

# Practical-4

## Hormonal Evaluation (MI evaluation)

- ❑ The Maturation Index from a Pap Smear

- ❑  $MI = \frac{\% \text{ Parabasal Cells}}{\% \text{ Intermediate Cells} + \% \text{ Superficial Cells}}$

- ❑ Additional Use of Pap Smear

- ❑ Interfering Factors in Pap Testing

- ❑ Specimen requirements

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# Hormonal Evaluation (MI evaluation)

## Additional Use of Pap Smear:

**Request Maturation Index (MI) evaluation.**

## The maturation index (MI):

- **Is a ratio obtained through performing a random count of three major cell types:**

- 1. Parabasal cells**
- 2. Intermediate cells**
- 3. Superficial cells**

**That are shed from the squamous epithelium.**

- **MI based on the assumption that the sex hormones (Estrogen and Progesterone) brings about maturation in squamous cells which can be detected by cytological examination.**

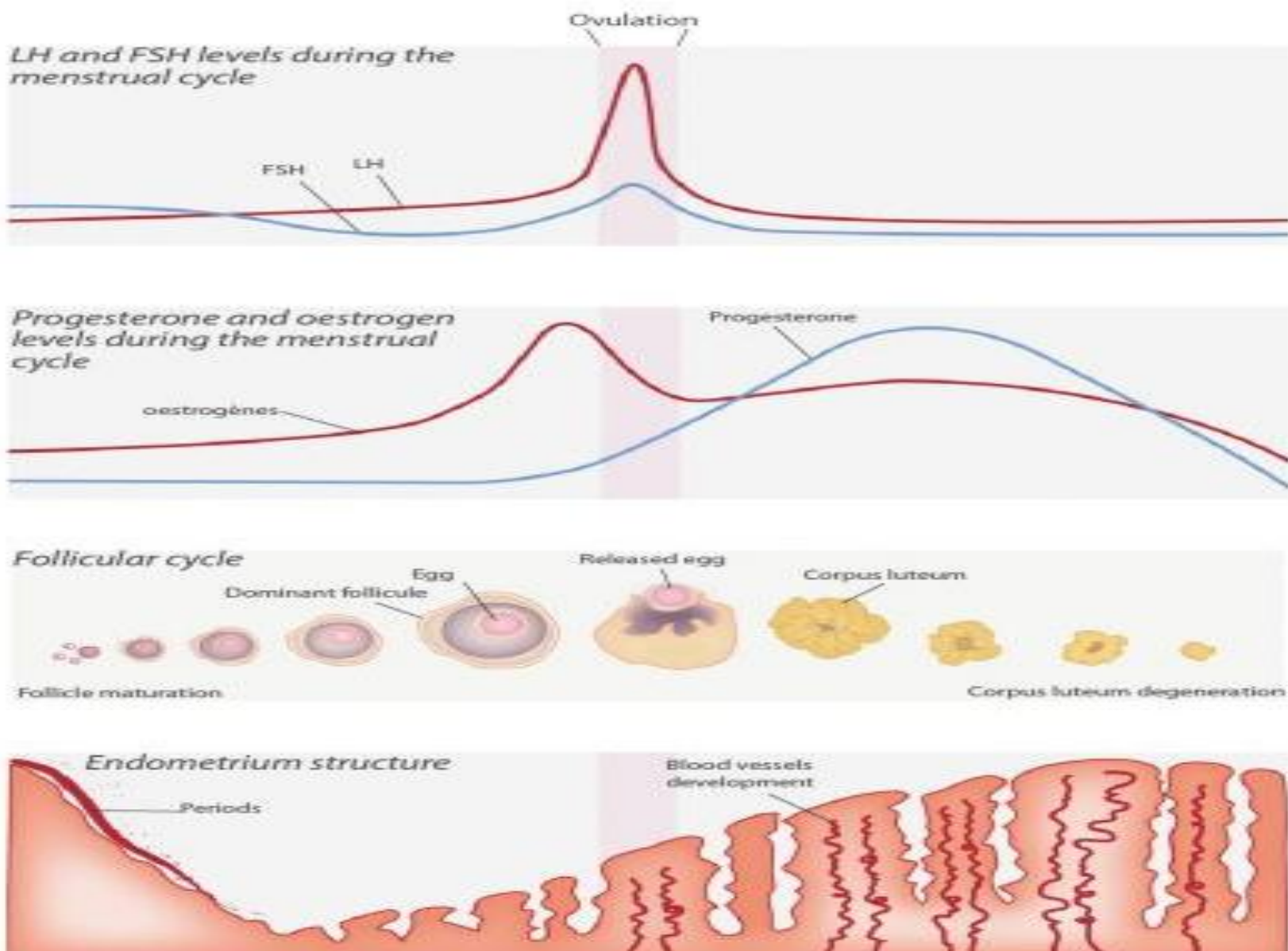
### **Uses of Maturation Index:**

- **Used to evaluate hormones:**
  - **Reflects Estrogen effect**
  - **Reflects progesterone balance**
- **Helps in the evaluation of therapies designed to treat vaginal hormonal symptoms.**

- **Sample for Hormonal Evaluation (Maturation Index):**  
A separate lateral vaginal wall smear/specimen is required.
- **In some cases a maturation index may not be performed due to certain conditions such as:**
  - Cellular Atypia
  - Excessive inflammation
  - Presence of bacteria or blood.
- **Conditions of Hormonal imbalance include:**  
Pituitary & ovarian dysfunction, menopause, and malignancies



# Menstrual Cycle



**Estrogens are promoters of tissue growth**, stimulating the proliferation of cells in the endometrium (the blood-rich lining of the uterus that is shed during menstruation).

The cell count is expressed as a percentage that reads as follows:

MI=% parabasal cells,  
% intermediate cells,  
% superficial cells.

Parabasal cells are the least mature cells have not been affected by estrogen or progesterone.

Intermediate cells display mild maturation, have been affected by progesterone.

Superficial cells display the most maturity, have been affected by estrogen.

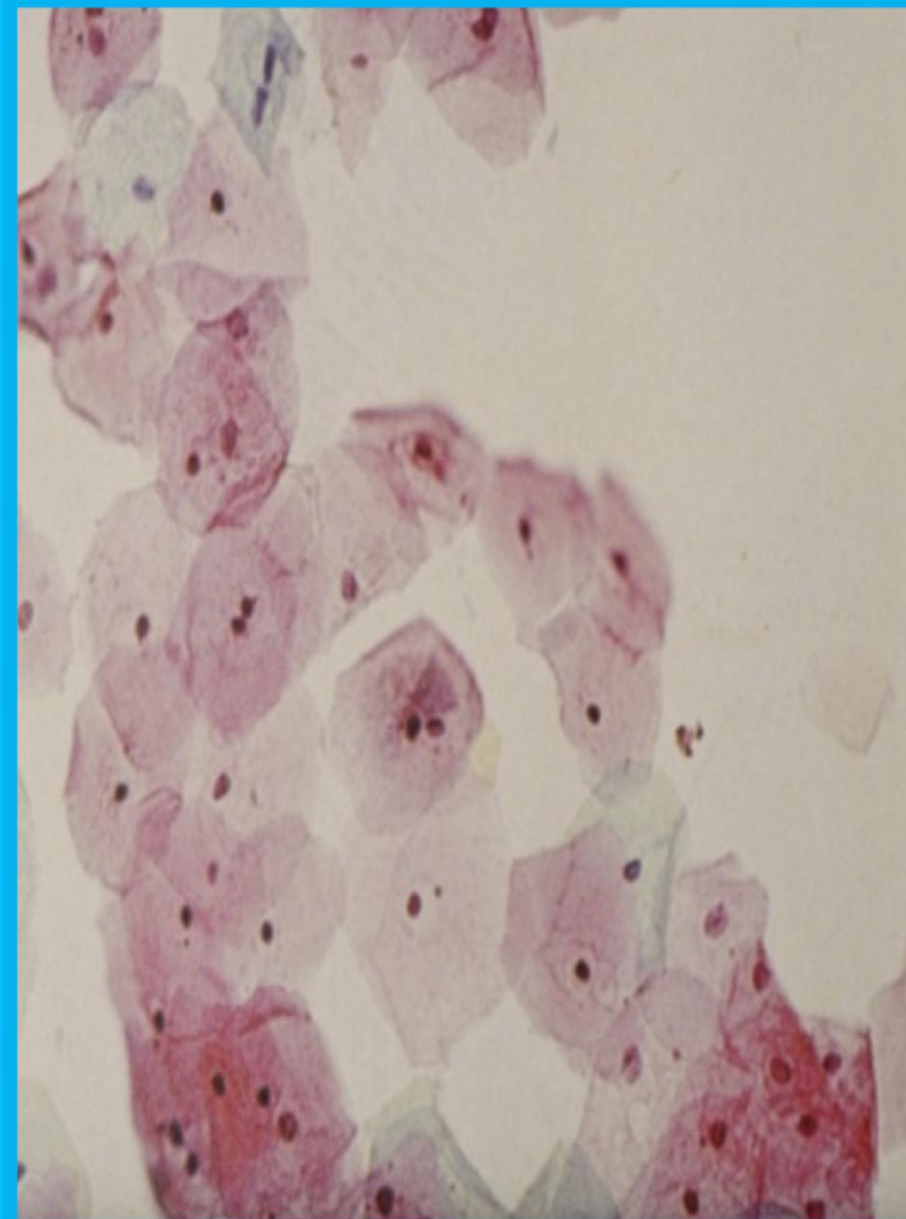
## There are only two absolutes when it comes to cellular patterns in an MI:

1. The first is that a predominance of **parabasal cells** indicates an **absence of estrogen stimulation**.
  2. The second is that a predominance of **superficial cells** indicates an **estrogen stimulation**.
- ✓ Intermediate cells have little clinical usefulness.
  - ✓ **The higher the number of mature cells** (the 'superficial' and 'intermediate') **the higher the maturation index or estrogen effect in the body.**



# Proliferative phase ; MI = 0/40/60

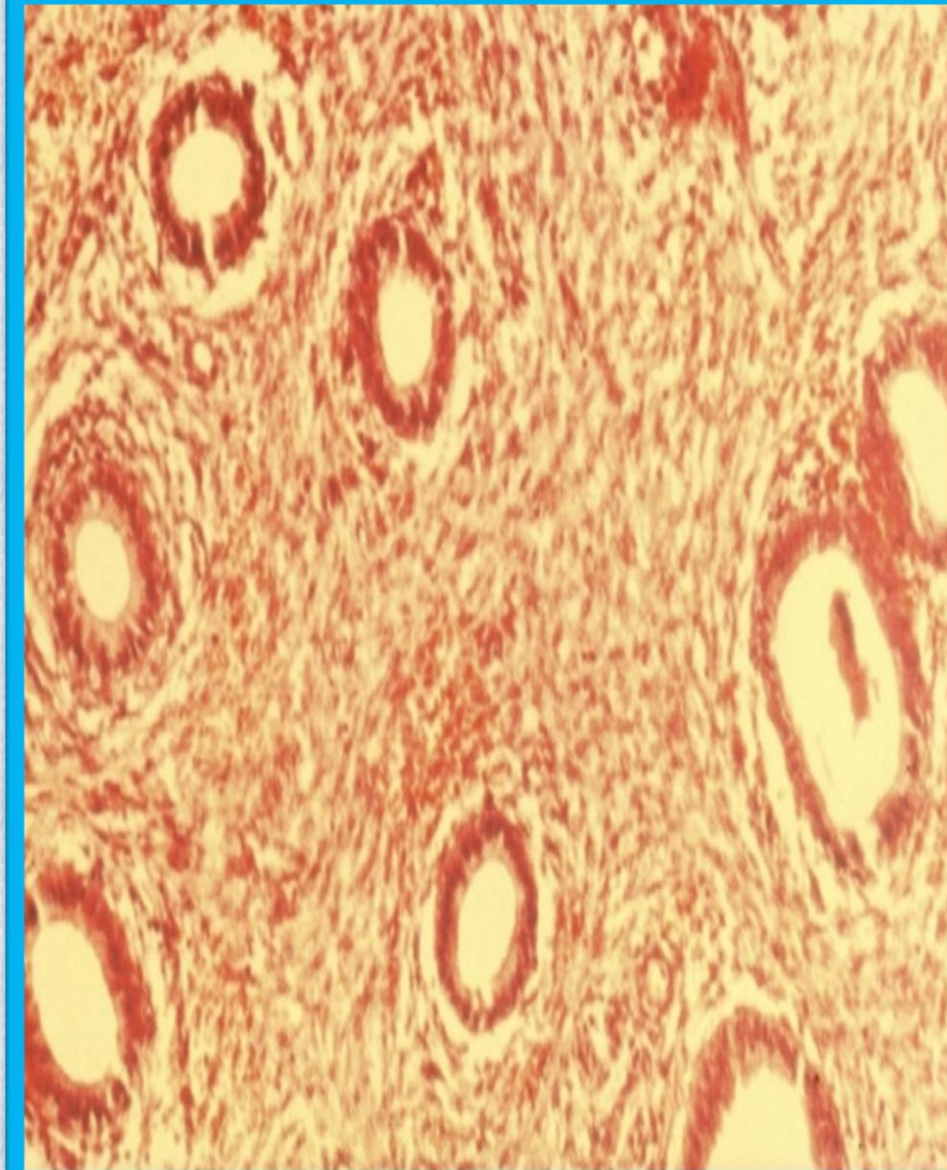
- Increase estrogen level.
- Gradually increase of the superficial cells.
- Clean background.
- No endometrial cells.
- Less folding & clumping.





# Proliferative phase of Endometrium

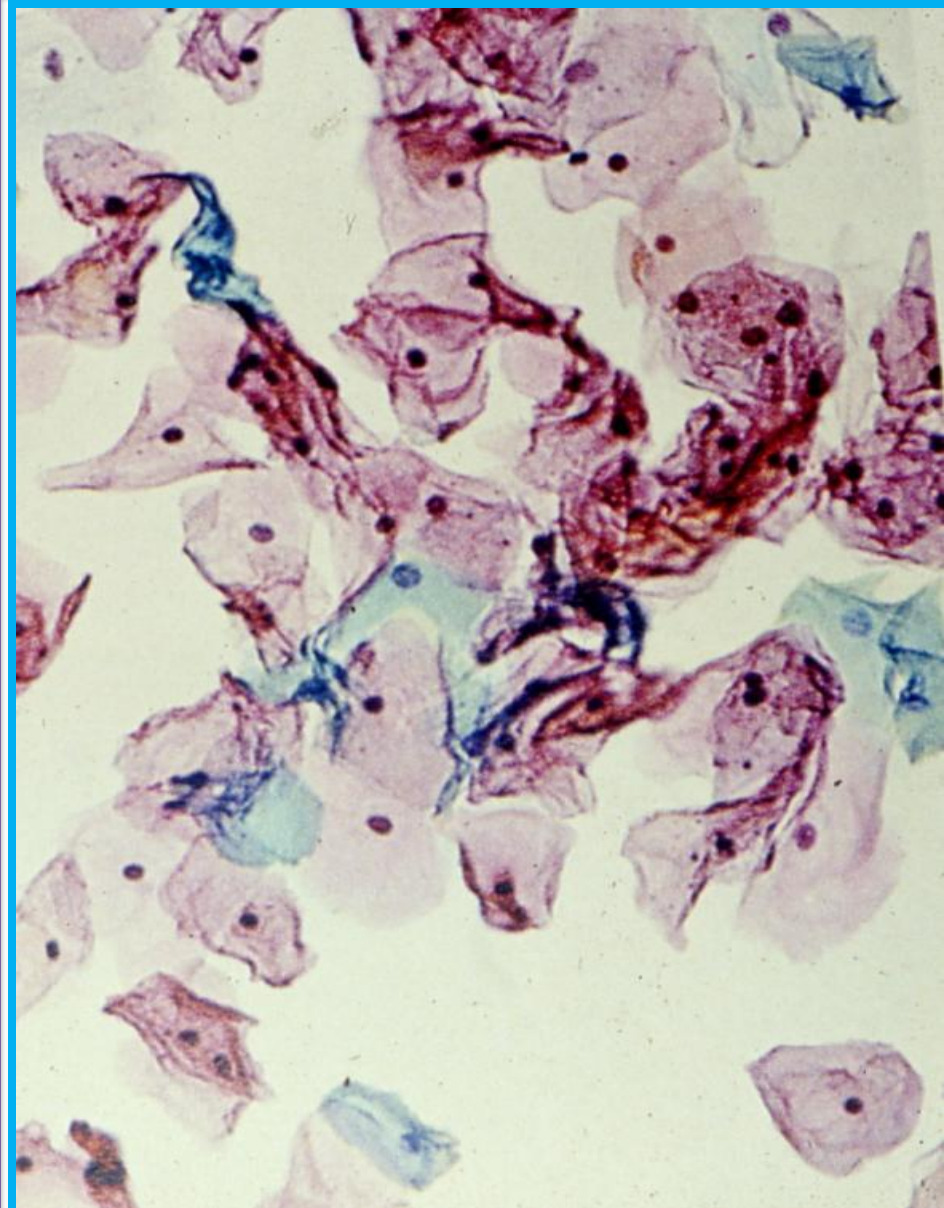
- Glands are uniform in size, shape and distribution appearing round or tube shaped according to the direction of cutting.
- Glands is lined by one row of tall columnar epithelial cells with central oval nuclei, some nuclei show mitosis.
- The stroma cells are elongated with deeply stained and scanty cytoplasm.





# Secretory (Luteal) phase; MI = 0/70/30

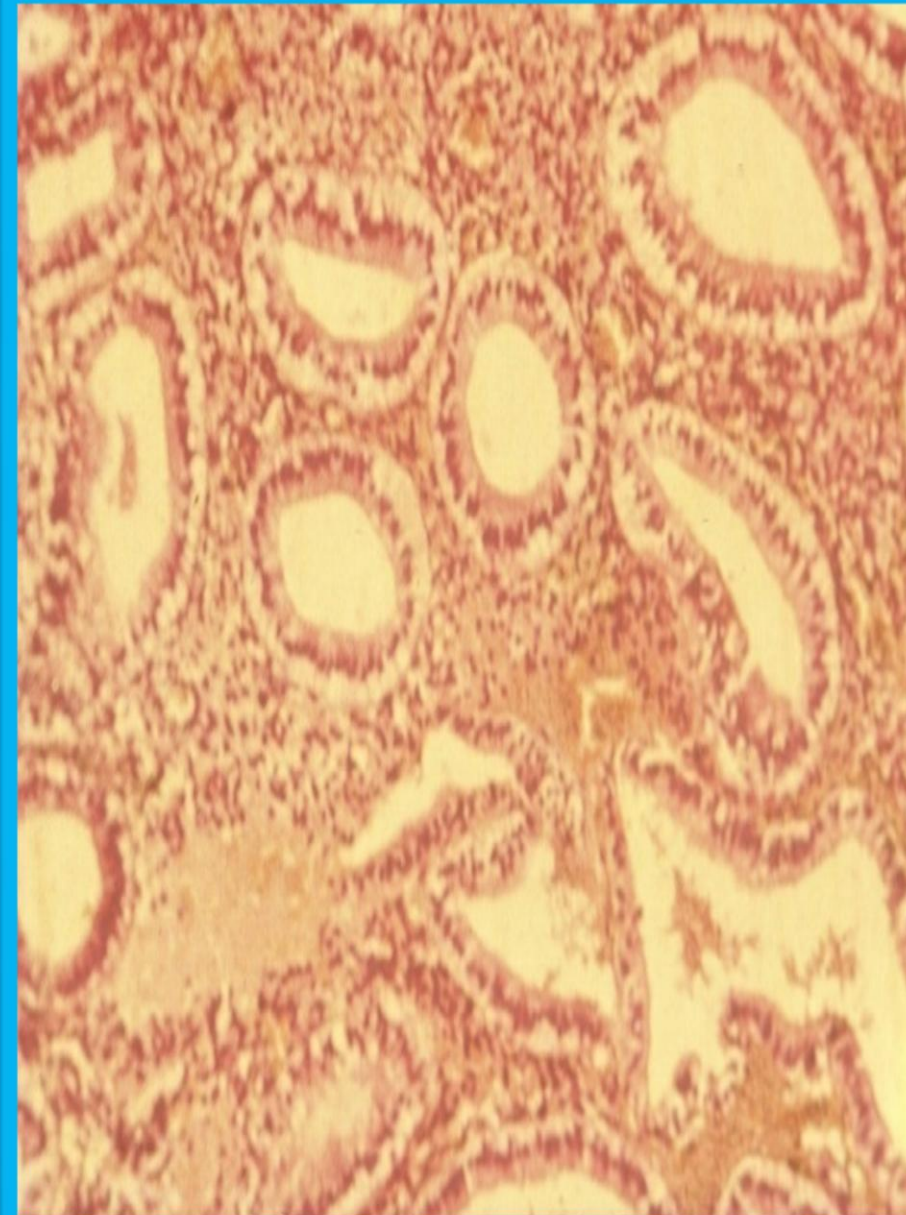
- Increase intermediate cells.
- Folding of the cells.
- After ovulation. number of superficial cells decrease rapidly shortly before start of menstruation phase.
- Some endocervical cells may be found.
- WBC's and no bacteria.





# Secretory phase of Endometrium

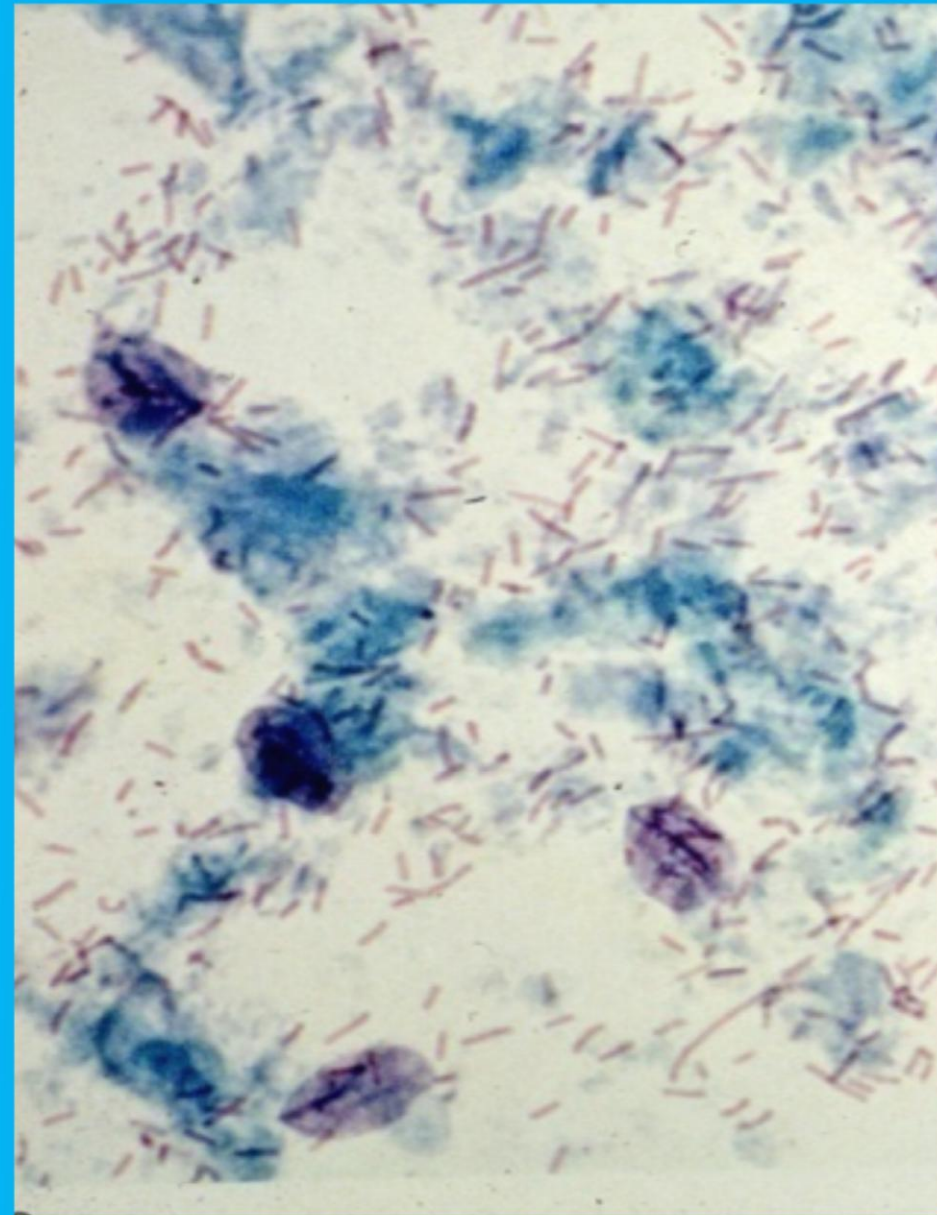
- Endometrial Glands are lined by one layer of cubical cells with round nuclei.
- The cells contain secretory vacuoles below or above each other.
- The stroma is congested, oedematous and shows small areas of haemorrhage and few scattered polymorphs.
- Stromal cells are rounded with abundant cytoplasm.





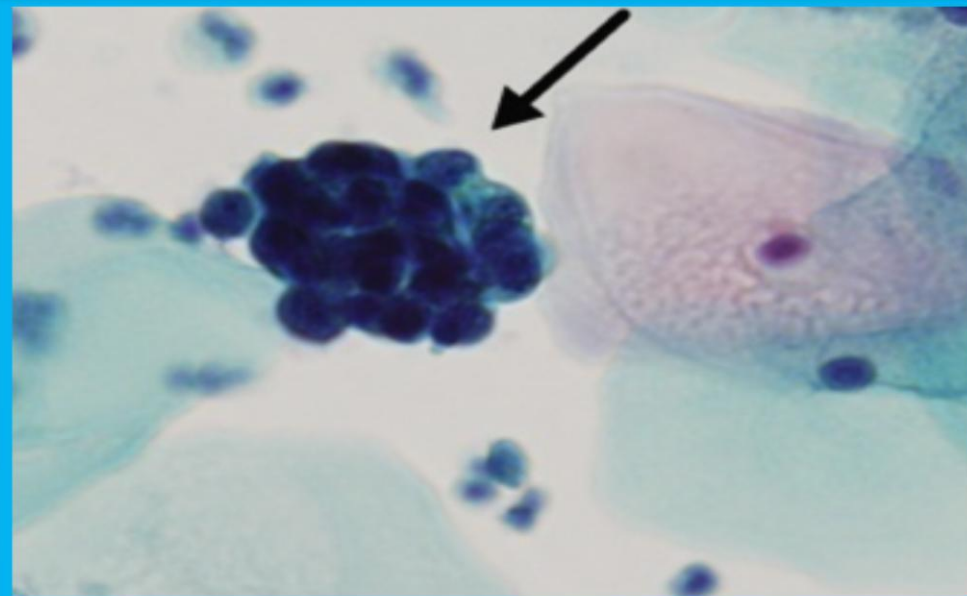
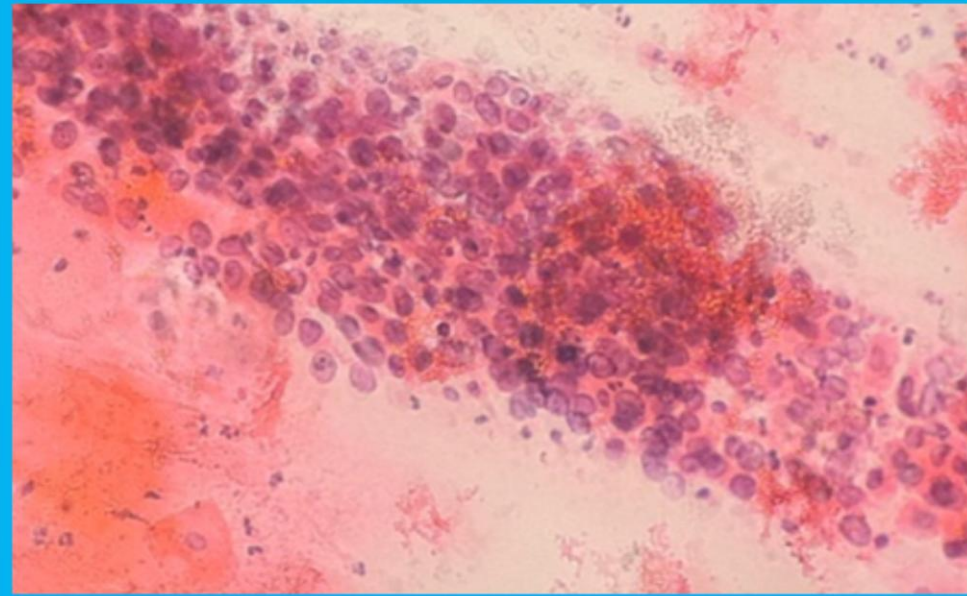
# Late Secretory Phase

- Increase number of lactobacilli.
- Cytolysis of intermediate cells with dirty background



# Menstrual phase (1-5 day):

- RBC's.
- WBC's.
- Bacteria.
- Endometrial cells, most abundant during the 3-5 days of the menstrual cycle, more often shed in groups.
- Intermediate cells.
- Superficial cells.





## Pregnancy;

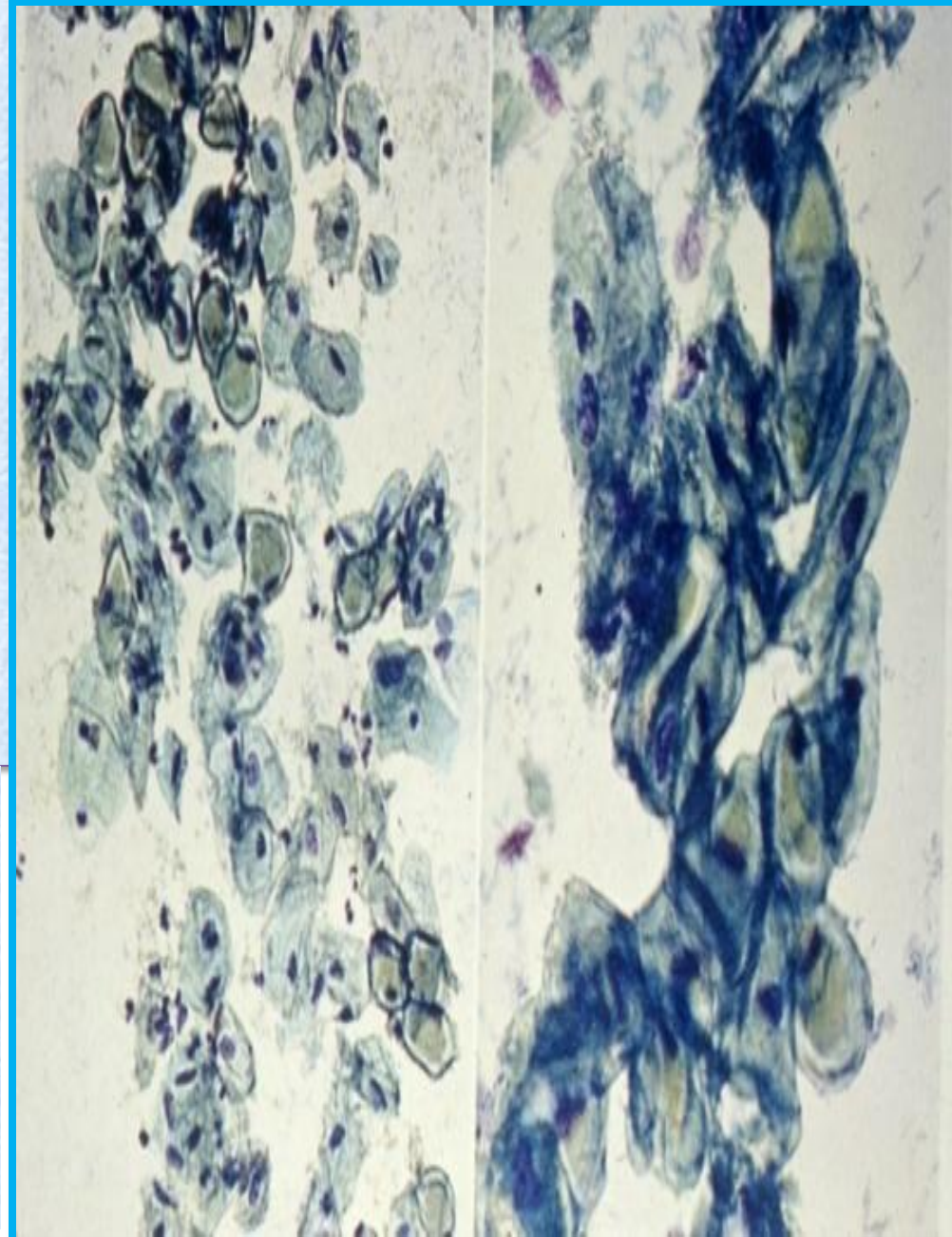
MI = 0/90/10

- Marked increase estrogen and progesteron.
- Increase number of intermediate cells.

## Pregnancy;

MI = 0/100/0

- After 4 months of pregnancy almost only intermediate cells seen.
- Progesterone only no estrogen.

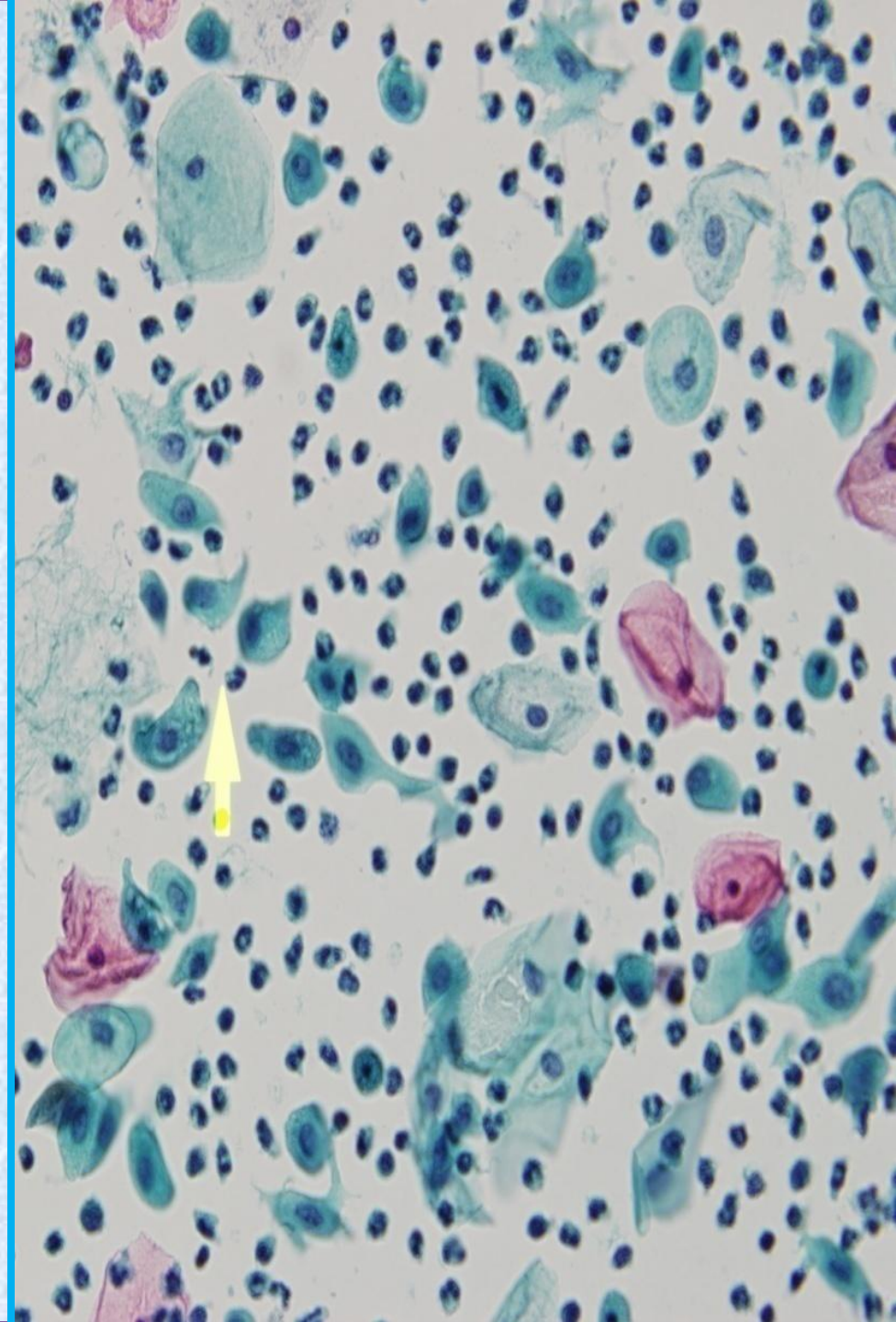




# Atrophic Vaginitis

- Menopausal women with predominately basal cells = Atrophic vaginitis
- It occurs when estrogen hormone is lacking in the body.
- Vaginal atrophy can occur in the early years leading up to menopause = the early-menopause.

- Multiple small round parabasal cells.
- Nuclear size often shows increased range with scattered cells with enlarged nuclei but with an even chromatin pattern.
- Abundant intra-cytoplasmic glycogen may be seen.
- Endocervical cells frequently identified often appear cuboidal with scanty cytoplasm.
- Intermediate squamous cells.
- More single cells.
- More sheets of cells.

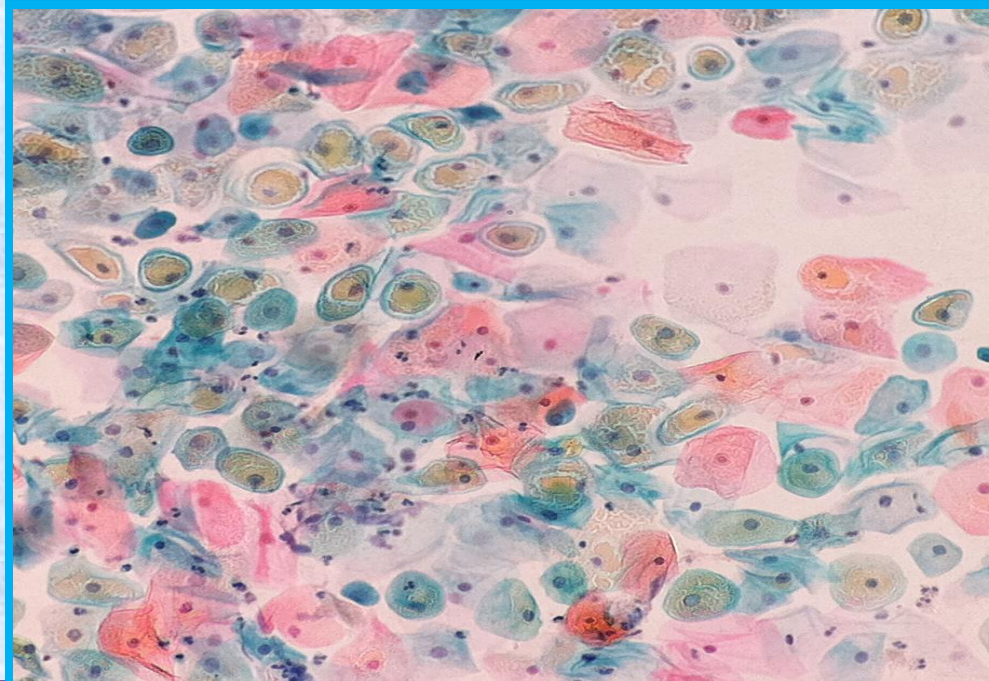
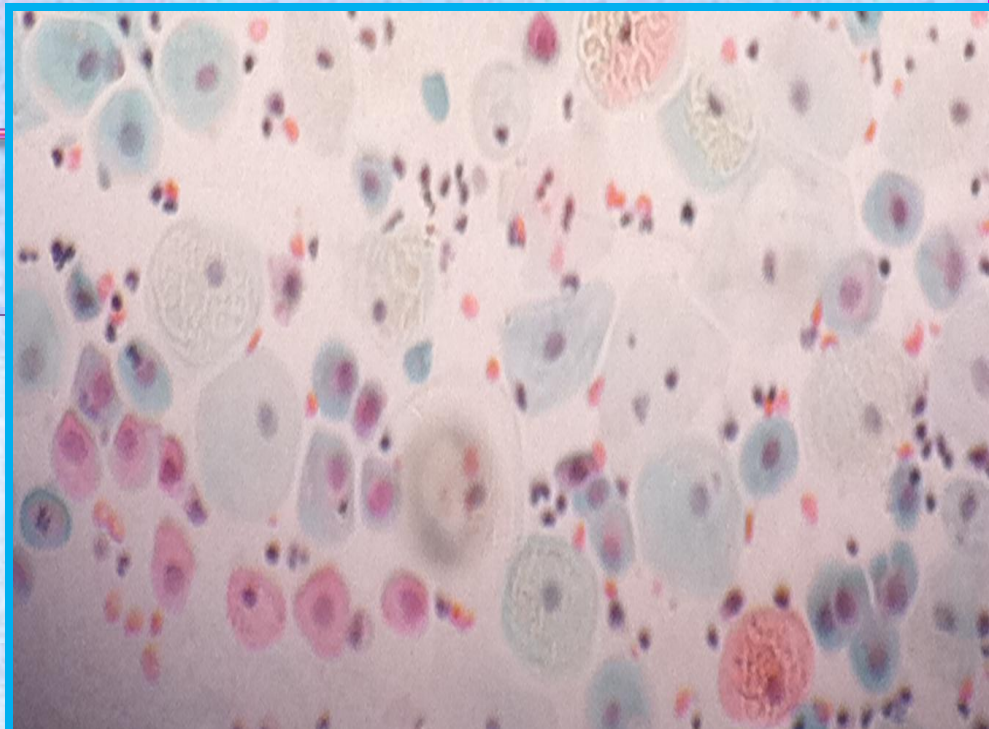




# Menopause / Atrophic

## MI = 50/50/0

- Progressive decrease of estrogen.
- Increase parabasal cells with some glycogen in cytoplasm.
- Increase no. of WBC's.





Late menopause;  
MI = 100/0/0

- Increase no. of parabasal cells with no glycogen.
- Complete atrophy of vaginal epithelium, thin in thickness without superficial cell.

