

Date:

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لجان الدفعات



تفريغ فسيولوجي



موضوع المحاضرة: Reproductive system
part 2

رقم المحاضرة: 20

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FERTILIZATION, IMPLANTATION AND, PHYSIOLOGY OF PREGNANCY AND INFERTILITY

INTRODUCTION.

Maternal adaptation to provide ideal atmosphere for fertilization, nutrition to growing fetus, safe child birth and to fulfil nutritional needs of newborn.

Fertilization and implantation.

- Transportation of ovum 1
- Transportation of sperm in female genital tract. 2
- Sperm capacitation. 3
- Fusion of gametes. 4
- Activation of ovum. 5

مقدم توفير بيئة مناسبة وتغذية
حيّة كوث ال Fertilization

5 stages of Fertilization.

Transportation of ovum

Fertilization - fusion of male & female gametes.

Site - Middle segment (Ampulla) of fallopian tube.

مكان
حدوث
Fertilization

Transportation of ovum

Transport of ovum - from peritoneal cavity after expulsion enters fallopian tube through fimbria of infundibulum

Helped by - smooth muscles of tube & ciliated epithelium.

مساعدة في transportation ال
of ovum

smooth muscles of tube ال
and ciliated epithelium

Ovum

Mature ovum - consists of Oocyte (23 unpaired chromosomes) surrounded by Zona pellucida & Granulosa cells in multilayer called Corona Radiata.

haploid ←

Fate of ovum.

- Held at ampulla isthmic junction for 2-3 days
- After ovulation ovum viable for 6-24 hrs.
- If fuses with sperm fertilization occurs if not dies and degenerate.

الكرنت
هيك
سقوط

* هلا هون از اخبار لل ovum اتحاد مع ال sperm

Transportation of sperm in female genital tract.

Each ejaculate contains 200 million cells.

Out of these only 50-100 manage to reach ovum

Only 1 penetrate.

Motility of sperms.

- pH of fluid medium (1)
- Cervical mucus secretions (2)
- Fluid currents (3)
- Temperature. (4)
- Hormones. (5)

تفتت
عالم
حوامل

pH of fluid medium

Neutraline & alkaline - enhances activity. ^{of the sperm}

But vaginal fluid is acidic so immediately after ejaculation sperms become inactive

Then alkaline semen neutralizes vaginal fluid - sperms becomes active again for next 24 to 40 hrs.

Cervical mucus secretions

Acts like a mechanical barrier.

Depend on hormonal levels

Proliferative phase & near ovulation - more oestrogen - secretions more thin - allow entry of sperms.

* Sperm لا يعيش في الجو acidic
إلي هو في جو vaginal fluid مكان هيك

يعمل ال alkaline semen على neutralize ال vaginal fluid

عشان بقدر ال sperm يدخل فيها لو شت
معيه يكون من (24-40 hrs)

Fluid currents

Vaginal & uterine cavity currents are setup by ciliary movements.

Direction - opposite towards externally.

Opposes movements.

Temperature.

With increase temperature activity ^{of the sperm} increases but life span decreases.

Can be stored at -100 °c for many years.

* cilia تعمل دخول sperm لـ
→ Femal genital tract

Hormones.

Oxytocin - release during coitus causes propulsive **movements of uterus** which **aspirate fluid from vagina into fallopian tube.**

Oestrogen - make **cervical secretions thin and watery** so favors transport of sperms.

Prostaglandins- in **semen** increases **female genital tract movements.**

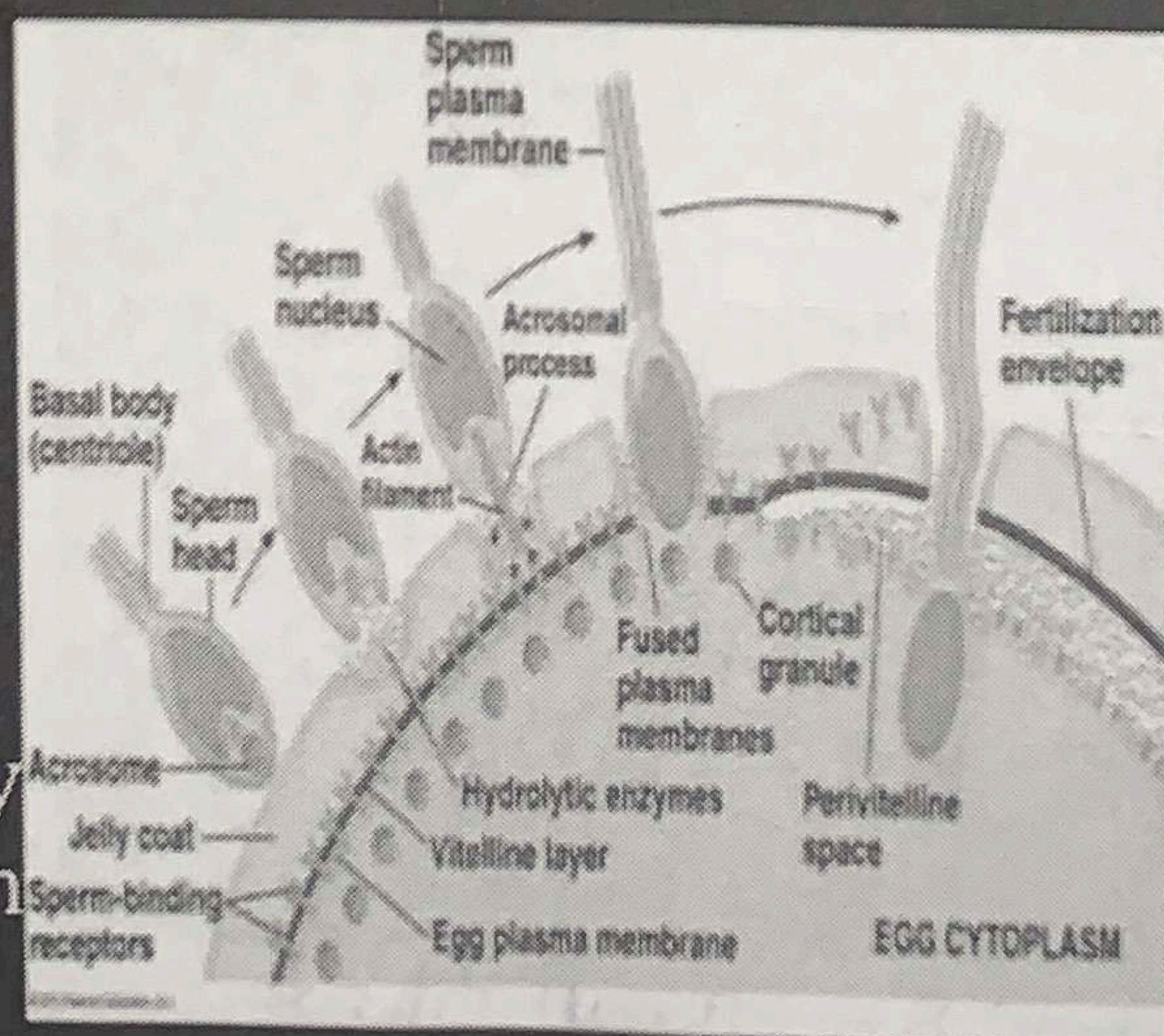
Progesterone- in **follicular fluid** affects **sperms motility.**

Sperm capacitation

Process which makes sperms capable to fertilize ovum

Takes 1-10 hrs

Cholesterol content of **acrosomal membrane** decreases -leads to easy release of enzymes from head.



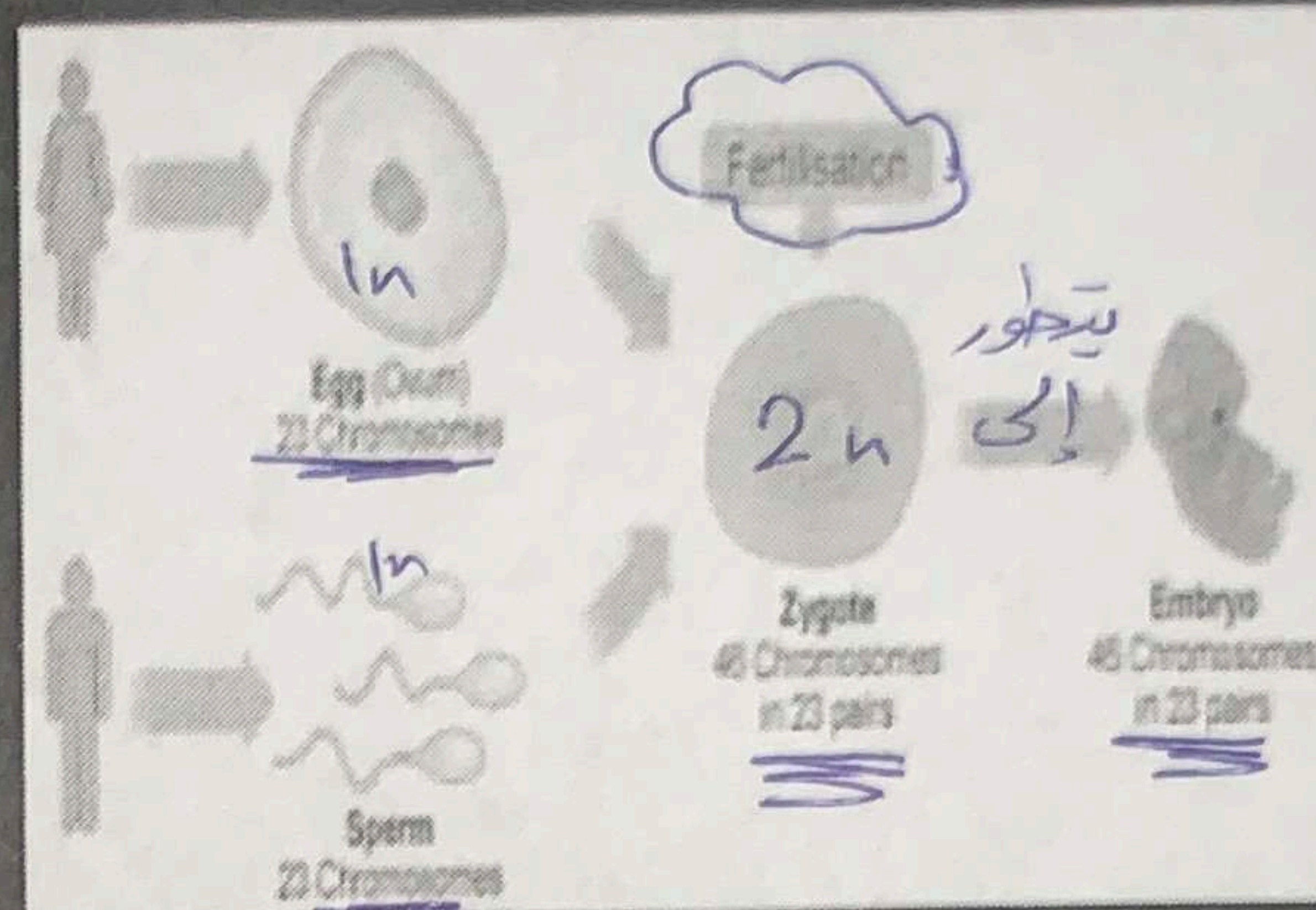
* acrosomal membrane
→ Head of sperm.

هذا ال enzyme هو الذي يسهل عليه تثبيت ال sperm مع ال Fertilized ovum وتقريرا باخذ من (1-10 hrs)

Fusion of Gametes.

① Chemoattraction -
Penetration of sperm
through ovum
coverings.

② Fusion of sperm with
oocyte.



جاذبه
اتحاد
الجامعات

Chemoattraction

By substances produced by ovum.

Penetration of sperm through ovum coverings.

- Through 2 layers.
- Corona radiata -
 - Acrosome of sperm head releases Hyaluronidase enzyme & other proteolytic enzyme.
 - Hyaluronidase enzyme - polymerizes Hyaluronic acid
 - Proteolytic enzyme - digest proteins of structural tissue.

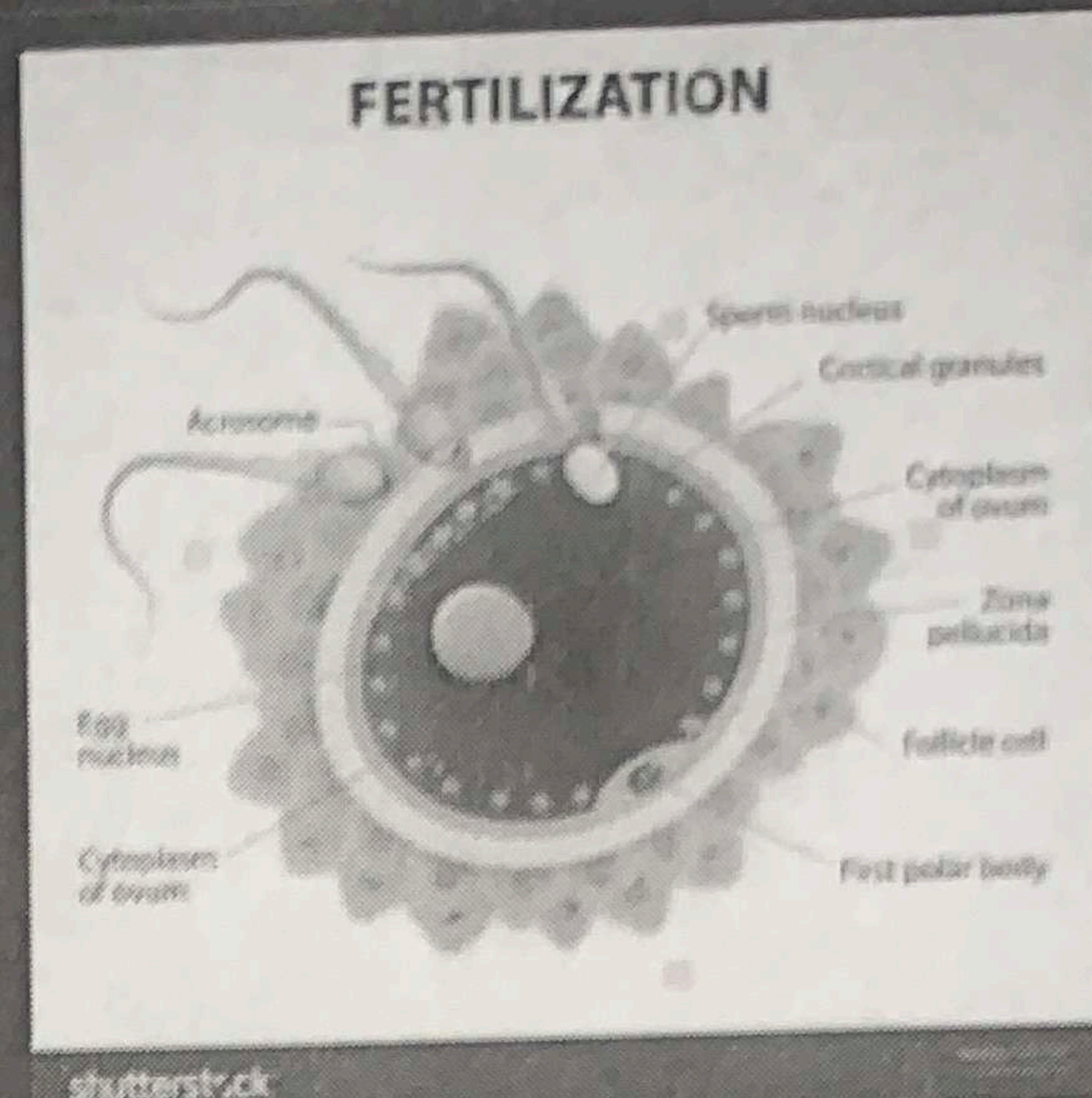
هائي ال substance بقل جذب
لا sperm باينه يقرب للovum
بعد ما يقرب يجيب لنا ال
penetration of sperm

Fusion of sperm with oocyte.

Site of contact - equatorial region of Acrosome.

Fertilin on activated sperms contact with protein on vitelline membrane

With 30 min membrane fuses-genetic material enters & embryo develops.



Activation of ovum.

Membrane potential of ovum

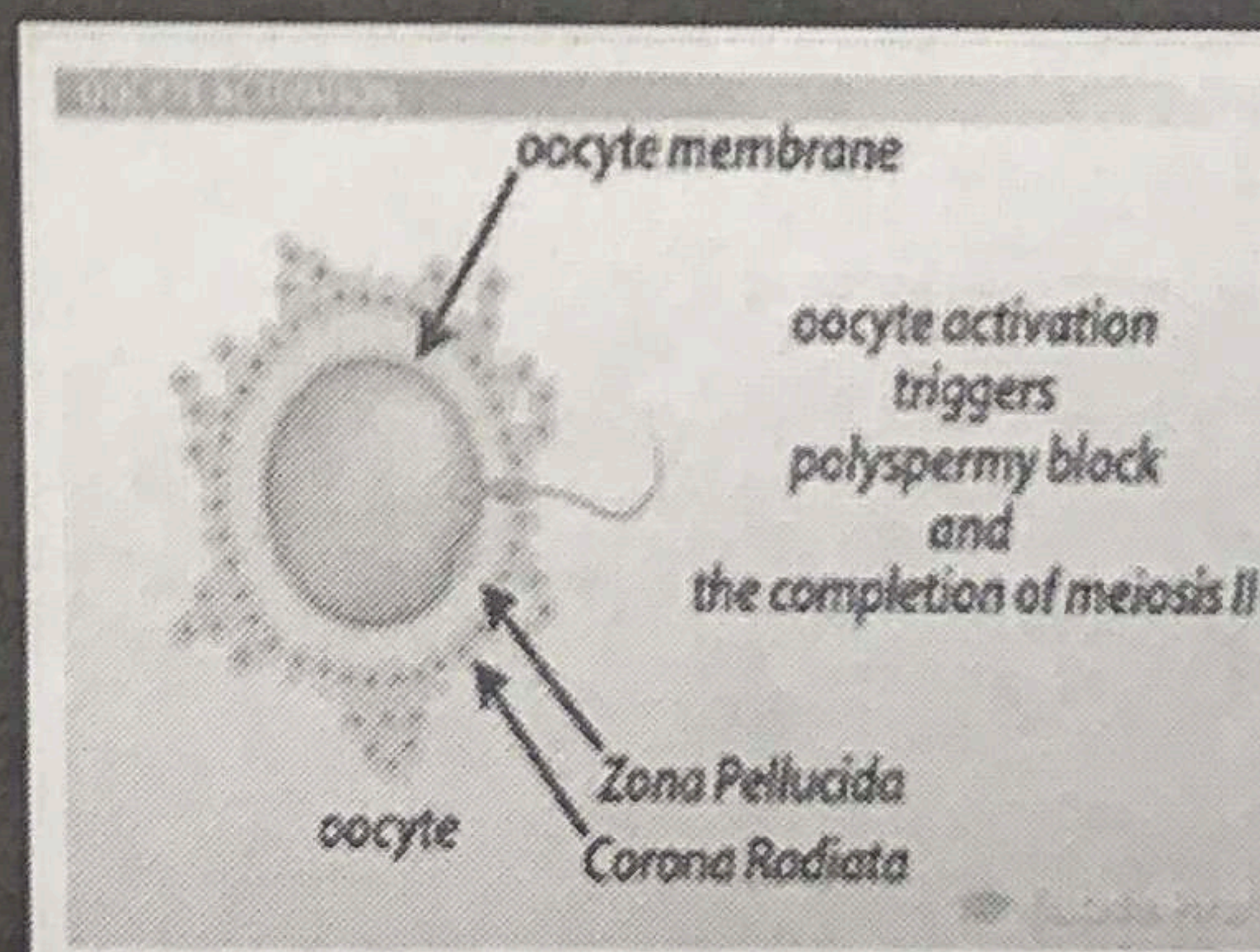
decreases - Zona pellucida

--structural changes

Release of Ca

Vitelline block to polyspermy

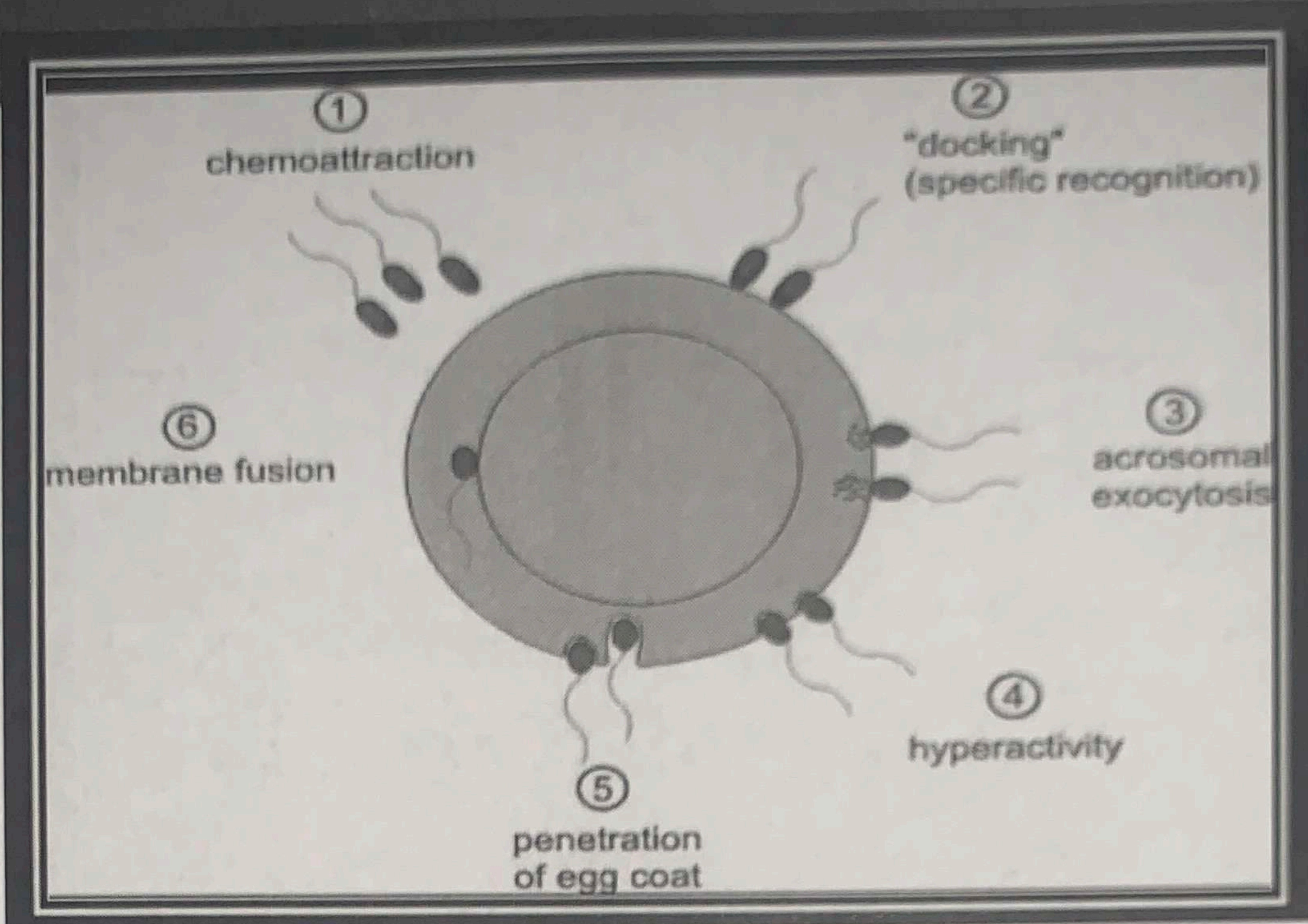
Zona blockade to polyspermy - by glucosidase & protease.



← جبهه ما صار
fusion blocking
عنا
کته یعنی مرده
ای sperm -

* های انرژی های تمنع دخول
Zona pellucida sperm ال

علاقۃ التخصيب



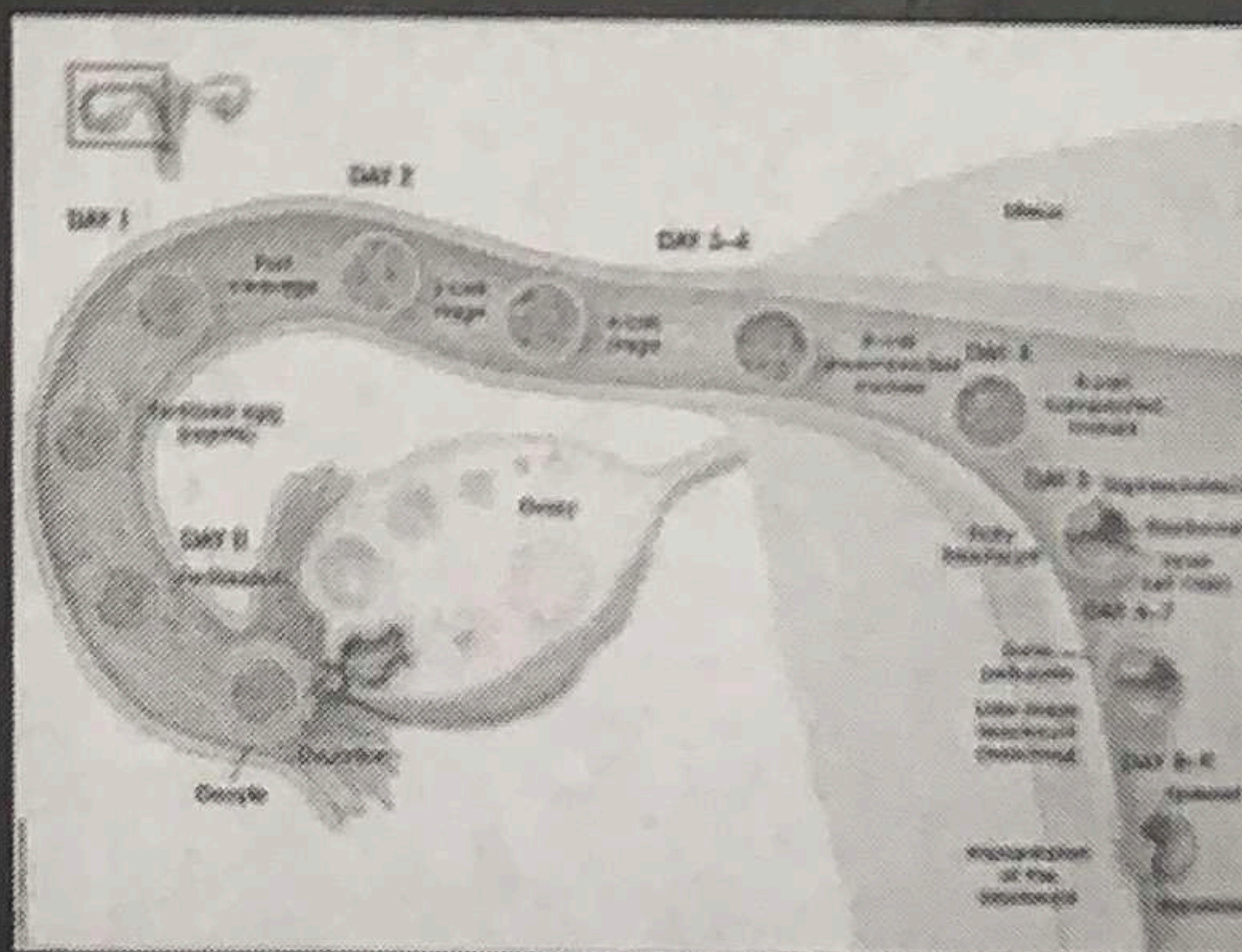
IMPLANTATION.

Formation of blastocyst

Transportation of blastocyst in uterine cavity.

Implantation of blastocyst in the **endometrium**.

Decidual reaction.



* علاقۃ التخصيب
بين sperm و
ovum
blastocyst

PHYSIOLOGICAL CHANGES IN MOTHER DURING PREGNANCY

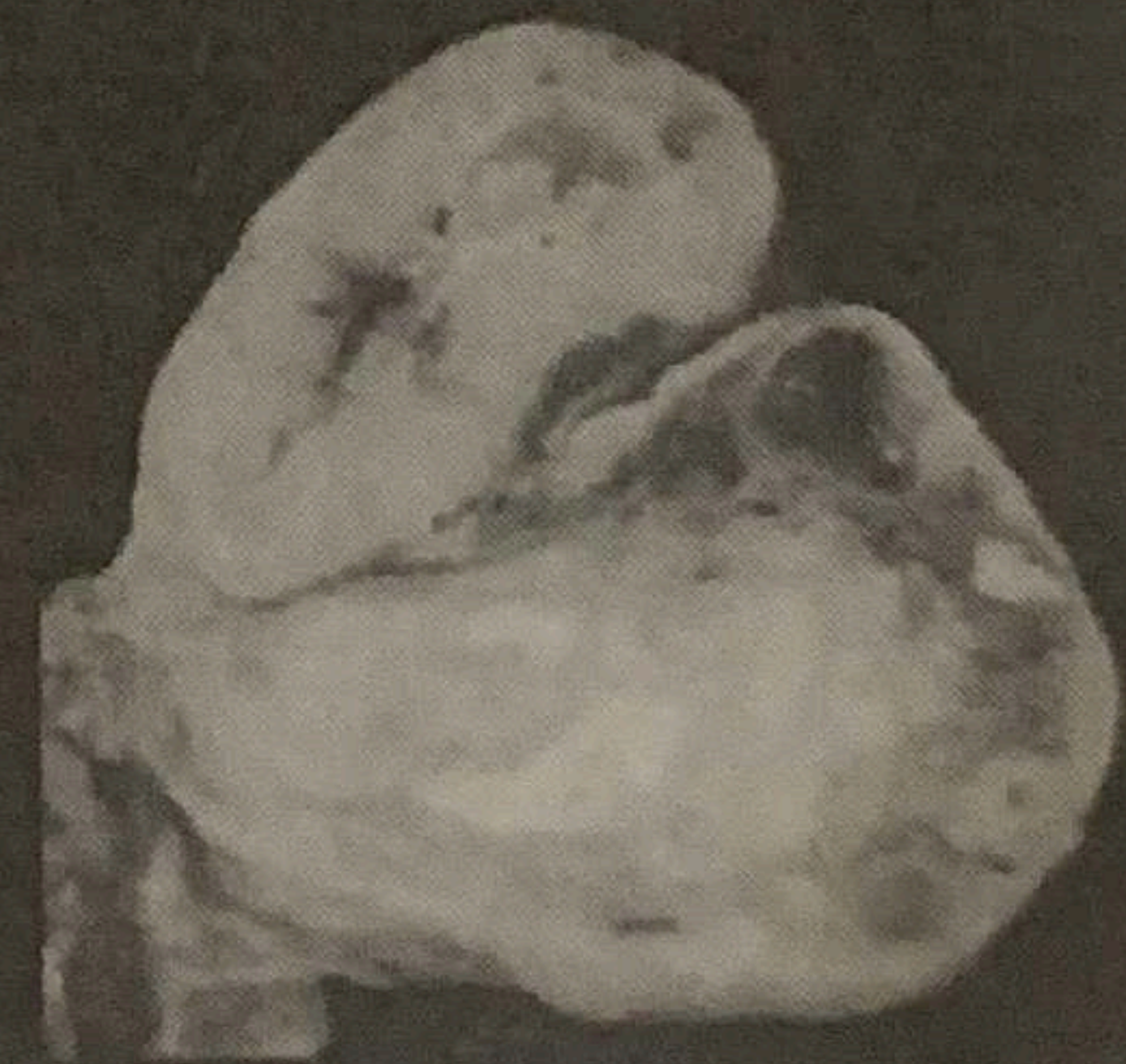
- Changes in genital organ
- Weight gain
- Haematological Changes
- CVS changes
- RS changes
- Urinary system changes
- GIT Changes
- Metabolic changes
- Endocrine changes
- Changes in skin.

Changes in Genital organ

- Uterus
- Ovaries
- Cervix
- Fallopiab tubes
- Mammary glands.

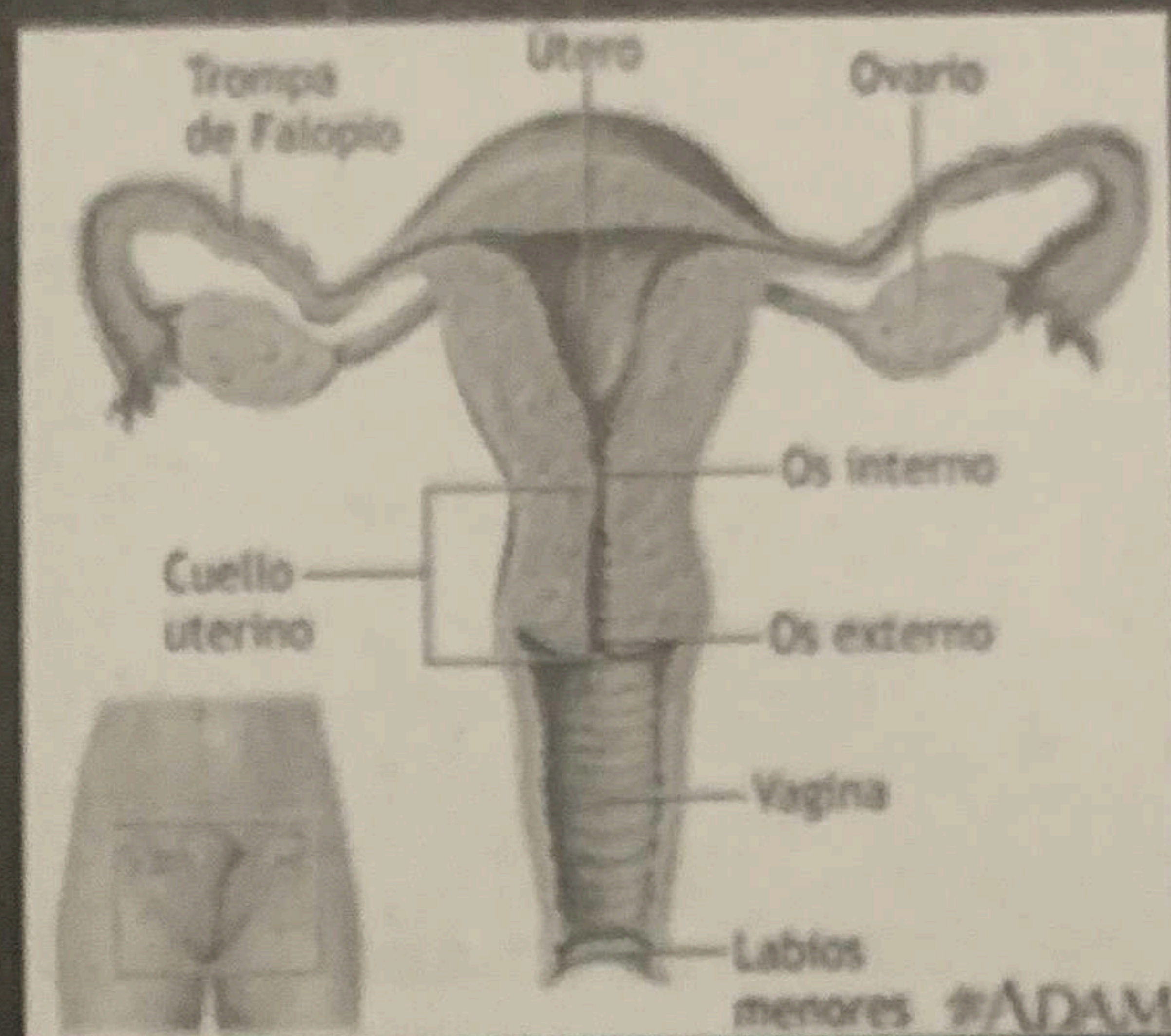
Ovaries

- First 12- 16 weeks corpus leuteum enlarges
- Then as HCG levels decreases it degenerate
- Its function taken over by placenta.



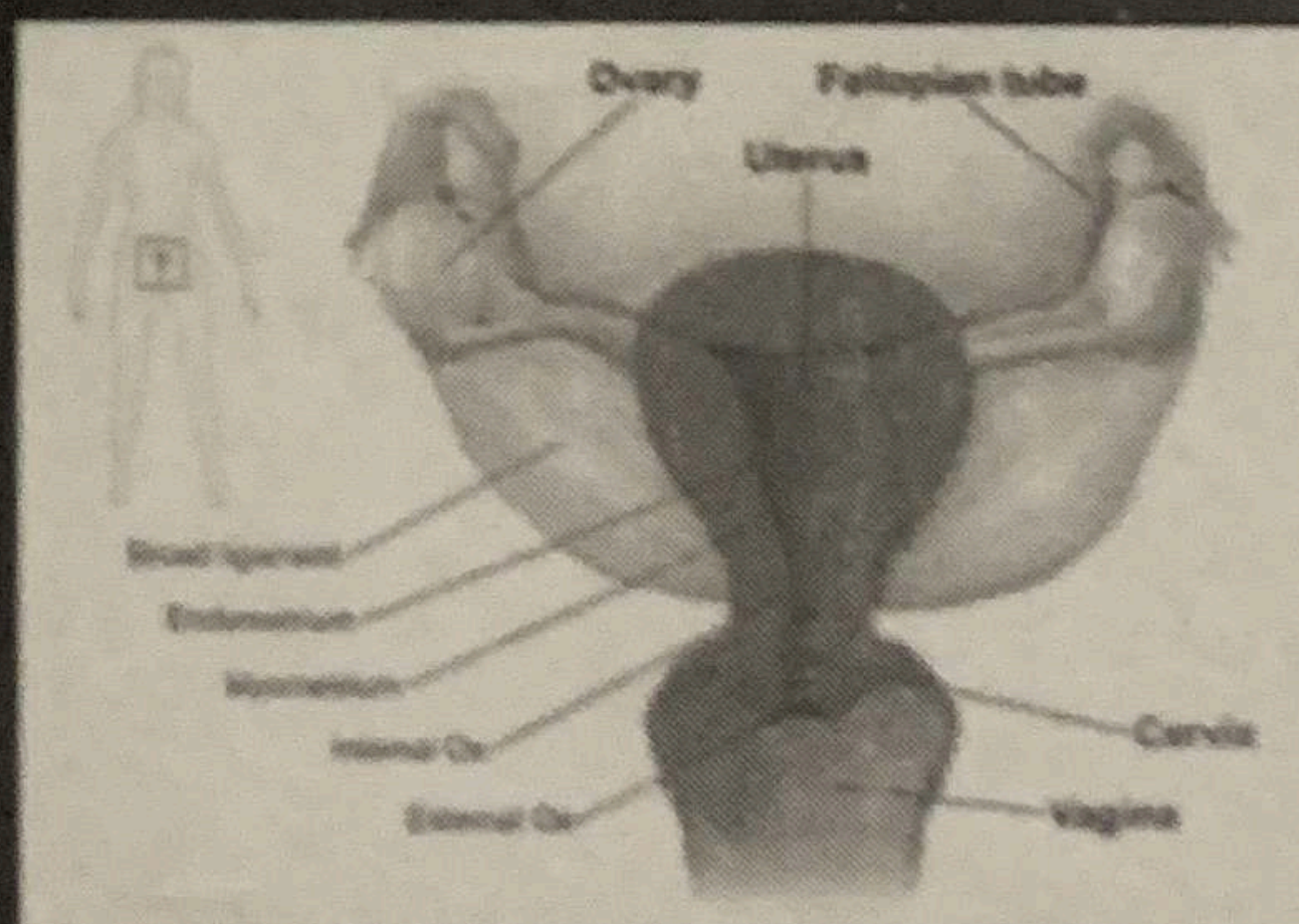
Cervix

- Endocervix – hypertrophied
- Cervical gland secretions increases form a plug which closes cervix
- Tough cervix becomes soft.



Fallopian tubes

- Due to enlargement of uterus – pushed upwards
- Blood supply increases
- Causes hyperplasia of epithelial cells.



Mammary glands.

- Hyperplasia of ductal & alveolar tissue
- Areola - Pigmented.
- Sebaceous glands becomes prominent in areola
- Nipples become larger & pigmented.

Weight gain

- Total weight gain - 10-12 kg.
- Fetus - 3kg
- Placenta & amniotic fluid - 1.5 kg
- Uterus & breast enlargement - 1.5 kg
- Blood volume & interstitial fluid 1.5 kg
- Fat deposition- 3-4 kg.

Haematological Changes

- Blood volume - ↑30%
- Blood indices - ↓
- Plasma proteins ↓
- Leucocytes ↑
- Platelets ↓
- Coagulation factors ↑
(VII, VIII, IX & X)

CVS changes

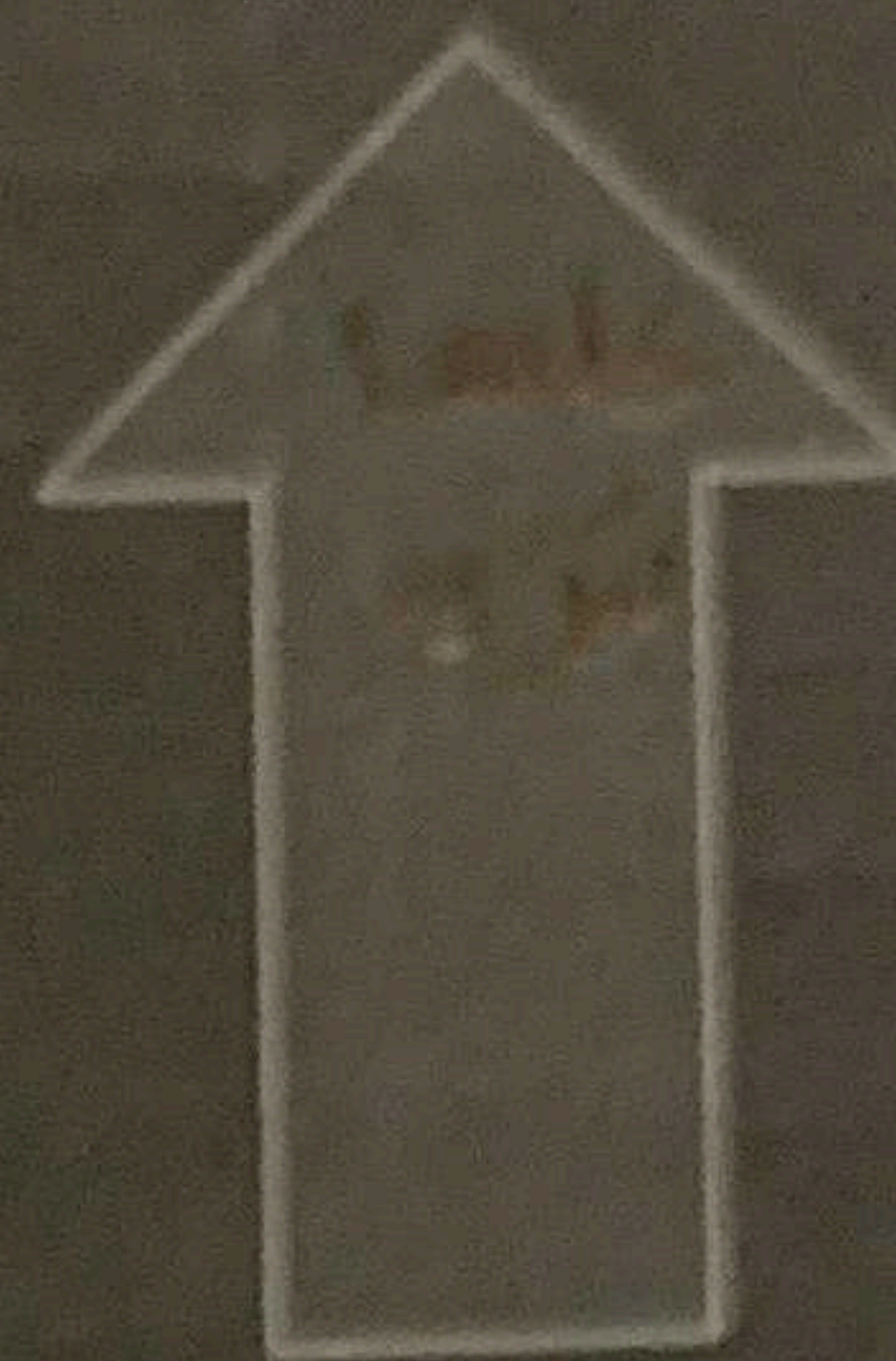
- Position of heart - more laterally & upward & LAD
- Heart rate - Tachycardia (Hyperdynamic circulation)
- Cardiac output - $\uparrow$ due to blood volume
- Blood pressure - both decreases mainly due to vasodilation.
- Venous pressure - due to gravid uterus rises causes oedema of feet, varicose veins, piles & peripheral thrombosis.
- Blood flow $\uparrow$ to uterus, kidney & skin.

RS changes

- Anatomical changes - Diaphragm elevation
- Hyperventilation - progesterone increases sensitivity to CO_2 -
- Ventilatory functions $\uparrow$ TV & IC and $\downarrow$ RV & FRC
- Gas exchange $\uparrow$ due to $\uparrow$ pulmonary blood flow
- Oxygen consumption $\uparrow$ by 15%.

Urinary system changes

- Renal blood flow
- Effective renal plasma flow
- GFR
- Renal tubular absorptive capacity
- Clearance rate
- Glycosuria
- Proteinuria
- Water balance
- Acid base balance Hyperventilation causes respiratory alkalosis



GIT Changes

- GIT secretion & motility ↓
- Gall bladder function ↑
- Liver function – fibrinogen ↑ albumin ↓
- Morning sickness – anorexia, nausea & vomiting.
- GTT – Diabetic type

Metabolic changes

- BMR - ↑
- Protein metabolism - nitrogen retention & positive nitrogen balance
- Carbohydrate - ↑ BSL, glycosuria ↓ hepatic glycogen.
- fat - ↑ in cholesterol, TG, PL
- Mineral - ↑ Ca & P retention, iron metabolism.

Endocrine changes

- Pituitary - ↑ prolactin, ACTH, TSH & ↓ GnRH
- Thyroid - ↑ thyroid binding globulin.
- Parathyroid ↑ active form of Vit D3
- Adrenal cortex - ↑ all
- Pancreas - ↑ Insulin. كل الهرمونات

PSYCHOLOGICAL CHANGES

- Craving for particular food
- Alteration in behaviour, emotion & mood
- In some cases true Psychosis.

INFERTILITY : DEFINITIONS

- Infertility: Failure to achieve a live birth over a 12-month period of unprotected intercourse.

↳ two type

- ^① Primary infertility: Never having had a live birth.
- ^② Secondary infertility: Failure to achieve a live birth after having had a live birth previously.

INFERTILITY: CAUSES

- ❖ ¹ Non-preventable: Anatomical, genetic, hormonal or immunological problems;
 - Do not vary much across countries/ within countries.
 - Account for a core of 5% of infertile couples.
- ❖ ² Preventable: Responsible for observed variations across/ within countries.

PREVENTABLE CAUSES

→ نفع ر
تمنع حدوثها

- ¹ ☐ Infections:
 - Sexually transmitted diseases: Chlamydia, Gonorrhea, syphilis etc.
 - Infectious and parasitic diseases: Tuberculosis, schistosomiasis, Malaria, sickle cell disease.
- ² ☐ Health care practices and policies:
 - Unhygienic obstetric practices.
 - Septic abortion and their complications.
 - Postpartum and postabortal complications.

PREVENTABLE CAUSES

3

- ❑ Exposure to potentially toxic substances in:
 - Environment: Arsenic, aflatoxins, pesticides.
 - Diet: Caffeine, tobacco, alcohol.

CULTURAL AND SOCIAL FACTORS

infertility 11 1/2 1/2 1/2 1/2

- Female genital Mutilation. ✓
- Early age at marriage or sexual intercourse. ✓
- Multiple sexual partners. ✓

INFERTILITY : TREATMENT AND MANAGEMENT

❑ Treatment : A **costly** and **less** effective process.

❑ Prevention : **More** effective, **less** expensive.

• علیہ سے مراد ہے
ال infertilitas
بکثرت سے علیہ
• علاج ال infertilitas

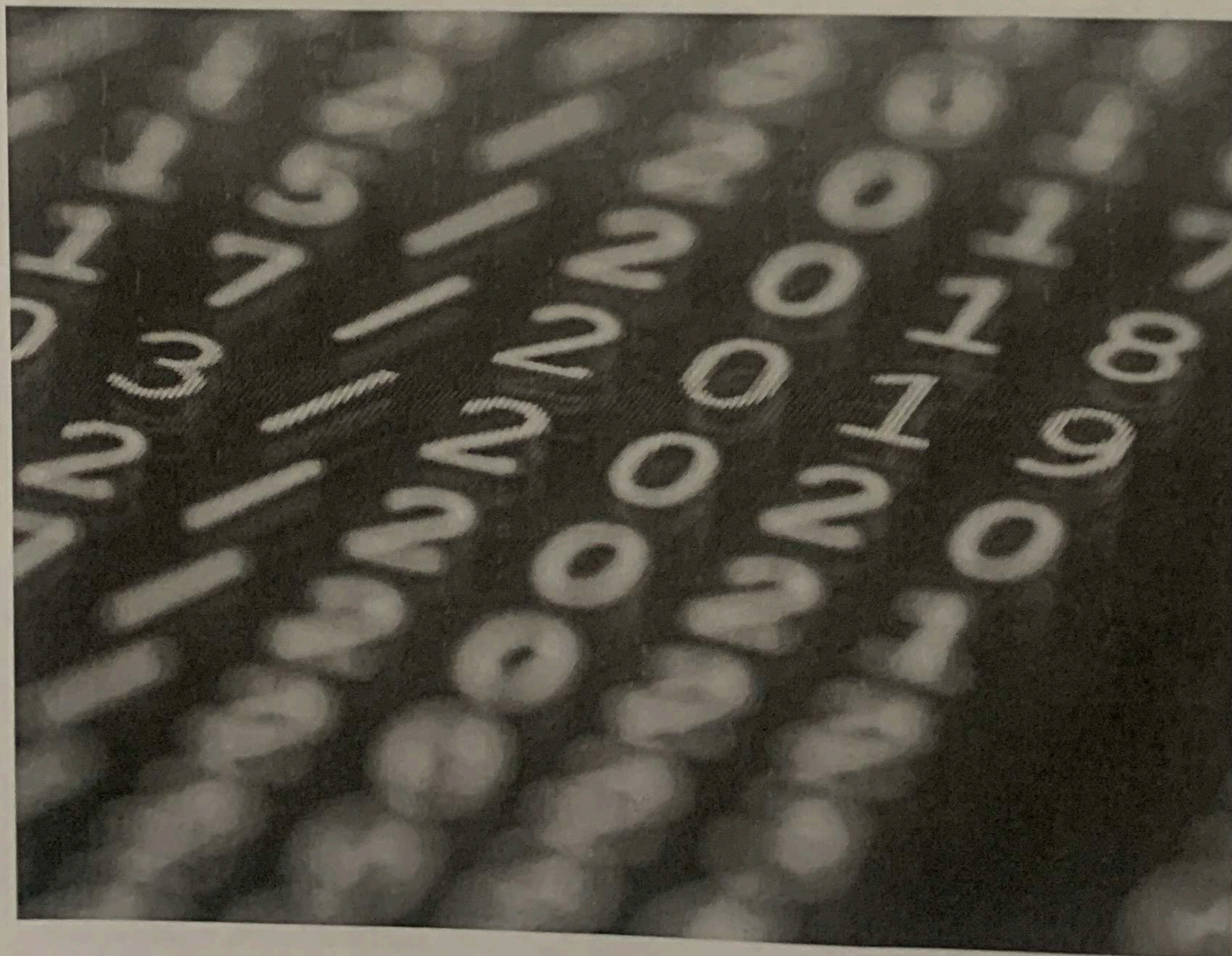
TREATING INFERTILITY: PROGRAMMATIC STRATEGIES FOR DEVELOPING COUNTRIES

1. **Advising** about timing of intercourse and other behaviors - smoking and alcohol.
2. Helping couples to cope with social and psychological burdens of infertility.
3. Helping couples to consider non-medical options such as adoption.

TREATING INFERTILITY: OTHER OPTIONS

علاج

- ☐ ⁴ Surgical techniques: Repairing tubal scarring, correcting other abnormalities of reproductive organs.
- ☐ ⁵ Artificial insemination: Using husband's or donor's semen.
- ☐ ⁶ In vitro fertilization techniques: Recovering mature ova, fertilizing them in lab, and then re-implanting in uterus



THANK YOU

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