

## \* Female Sex Hormone

### or, Endocrine function of Ovary: →

The endocrine function of ovaries commence just before puberty and continue upto menopause. As against testis which have continued endocrine function, the ovaries secrete their hormone in cyclic fashion.

The hormone elaborate by ovaries are  
i) Estrogen      ii) Progesteron      and      iii) Relaxin

In addition of these three, they also secrete minute amount of androgens.

i) Estrogen → All substances producing estrous and vaginal cornification are said to be oestrogenic substances. This hormone was isolated first in 1929 by DOISY and BUPENANDT.

source: → a) The chief sources of estrogen hormone are the ovaries, the placenta, the adrenal cortex and the testis.

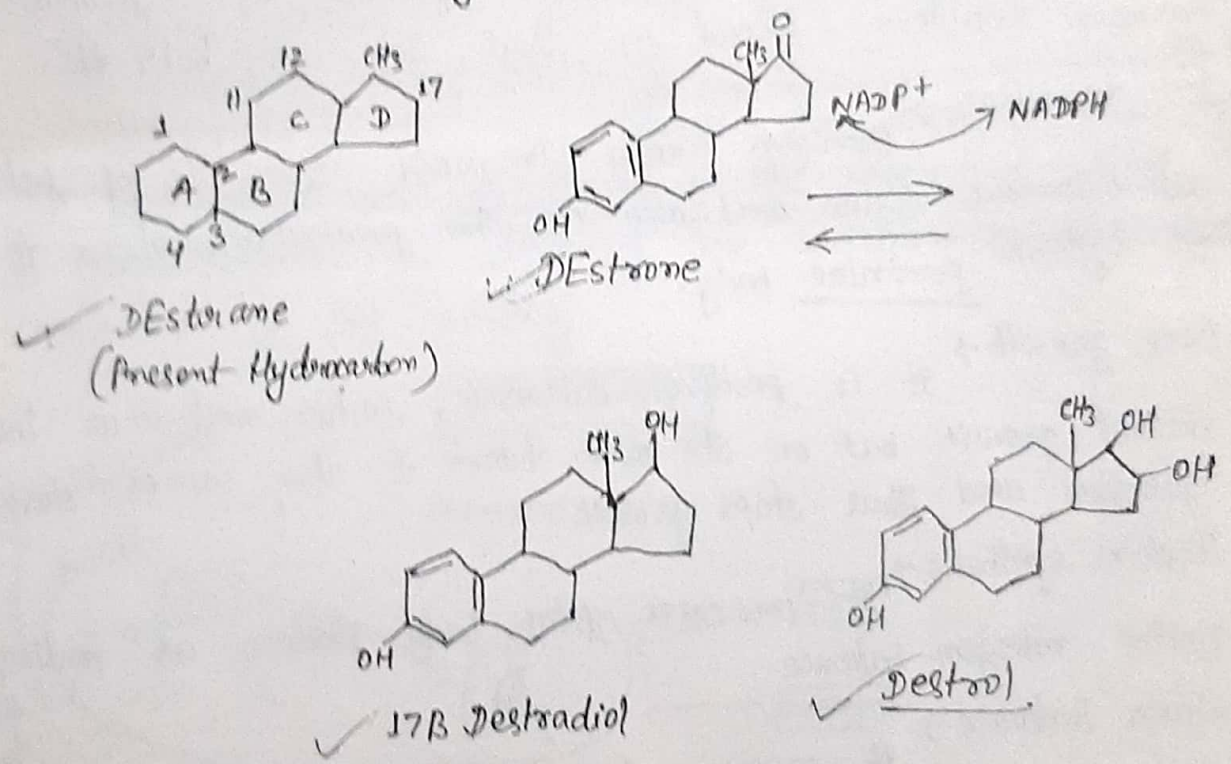
b) In non-pregnant female, the chief sources of this hormone is ovarian graffian follicle while most of the estrogen present in the pregnant female is produced by placenta.

c) The main site of estrogen production (in non-pregnant mature women) is theca interna cells of mature graffian follicle.



Nature →

- It is steroid in nature, consisting of cyclopentaenoperhydro phenanthrene ring as their basic chemical nucleus.
- There are 3 primary oestrogen has been isolated in female from tissue as well as from urine. These are closely related to each other.
- a) DEsterone } These were isolated from adult female urine by
- b) DEsteride } Marriam, 1930.
- c) DEsteradiol → 17B isolated from ovarium tissue in 1935.
- The principal among them is Esteradiol 17-B producing by the human ovary. It is excreted as sulphate as estrone, estrol or other closely related substances.



- The oestrogenic hormone secretion is periodically stimulated by FSH by adenohypophysis.



## Function →

- 1) Responsible for all the puberty change such as →
  - a) Growth of uterus, vagina, stratification of vaginal epithelium.
  - b) Increase contractility, secretion and ciliary movement of the fallopian tube.
  - c) Development of breast.
  - d) Menstrual change
  - e) Appearance of secondary sexual characters.
- 2) - Secondary sex characters → It is responsible for the development of secondary sexual character in female. eg. → formation of narrow shoulders, broad hip, thigh, less body hair etc.
- 3) Fat deposition → Estrogen causes increased deposition of fat in sub-cutaneous tissue and also in other particular regions to make a typical feminine body.
- 4) Bone growth → It is positive calcaemic factor and thus increase skeletal growth but on the other hand it also causes closure epiphysis and thus stops growth.
- 5) Protein synthesis → It increases total body protein as indicated by positive nitrogen balance.
- 6) Water balance → It causes water, Na & Ca retention, increases the blood volume and water content of muscles.
- 7) Stimulates ACTH secretion → Estrogen stimulates the secretion of ACTH from anterior pituitary and causes hypertrophy of adrenal cortex.



- 8) Synergistic action with androgen → In male estrogen acts synergistically with androgens and helps in the develop<sup>ment</sup> of secondary sex hormones.
- 9) Relation with Progesterone corpus Luteum → Estrogen and Progesterone often act synergistically in menstrual changes and breast formation.
- 10) Ant. Pituitary Relation → Estrogen ~~is~~ inhibits the secretion of FSH from ant. pituitary.
- 11) Responsible for the Menstruation → It is responsible for the proliferative stages of menstruation.
- 12) Growth of Uterus → The enormous growth of uterus is believed to be estrogens during pregnancy.

Although the hormone helps to control the development and functioning of the mammary gland it appears to inhibit lactation by inhibiting the secretion of the lactogenic hormone by the pituitary.

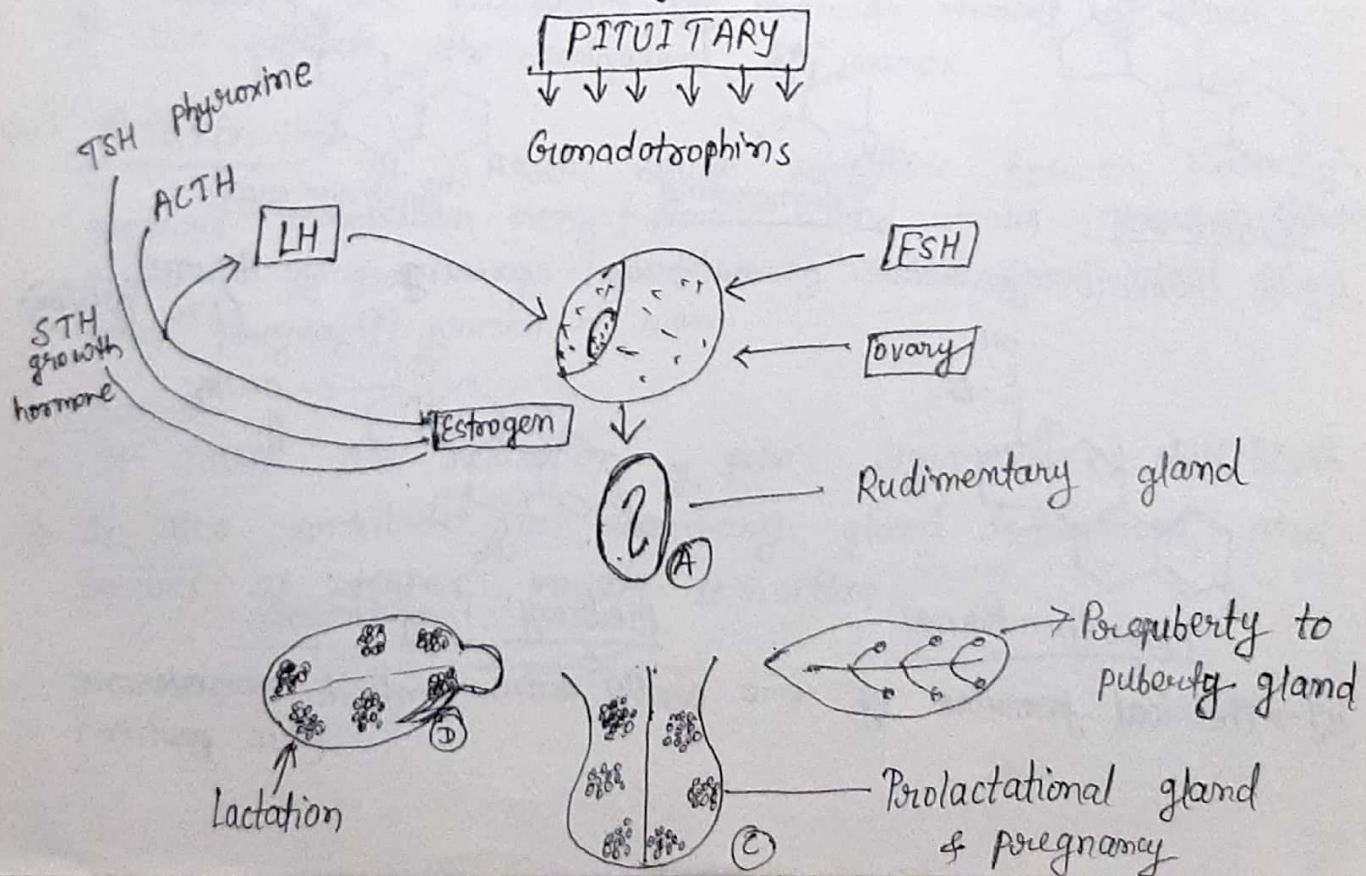




fig → A simplified diagram showing the action of hormone on mammary growth and lactation (A) The gland before the age of 10 years (B) The gland just before puberty. (C&D) Gland after the action of hormone.

## <ii> Progesterone :-

It is the active principle of corpus luteum.

Source → 1) The chief source of this hormone is corpus luteum of the ovary, placenta and adrenal cortex.

⇒ from placenta during later period of the pregnancy.

⇒ From adrenal cortex, secreted as a precursor of both  $C_{19}$  &  $C_{21}$  corticosteroids.

⇒ From ovary after ovulation.

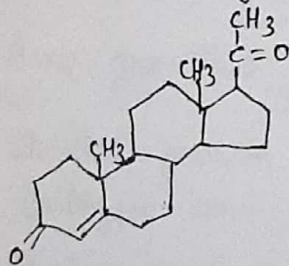
2) It is also produced from the testis in very small amount.

Nature → 1) It is steroid in nature.

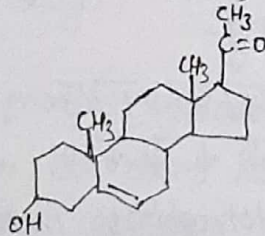
2) It is synthesized from cholesterol.

3) The chief excretory product of progesterone is pregnenediol

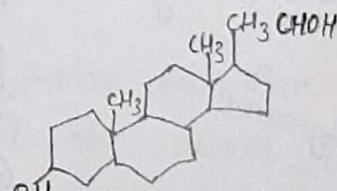
recovered from the urine indicates a progestational endometrium.



Progesterone

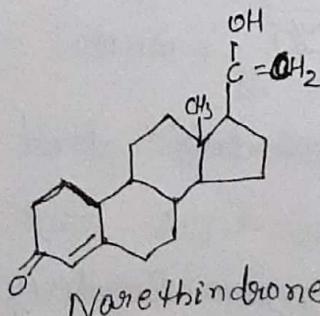


Pregnenolone

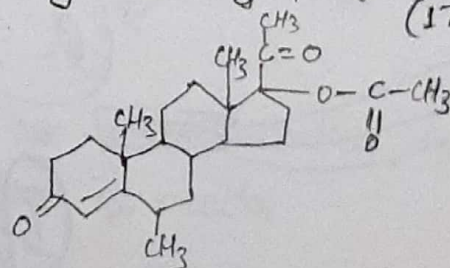


Pregnenediol

fig → chemical formulae of naturally occurring progesterone (17C position)



Narethindrone



Medroxy Progesterone

fig → chemical formulae of some orally active synthetic progesterone (21C position)



Functions -

- 1) Maintenance of Pregnancy -> It is essential for maintenance of pregnancy and various other changes associated with. It also takes part in menstrual cycle.
- 2) Development of Breast -> Breast develop fully during pregnancy chiefly due to the proliferation of glandular elements.
- 3) Inhibition of MC & ovulation -> During pregnancy maturation of follicle, ovulation & MC are inhibited also. Progesterone inhibits LH secretion & thus ovulation stop.
- 4) Enlargement of birth canal -> At full term birth canal enlarge due to growth of vagina & relaxation of pelvic ligaments.
- 5) Protein catabolic action -> Progesterone has slight protein catabolic activity.
- 6) Water and salt metabolism -> It causes mild salt and water retention but administered to man or woman it causes salt loss. Synthetic progesterone has a mild sodium retaining effects.
- 7) Respiration -> Progesterone stimulates respiration because in woman during the luteal phase of MC the alveolar space is lower than in males.
- 8) It reduces the excitability of muscular element of uterus. It also regulate the development of placenta.

(iii) Relaxin -> It is water soluble polypeptide hormone present in pregnant mammalian ovary, placenta and uterus. This non-steroid hormone of pregnancy hasn't been isolated from blood of either pregnant women or men.

Function ->

- 1) It causes the relaxation of pelvic ligament at child birth.
- 2) It also contributes to mammary gland development and inhibits of uterine muscle contraction.

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