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COURSE: PHA 304 (ENDOCRINE AND REPRODUCTIVE SYSTEM)

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**ASSIGNMENT**

Q1. WRITE ON THE ESTROGENS AND PROGESTINS

Q2. DRUGS USED AS ANTIFERTILITY DRUGS

**OESTROGEN**

Oestrogens are hormones that are important for sexual and reproductive development, mainly in women. They are also referred to as female sex hormones. The term "oestrogen" refers to all of the chemically similar hormones in this group, which are estrone, estradiol (primary in women of reproductive age) and estriol.

Therapeutic uses

1. These Hormones appear to prevent coronary atherosclerosis in women before menopause because of an alteration in the composition of circulating lipids.

2. Because of feminizing effects, estrogen therapy in males is limited.

3. One of the primary therapeutic uses is in the treatment of menopausal symptoms such as hot flashes, chilly sensations, dizziness, fatigue, irritability, and sweating.

4. For many women, menopause does not cause much discomfort; in some, however, both physical and mental discomfort may occur and can usually be prevented through estrogen therapy.

5. One of the most widespread uses of oestrogens is in birth control. These hormones are used in postmenopausal osteoporosis because it is thought that an estrogen deficiency in postmenopausal women can lead to this serious disorder of the bone.

6. Hormone Replacement Therapy: Another major use of oestrogens is in HRT for postmenopausal women. For this use, a progestin is often included to oppose the effects of oestrogens on endometrial tissue.

7.Treatment of Estrogen Deficiency from Ovarian Failure or After Oophorectomy.

8. Treatment of Advanced, Inoperable Breast Cancer in Men and Postmenopausal Women and of Advanced, Inoperable Prostate Cancer in Men.

Side effects

1. Nausea appears to be the main side effect; other adverse effects include vomiting, anorexia, and diarrhoea.

2. Excessive doses of oestrogens inhibit the development of bones in young patients by accelerating epiphyseal closure.

3. When oestrogens are given in large doses over long periods of time, they can inhibit ovulation because of their feedback inhibition of the release of FGH from the adenohypophusis resulting in inhibition of ovulation. Administration of these drugs may promote sodium chloride retention; the result is retention of water and subsequent edema.

4. When administered to males, oestrogens result in feminization.

5. Carcinoma of the vagina was more common in young women whose mothers were given stilbestrol in early pregnancy in a misguided attempt to prevent miscarriage.

CHANGES IN ESTROGEN LEVELS

There are many times throughout a person's life when oestrogen levels may change. For example, oestrogen levels naturally increase during puberty and during pregnancy. Oestrogen levels fall after [menopause](https://www.livescience.com/7947-whats-menopause.html), or when a woman stops menstruating. This reduction in oestrogen production can cause symptoms such as hot flashes, vaginal dryness and loss of sex drive. Oestrogen levels also decrease after childbirth.

Other conditions that can cause estrogen levels to drop include hypogonadism (or diminished function of the ovaries) and [polycystic ovarian syndrome](https://www.livescience.com/34805-pcos-symptoms-treatment-insulin-resistance.html). Extreme exercise and anorexia can also cause a decrease in estrogen levels because women with low body fat may not be able to produce adequate amounts of estrogen.

MEDICATIONS WITH OESTROGEN

1. Estrogen is found in most oral birth control pills (along with the hormone progestin.) Estrogen helps stop ovulation during pregnancy, and birth control pills mimic this effect by regulating the levels of estrogen and thereby preventing ovulation from occurring.
2. [Hormone replacement therapy](https://www.livescience.com/44259-hormone-replacement-therapy-risks-benefits.html); a treatment to reduce symptoms of menopause. This therapy is sometimes used to treat postmenopausal problems such as hot flashes, night sweats, anxiety, sleeping problems and vaginal atrophy, a thinning, drying and inflammation of the vaginal walls due to a decrease in estrogen, according to the U.S. National Library of Medicine.
3. Estrogen hormone replacement therapy is also key for transgender women to achieve breast growth, inhibit body hair growth and to create other changes that are important for transitioning from male to female.

MECHANISM OF ACTION OF OESTROGEN

Oestrogen binds to intracellular receptors. There are two types of oestrogen receptor, termed as ERα and ERβ. When oestradiol binds to the estrogen receptor, a conformational change of the estradiol receptor complex occurs and results in interactions of the estradiol receptor complex with particular HRE regions of the cellular DNA, referred to as estrogen responsive elements (EREs). Binding of the complex to ERE elements results in initiation of transcription of the DNA sequence to produce mRNA. Finally, the elevated levels of mRNA lead to an increase in protein synthesis in the endoplasmic reticulum. Oestrogens produce their effects upon the mammalian uterus by increasing synthesis of RNA in the target cells.

PHARMACOKINETICS

Natural as well as synthetic oestrogens are well absorbed in the gastrointestinal tract, but after absorption the natural oestrogens are rapidly metabolised in the liver, whereas synthetic oestrogens are degraded less rapidly. Most oestrogens are readily absorbed from skin and mucous membranes. They may be given topically in the vagina as creams or pessaries for local effect. In the plasma, natural oestrogens are bound to albumin and to a sex steroid-binding globulin. Natural oestrogens are excreted in the urine as glucuronides and sulfates.

**PROGESTINS**

Progestin’s are synthetic forms of the body’s naturally-occurring hormone [progesterone](https://helloclue.com/articles/cycle-a-z/progesterone-101).

Progestin’s were designed to interact with progesterone receptors in the body in order to cause progesterone-like effects. This means that they do some of what the body’s natural progesterone does. For instance, progestin’s can cause changes to the endometrium that prevent it from proliferating (building up) too much, and that can help it support implantation and the continuation of an early pregnancy.

Progestins were originally developed because natural progesterone isn't absorbed well when taken as a pill by mouth and is metabolized by the body too quickly to have much effect.

Now progesterone is available in a micronized (smaller particle) form that is absorbed easier and lasts longer in the body, but only progestins—not micronized progesterone—are used in birth control.

**What are progestins used for?**

Progestins in hormonal birth control

Progestins are present in all forms of [hormonal birth control](https://helloclue.com/articles/sex/cycle-science-hormonal-contraception-and-your-body), either alone in progestin-only methods (like the implant, hormonal IUDs, injection, or mini-pill) or with an estrogen in combined hormonal birth control (like most pills, patch, vaginal ring, and some injections).

Progestins prevent pregnancy by inhibiting [ovulation](https://helloclue.com/articles/cycle-a-z/ovulation-101-what-is-it-how-does-it-work)and reducing the amount and stretchiness of [cervical mucus](https://helloclue.com/articles/cycle-a-z/wet-sticky-what-your-discharge-is-telling-you), making it unfriendly to [sperm](https://helloclue.com/articles/cycle-a-z/what-is-sperm-what-are-human-eggs) that are trying to enter the uterus.

Some common progestins and the type of birth control they are found in:

PROGESTINS BIRTH CONTROL

1. Ethynodiol diacetate PILL
2. Norethindrone MINI-PILL
3. Norrthindrone acetate PILL
4. Levonorgestrel IMPLANTS, H.IUDS, PILL, EMERGENCY CON
5. Norgestimate PILL
6. Desogestrel PILL, MINI PILL
7. Etonogestrel IMPLANT, VAGINAL RING
8. Norrelgestromin PATCH
9. Gestodene PILL
10. Dienogest PILL
11. Medroxyprogesterone acetate INJECTION/SHOT
12. Chlormadinone acetate PILL
13. Cyproterone acetate PILL
14. Drospirenone PILL

Progestins are prescribed for amenorrhea (the absence of periods) and[irregular menstrual bleeding](https://helloclue.com/articles/cycle-a-z/what-is-an-irregular-menstrual-cycle). They are also used to treat the chronic pelvic pain and [period cramps](https://helloclue.com/articles/cycle-a-z/period-cramps-101-why-menstrual-cramps-and-pain-occur-and-how-to-relieve) experienced by people with.

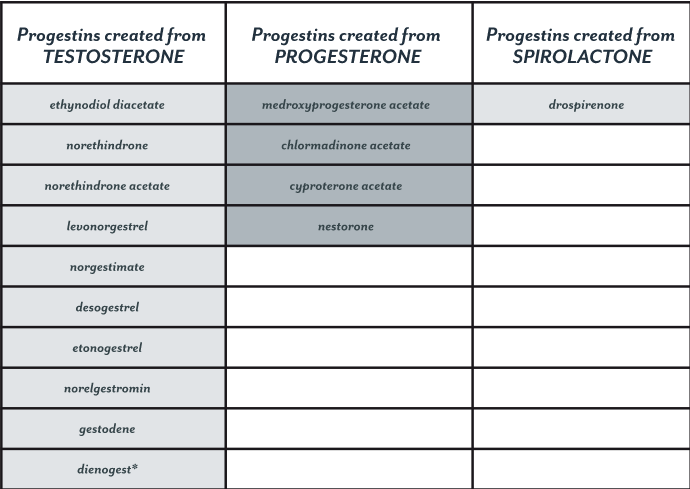
Progestins are sometimes used as part of [menopausal hormone therapy](https://helloclue.com/articles/life-stages/everything-we-know-about-menopause-and-hormone-replacement-therapy-hrt) because they prevent the endometrium from building up too much and becoming cancerous.

**How do progestins differ from natural progesterone?**

Progestins are created in a lab, usually starting with a hormone as a building block. Most progestins are created from testosterone, some from progesterone, and one is a type of spirolactone (class of synthetic hormones that can impact the body’s salt and water balance).

Progestins are sometimes grouped in "generations," which refer to how long they have been on the market. A more useful classification system to understand their effects is to group them by structure based on the hormone from which they were created.

**PROGESTIN FAMILY**

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The chemical structure of progestins is different from natural progesterone. These small changes in shape will impact the way they interact with hormone receptors in your body.

Progestins may attach to more than just progesterone receptors in the body.

Progestins may also bind to receptors for:

* [androgens](https://helloclue.com/articles/cycle-a-z/androgens-101)
* [estrogens](https://helloclue.com/articles/cycle-a-z/estrogen-101)
* other hormones, like mineralocorticoids, or glucocorticoids (hormones produced by the adrenal glands)

If progestins bind to these receptors, they can cause different side effects—depending on whether the progestin activates or blocks the receptor.

**Side effects related to progestin excess**

* elevated blood pressure
* feeling tired or sleepy
* hypoglycemia (low blood sugar)
* decrease in period length

**ANTI-FERTILTY DRUGS**

Drugs which used for preventing fertilization are called as antifertility agents. These are also known as contraceptive agents. Contraception is the method of preventing normal process of ovulation, fertilization and ovum implantation nothing but pregnancy. Oestrogens are the primary female sex organs which can be either natural steroidal or synthetic non-steroidal. This group of compounds has their importance in menstrual and estrous reproductive cycles. They are basically used as oral contraceptives.

Classification

These are classified into two types.

1. Female contraceptive agents

2. Male contraceptive agents

**Female contraceptive agents**

These are available as oral, injectable, and transdermal patches. Oral contraceptive agents include both steroidal and non-steroidal agents and also available in chemical, mechanical and surgical dosage forms.

1. Steroidal oral contraceptive agents:

Oestrogens: Ethinyl Oestradiol, Mestranol.

Progesterones: Norethindrone, Norethynodrel, Levonorgestrel, Norgestrel.

1. Non steroidal oral contraceptive agents: Diethyl Stilbestrol, dienestrol.

**Male contraceptive agents**

a. Steroidal contracptive agents:

E.g. Testosterone enanthate, levonorgestrel

b. Non steroidal agents:

E.g. Gossypol

OESTROGENS

There are three main endogenous oestrogens in humans: Oestradiol, Oestrone and Oestriol. Oestradiol is the most potent and is the principal oestrogen secreted by the ovary.

**Classification**

Based on the sources Oestrogens are classified as

1. Natural Oestrogens

Eg: Oestradiol, Oestriol, Oestrone

2. Esterified Oestrogens

Eg Oestradiol valerate, Oestradiol benzoate, Oestradiol dipropionate

3. Conjugated Oestrogens Eg: Equilin.

4. Semisynthetic Oestrogens Eg: Ethinyl oestradiol, Mestranol

5.Synthetic Oestrogens Eg: Dienoestrol, Stilboestrol.

6. Oestrogens from plants Eg: Coumestrol

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