Estrogens and Androgens

Part 2

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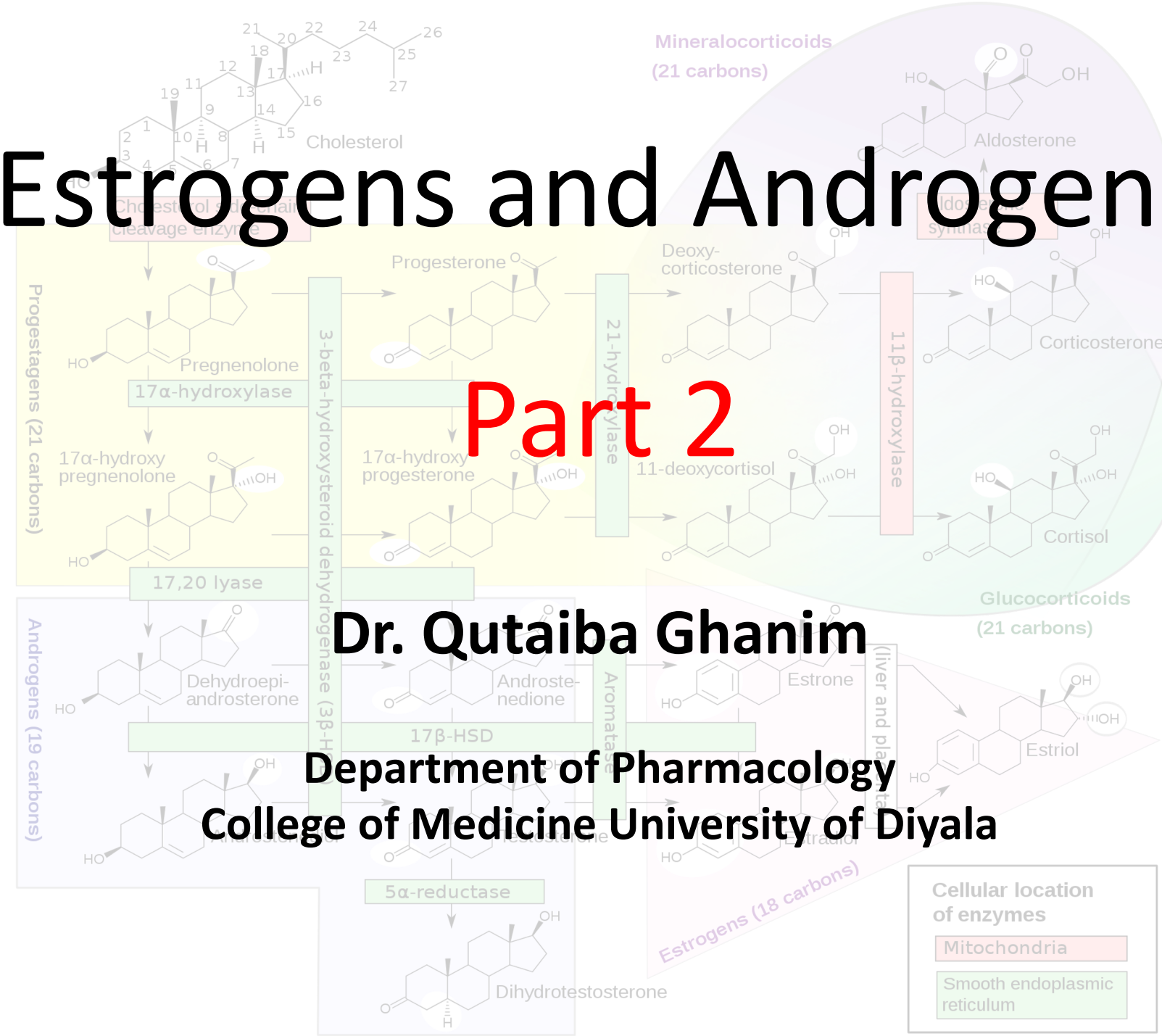
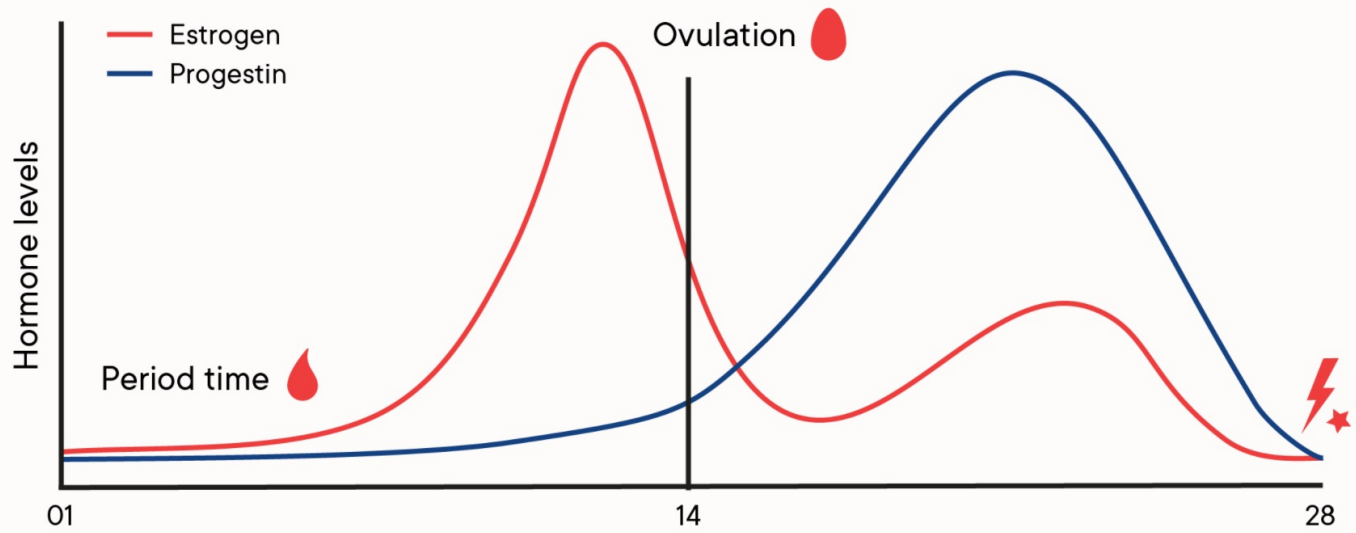
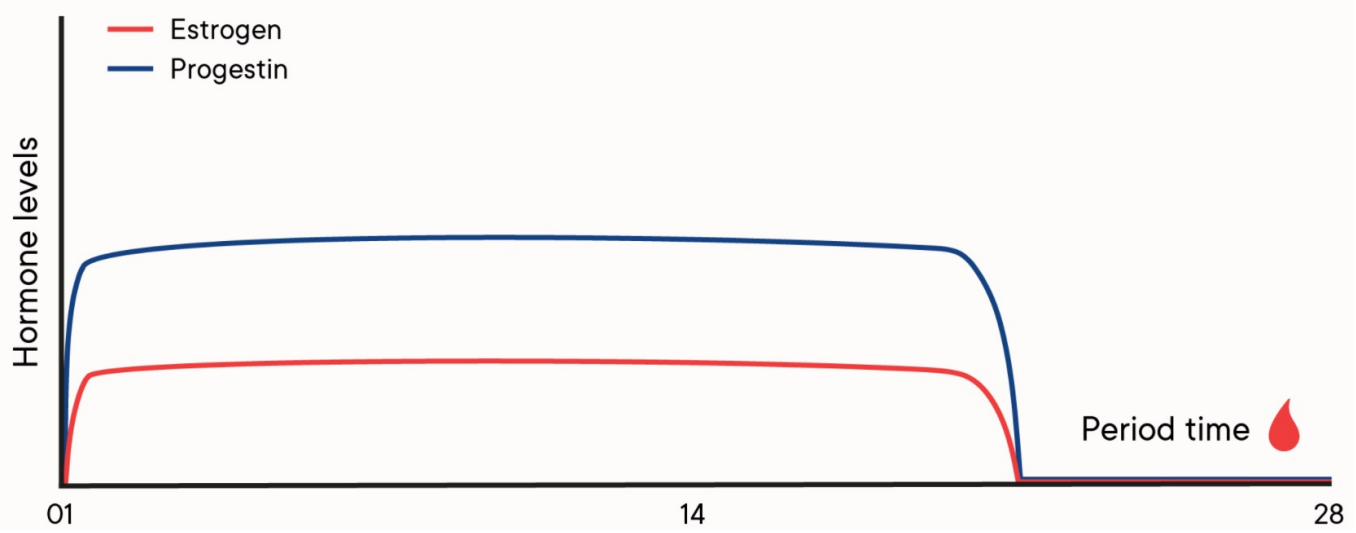




Hormone changes in an average cycle



Hormones levels for people using combination pill of contraceptive

Contraceptives

1. **Combination oral contraceptives:** Products containing a combination of an estrogen and a progestin are the most common type of oral contraceptives. Monophasic combination pills contain a constant dose of estrogen and progestin given over 21 to 24 days.

- Triphasic oral contraceptive products attempt to mimic the natural female cycle and most contain a constant dose of estrogen with increasing doses of progestin given over three successive 7-day periods.

- With most oral contraceptives, active pills are taken for 21 to 24 days, followed by 4 to 7 days of placebo, for a total regimen of 28 days. Withdrawal bleeding occurs during the hormone-free (placebo) interval.

- The most common estrogen in the combination pills is **ethinyl estradiol**.

- The most common progestins are **norethindrone, norethindrone acetate, levonorgestrel, desogestrel, norgestimate, and drospirenone.**

Contraceptives

- Use of extended-cycle contraception (84 active pills followed by 7 days of placebo) results in less frequent withdrawal bleeding. A continuous oral contraceptive product (active pills taken every day) is also available.

2. Transdermal patch: An alternative to combination oral contraceptives is a transdermal patch containing **ethinyl estradiol and the progestin norelgestromin**.

- One contraceptive patch is applied each week for 3 weeks to the abdomen, upper torso, or buttock. No patch is worn during the 4th week, and withdrawal bleeding occurs.

- The transdermal patch has efficacy comparable to that of the oral contraceptives, but it is less effective in women weighing greater than 90 kg.

3. Vaginal ring: contains **ethinyl estradiol and etonogestrel**. The ring is inserted into the vagina and is left in place for 3 weeks and then removed. No ring is used during the fourth week, and withdrawal bleeding occurs.

Contraceptives

4. Progestin-only pills: Products containing a progestin only, usually **norethindrone** (called a "mini-pill"), are taken daily on a continuous schedule.

- Progestin-only pills deliver a low, continuous dosage of drug. These preparations are less effective than combination products, and they may produce irregular menstrual cycles more frequently.

- The progestin-only pill may be used for patients who are breast-feeding (unlike estrogen, progestins do not have an effect on milk production), are intolerant to estrogen, are smokers, or have other contraindications to estrogen-containing products.

5. Injectable progestin: ***Medroxyprogesterone acetate*** is a contraceptive that is administered via intramuscular or subcutaneous injection every 3 months. Weight gain is a common adverse effect.

6. Progestin implants: After subdermal placement, the **etonogestrel** implant offers contraception for approximately 3 years. The implant is nearly as reliable as sterilization, and the effect is totally reversible when surgically removed.

Contraceptives

7. Progestin intrauterine device: A **levonorgestrel-releasing intrauterine system** offers a highly effective method of contraception for 3 to 5 years depending on the system. It is a suitable method of contraception for women who desire long-term contraception and those who have contraindications to estrogen therapy.

8. Postcoital or emergency contraception: it reduces the probability of pregnancy after an episode of coitus without effective contraception to between 0.2% and 3%.

- Emergency contraception uses high doses of **levonorgestrel** (preferred) or high doses of **ethinyl estradiol plus levonorgestrel**.

- For maximum effectiveness, emergency contraception should be taken as soon as possible after unprotected intercourse and preferably within 72 hours.

- The progestin-only emergency contraceptive regimens are generally better tolerated than the estrogen–progestin combination regimens.

Contraceptives

- An alternative emergency contraceptive is the progesterone agonist/antagonist ***ulipristal***. It is indicated for emergency contraception within 5 days of unprotected intercourse.

- **Mechanism of action:** Estrogen provides a negative feedback on the release of LH and follicle-stimulating hormone (FSH) by the pituitary gland, thus preventing ovulation. Progestin also thickens the cervical mucus, thus hampering the transport of sperm. Withdrawal of the progestin stimulates menstrual bleeding during the placebo week.

Androgens

- The androgens are a group of steroids that have anabolic and/or masculinizing effects in both males and females.

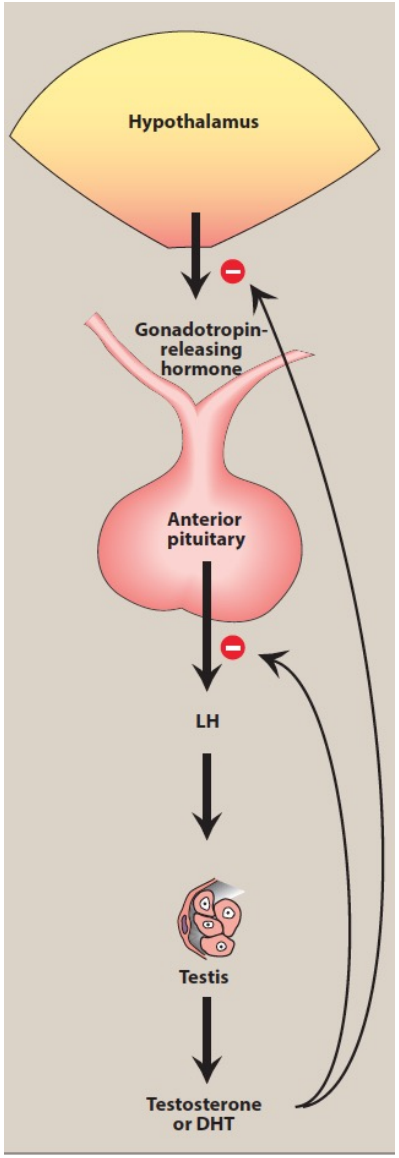
- **Testosterone**, the most important androgen in humans, is synthesized by Leydig cells in the testes and, in smaller amounts, by thecal cells in the ovaries and by the adrenal gland in both sexes.

- Other androgens secreted by the testes are **5α-dihydrotestosterone (DHT), androstenedione, and dehydroepiandrosterone (DHEA)** in small amounts.

- In adult males, testosterone secretion by Leydig cells is controlled by gonadotropin-releasing hormone from the hypothalamus, which stimulates the anterior pituitary gland to secrete FSH and LH. Testosterone or its active metabolite, DHT, inhibits production of these specific trophic hormones through a negative feedback loop and, thus, regulates testosterone production.

- The androgens are required for 1) normal maturation in the male, 2) sperm production, 3) increased synthesis of muscle proteins and hemoglobin, and 4) decreased bone resorption.

- **Mechanism of action:** Like the estrogens and progestins, androgens bind to a specific nuclear receptor in a target cell. Although testosterone itself is the active ligand in muscle and liver, in other tissues it must be metabolized to derivatives, such as DHT.



Androgens

- **Therapeutic uses:** Androgenic steroids are used for males with primary hypogonadism (caused by testicular dysfunction) or secondary hypogonadism (due to failure of the hypothalamus or pituitary).

- Anabolic steroids can be used to treat chronic wasting associated with human immunodeficiency virus or cancer.

- ***DHEA*** (a precursor of testosterone and estrogen) has been touted as an antiaging hormone as well as a "performance enhancer." There is no definitive evidence that it slows aging, however, or that it improves performance at normal therapeutic doses.

- ***Danazol***, a weak androgen, is used in the treatment of endometriosis (ectopic growth of the endometrium) and fibrocystic breast disease. Weight gain, acne, decreased breast size, deepening voice, increased libido, and increased hair growth are among the adverse effects.

• Antiandrogens:

- Antiandrogens counter male hormonal action by interfering with the synthesis of androgens or by blocking their receptors. **Finasteride and dutasteride** inhibit 5α-reductase resulting in decreased formation of dihydrotestosterone. These agents are used for the treatment of benign prostatic hyperplasia.

- Antiandrogens, such as ***flutamide, bicalutamide, enzalutamide, and nilutamide***, act as competitive inhibitors of androgens at the target cell and are effective orally for the treatment of prostate cancer.


Thank You!