Cytopathology

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LAB #4

Hormonal Evaluation of a PAP Smear

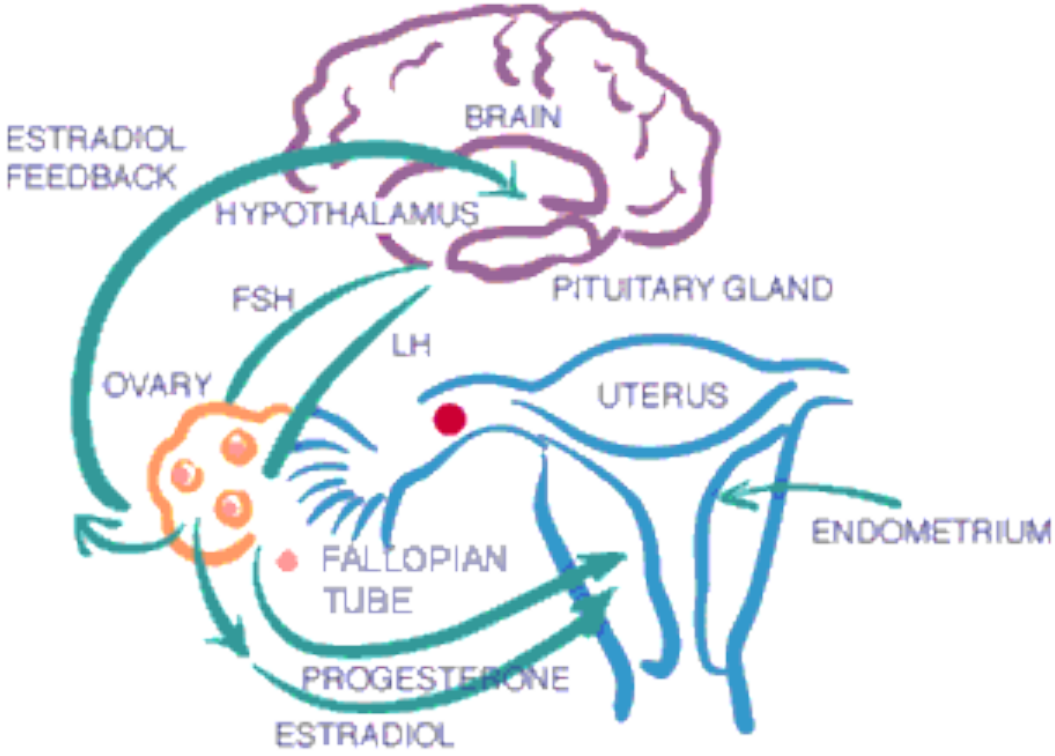
Introduction

Maturation index

- Sexual maturity

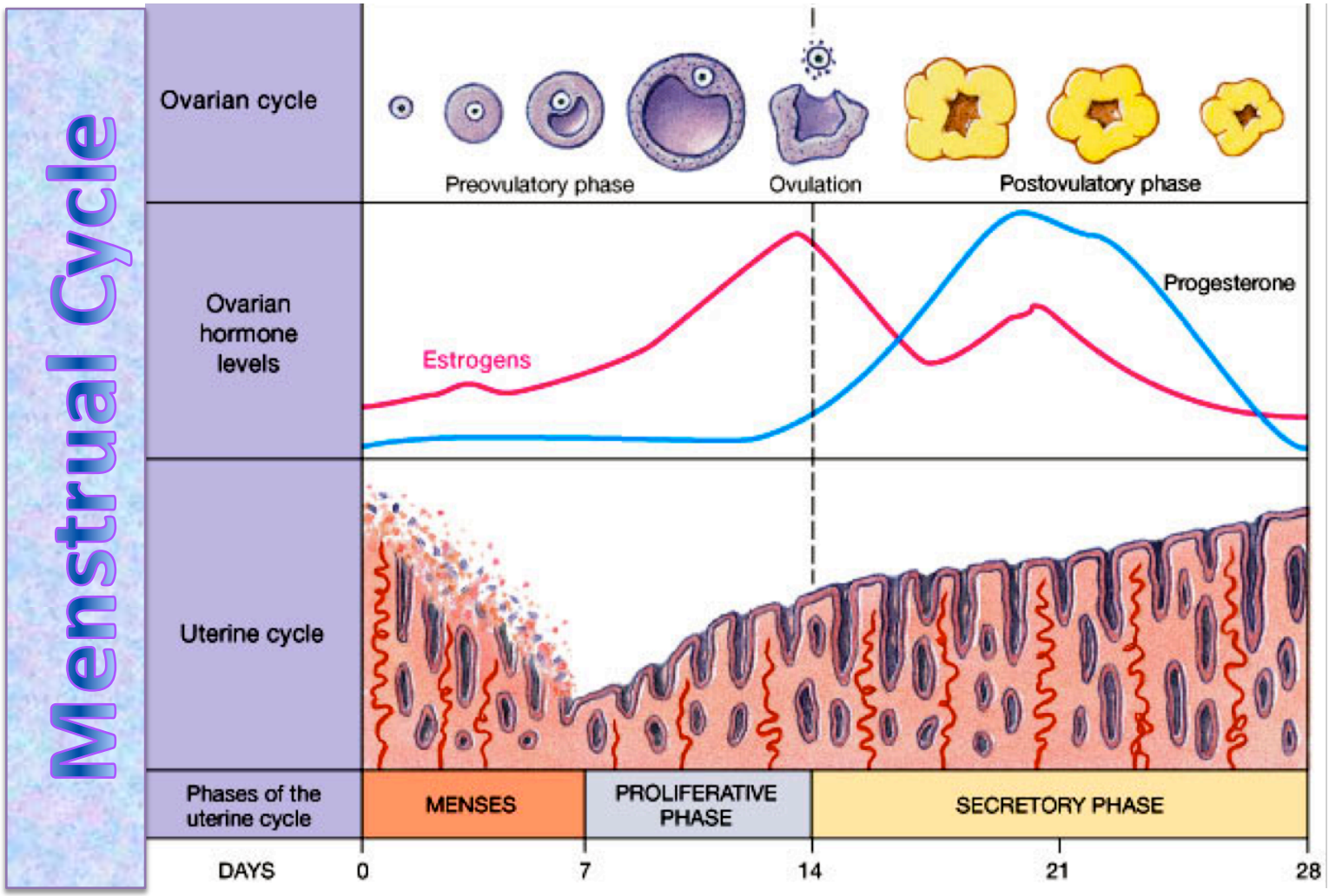
1) Menstrual phase
2) Proliferative phase
3) Secretory phase

- Pregnancy
- Menopause



Introduction

- The epithelia of the female genital tract are influenced by the sex hormones Estrogen and progesterone.



- Estrogen stimulates the proliferation of the endometrium, while Progesterone promotes differentiation and maintenance of the endometrium → secretory endometrium.

- This hormonal effect can be studied through evaluating the squamous cell layer that lines the vagina and cervix (a test known as a maturation index).

Maturation index (MI)

MI is a ratio obtained through performing a random count of 3 major cell types: 1)parabasal cells 2)intermediate cells 3)superficial cells that are shed from the squamous epithelium.

The cell count is expressed as a percentage that reads as follows:
MI= % parabasal cells, % intermediate cells, % superficial cells.

1) Parabasal cells are the least mature cells having not been affected by estrogen or progesterone.

2) Intermediate cells display mild maturation, having been affected by progesterone.

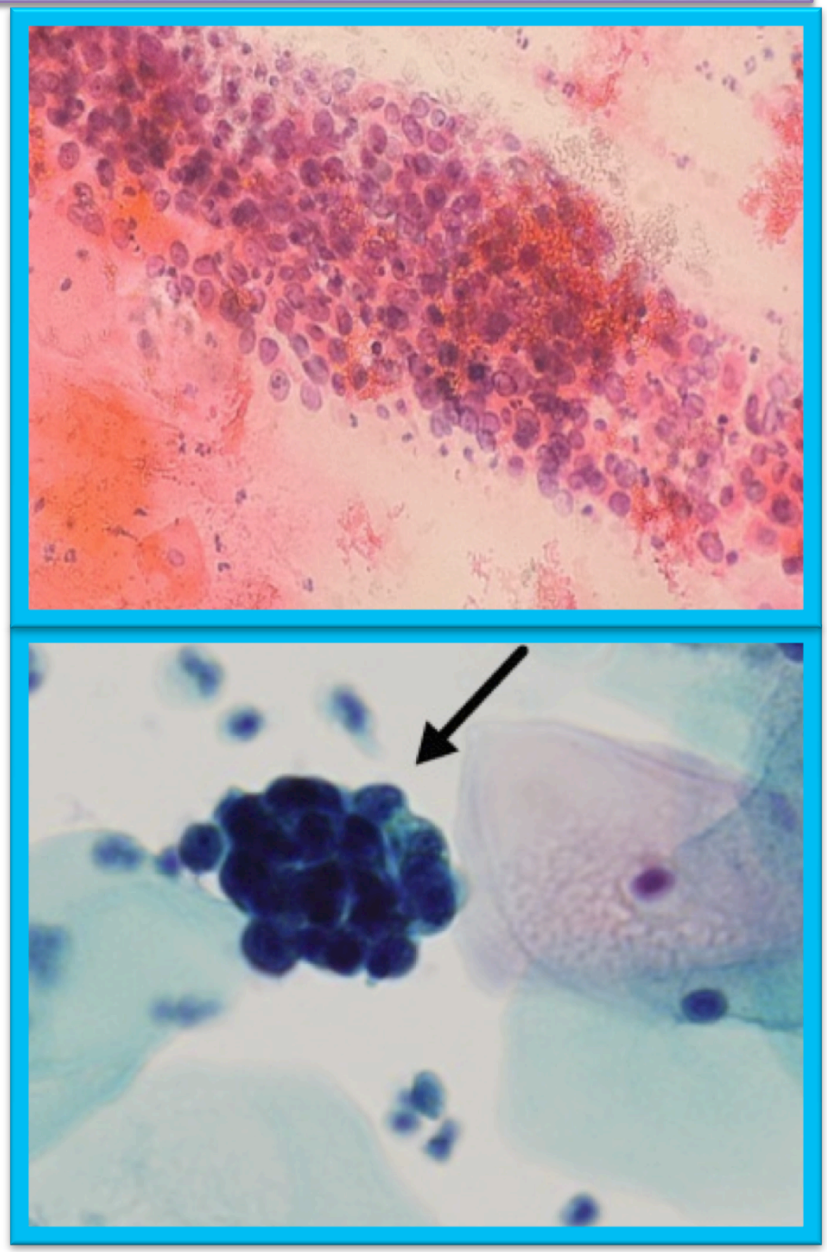
3) superficial cells display the most maturity, having been affected by estrogen.

1) Menstrual phase (1-7)

(messy crowded slide)

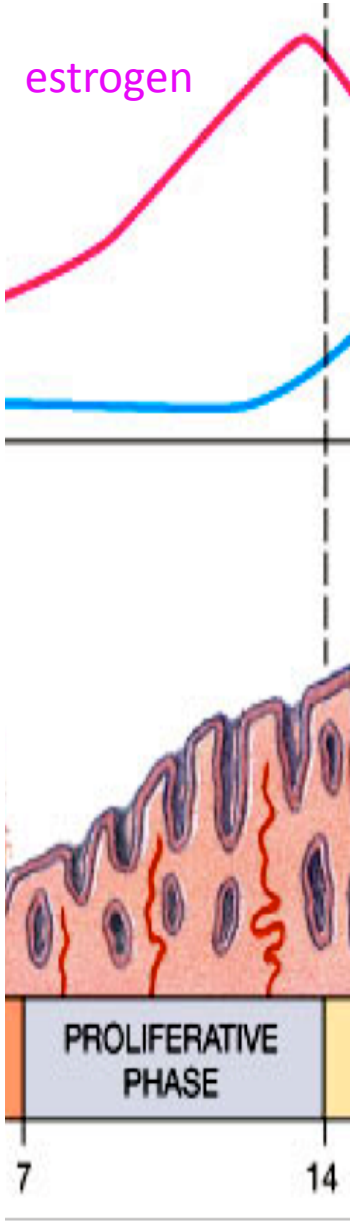
- Intermediate cells.
- Superficial cells.
- Endometrial cells, most abundant during the 3-5 days of the menstrual phase, more often shed in groups.

- Huge number of RBCs.
- WBCs.
- bacteria

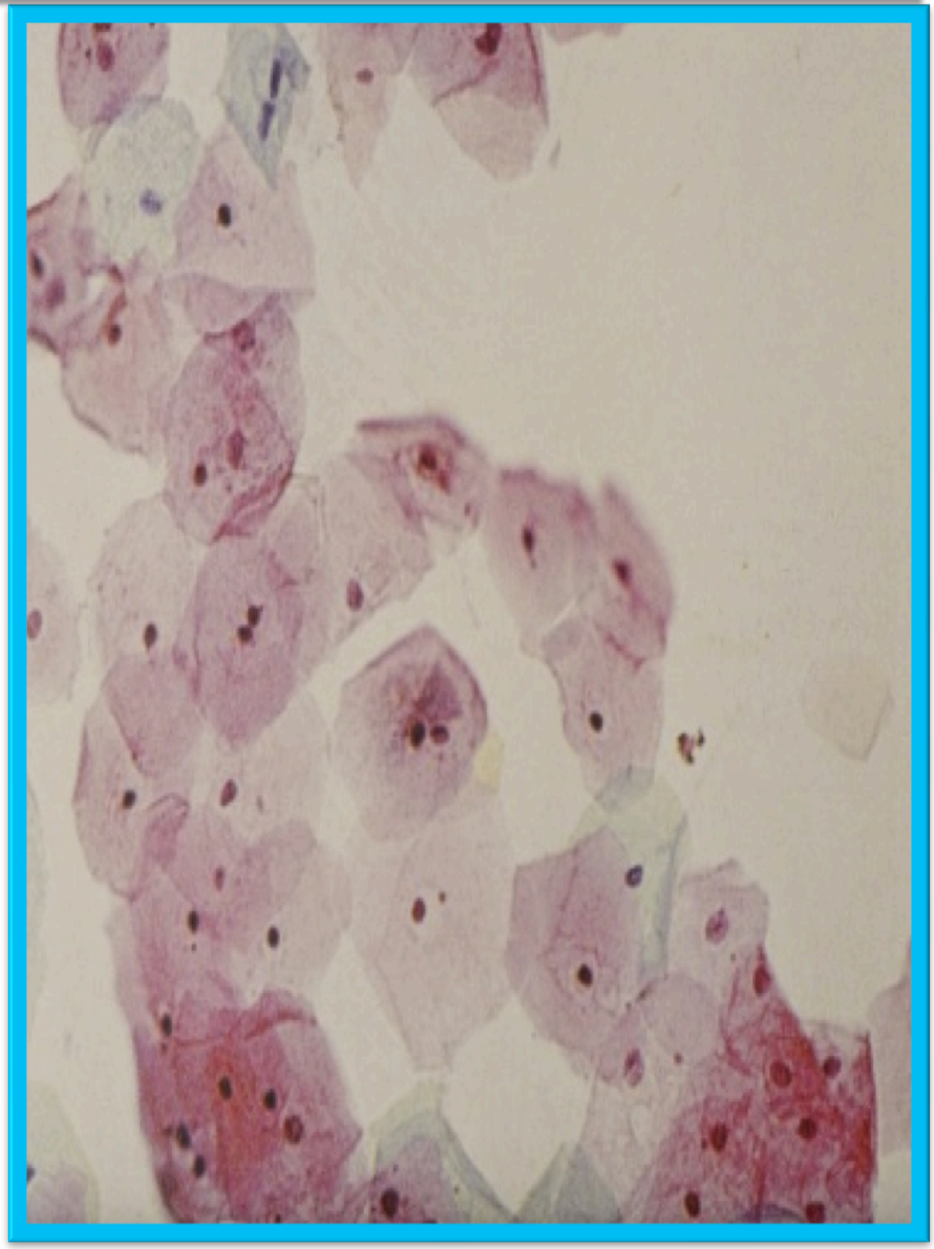


2) Proliferative phase (7-14)

Under the influence of estrogen

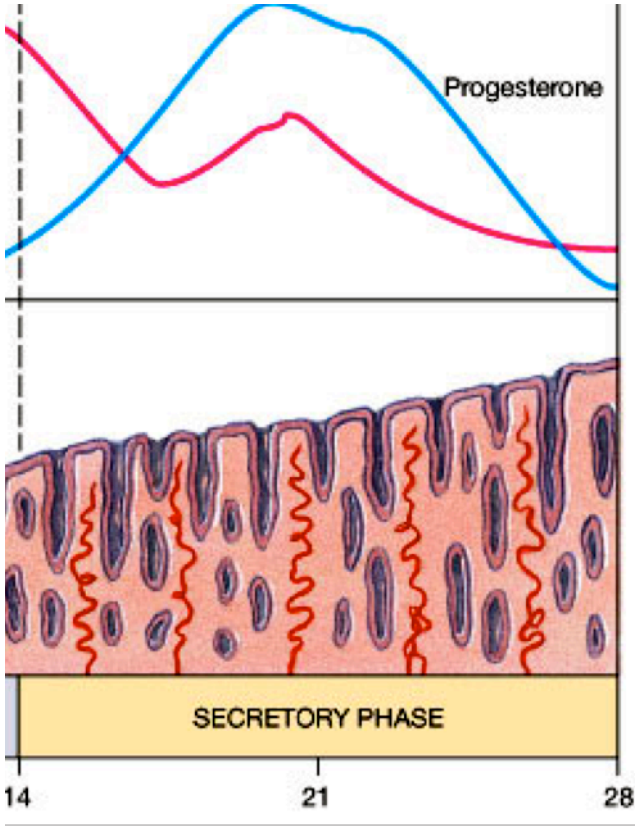


- The number of superficial cells Gradually increase and peaks on the day of ovulation (day 14).
- Mostly the cells are isolated, flat and spread out.
- Minimal folding & clumping.
- Clean background.
- Free of WBC



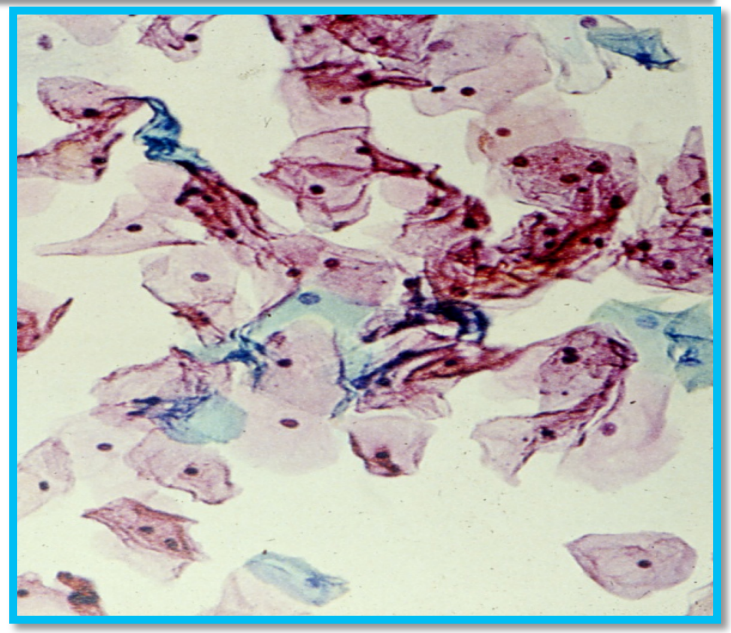
3) secretory phase (15-28)

Under the influence of progesterone



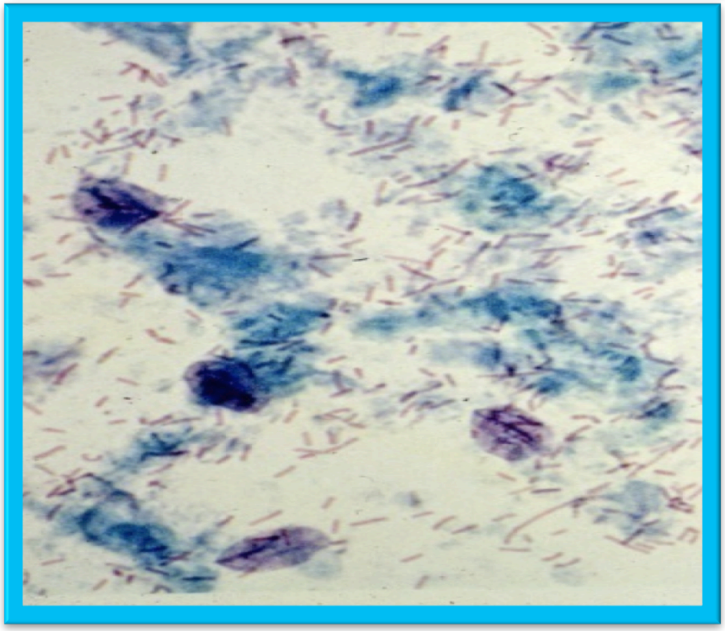
<u>After ovulation:</u>

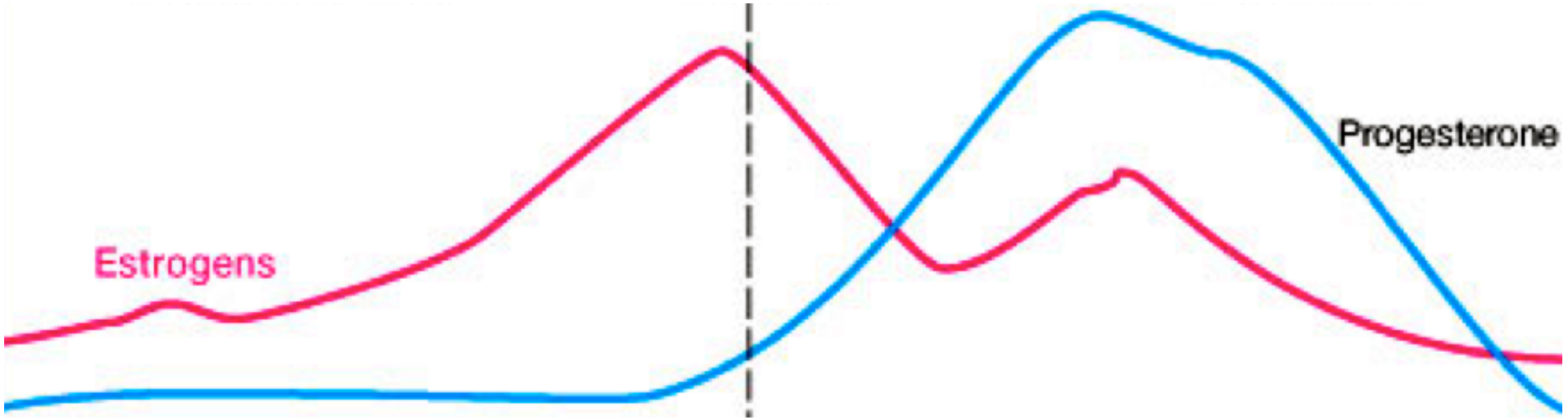
- number of superficial cells decrease
- Increase intermediate cells.
- Folding of the cells.
- Some endocervical cells may be found.



<u>Late secretory phase:</u>

- Increase number of lactobacilli and leukocytes (Dirty background)
- Cells lie mainly in clusters, wrinkeled, folded
- Navicular cells.
- +





ovulation

Estrogen increase

Progesterone increase

1 7 14 28

increase amount of superficial cells
Clear background
Cells are isolated flat and spread out

Increase amount of intermediate cells.
Dirty background with bacilli and WBC.
Cells lie in clusters, folded and wrinkled.
Navicular cells (intermediate cells rich with glycogen).

menses

Proliferative phase

Secretory phase

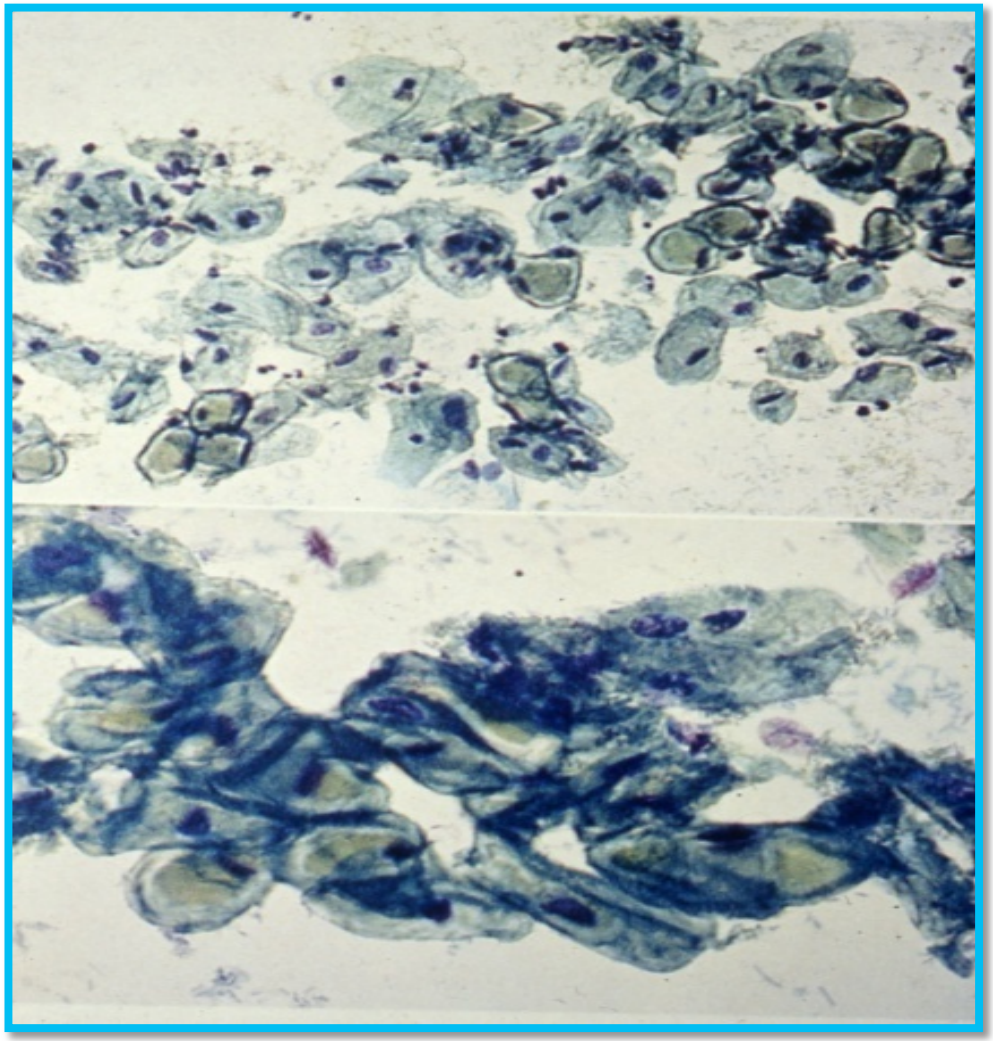
MI = 0:40:60

MI = 0:70:30

Pregnancy MI = 0/95/5

•Superficial cells decrease.
•Increase number of dense clustered intermediate cells

Under the influence of progesterone



Pregnancy
MI = 0/100/0

By the end of the 3rd month of pregnancy (Progesterone only no estrogen)
•Almost only clusters of intermediate cells are seen.
•Background is dirty and messy
•Thick clusters of navicular cells are formed.

PreMENOPOUSE MI = 0/80/20 Progressive decrease of estrogen.

Dominated by intermediate cells

Few superficial squamous cells.

Endocervical cells often appear cuboidal with scanty cytoplasm.

More single cells.

Menopause MI = 50/50/0 Progressive decrease of estrogen.

Decrease Intermediate cells with some glycogen in cytoplasm.

Increase parabasal cells.

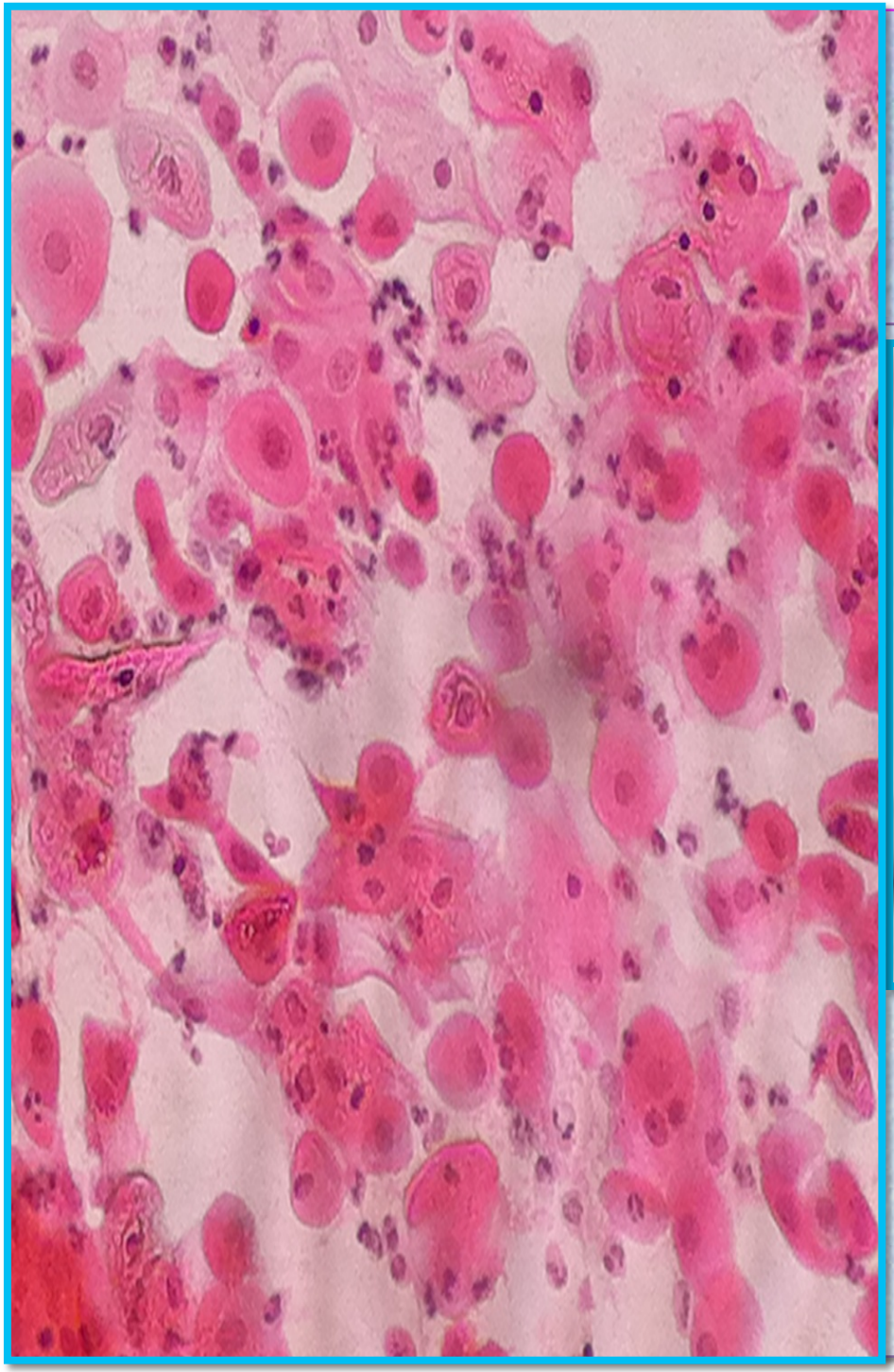
Increase no. of WBC's.

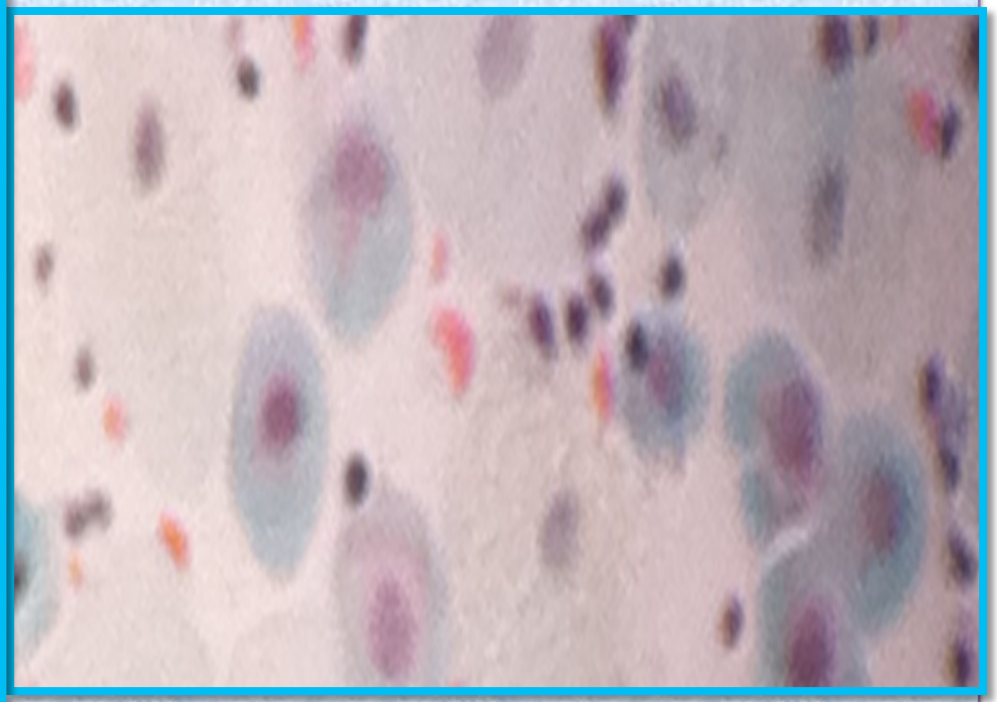
PostMenopause MI = 100/0/0

Increase no. of parabasal cells

Complete atrophy of vaginal epithelium, thin in thickness without superficial cell nor intermediate cells.

Atrophic smear





TYPICAL MATURATION INDEXES

Day 14 – Ovulation	**MI = 0:40:60**	**Indicates mostly estrogen stimulation.**
Day 28– Premenstrual	**MI = 0:70:30**	**Indicates mostly progesterone stimulation.**
Pregnancy	**MI = 0:95:5**	**Indicates mostly progesterone stimulation.**
Pregnancy>1st trimester	**MI = 0:100:0**	**Progesterone only, no estrogen.**
premenopausal **Menopausal**	**MI = 0:80:20** **MI = 50:50:0**	**Declining estrogen**
Postmenopausal (atrophic smear)	**MI = 100:0:0**	**No progesterone, no estrogen**

Note:

- A patient's MI can vary on a daily basis, and of course MI vary from patient to patient.

- There are only two absolutes when it comes to cellular patterns in an MI: the first is that a predominance of parabasal cells indicates an absence of hormone stimulation, and second is that a predominance of superficial cells indicates estrogen stimulation.