro inhibition
of PI3K
No change in
progesterone
production
In vitro inhibition of PI3K
LDL receptor