



تفريغ ميديسينال
Sex hormones محاضرة
Yara Hani الصيدلانية



لجان الرفعات



Female Sex Hormones (15)

(Estrogens and Progestins)

Control:

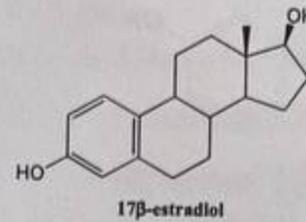
Follicle-Stimulating Hormone (FSH) stimulate the production of Estrogens.

Luteinizing Hormone (LH) stimulate the production of Progestins.

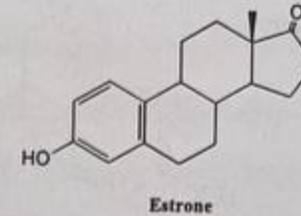
استعماله على شكل حقن وحبوب

Estrogens

Natural Estrogens:

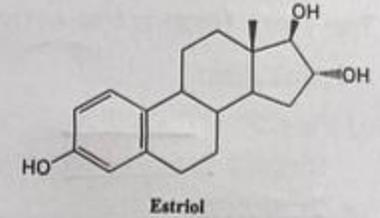


Excreted by human ovary

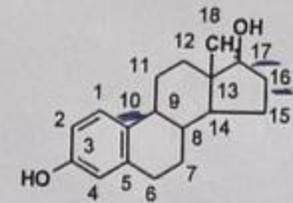


Excreted by human ovary.

It has 1/3 the effect of estradiol.



It is the metabolite by oxidation of estradiol.



Uses

- Birth control pills.
- Failure of ovarian development.
- Menstrual disturbances.
- Suppress lactation after birth.
- Postmenopausal osteoporosis.
- Prostate cancer.

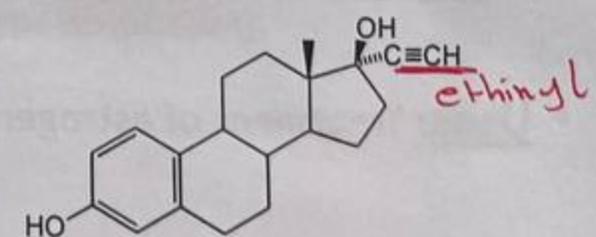
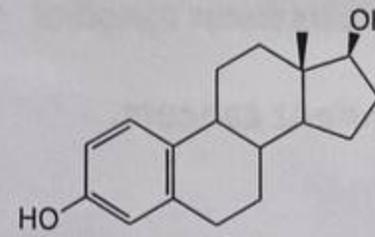
Steroidal Estrogenic Drugs

Estradiol:

- Most active natural estrogen.
- Very short duration of action due to first pass metabolism.
- Mainly used for local effect on the uterus.

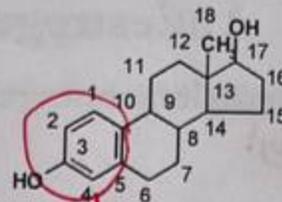
Ethinyl estradiol (17-α-ethynylestradiol).

- 15- 20 more potent than estradiol orally.



(Steroidal Semisynthetic estrogen)

البنية
SAR



- Aromatic ring with C-3-OH is essential for activity.
- Steroidal structures is not essential for activity.
- Alkylation of the aromatic ring decrease the activity.
- The 17β-hydroxyl with constant distance from 3-OH is essential for activity → (4.5 Å) لازم الـ 4.5 تكون
- The group between the two hydroxyl must be hydrophobic.
- Unsaturation of ring B decreases the activity.
- 17α- and 16 position when modified enhance the activity.

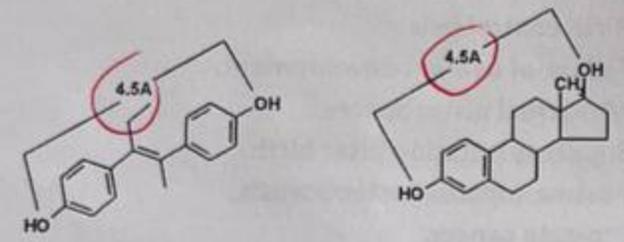
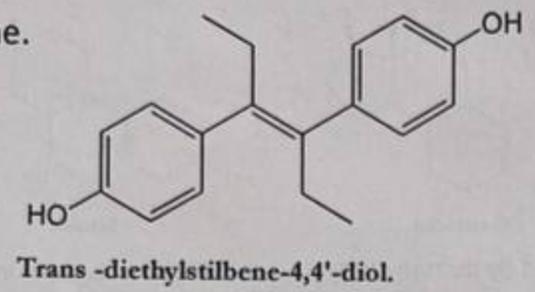
بنية مريضون يكون عند
(Backbone)
وهذا هو رجع يجرى عليه
سؤال

رغبي صداد (backbone)
 ← موصولة وموشرط أصلا
 ← ومقويين باقي الستيرويد.

Nonsteroidal Estrogens

1. Diethylstilbesterol:

- The *trans* form is the active one.
- **Advantages:**
 - As active as Estradiol.
 - Longer duration of action.
 - Orally active
 - Cheap.



Estrogen Antagonists → Blocked

- **Triphenylethylene antagonists:**
 - They are related to stilbene in structure.
 - Antagonist bind strongly to the receptors.
- **Aromatase inhibitors:**
 - Steroidal or nonsteroidal.
 - Block conversion of androgens to estrogens.

← مخصص الإبانة

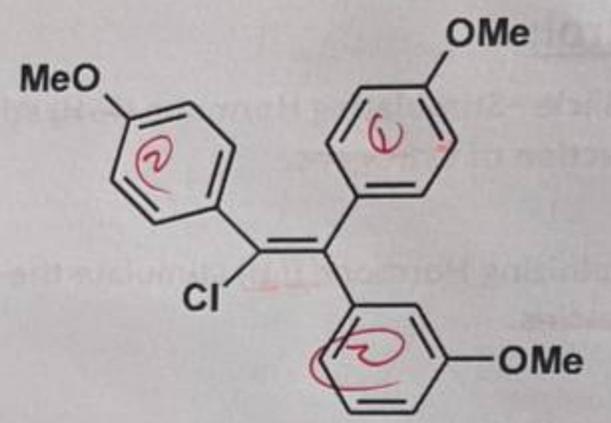
- **Uses:** Treatment of estrogen dependent cancers.

Nonsteroidal Estrogens

2. Chlortrianisene:

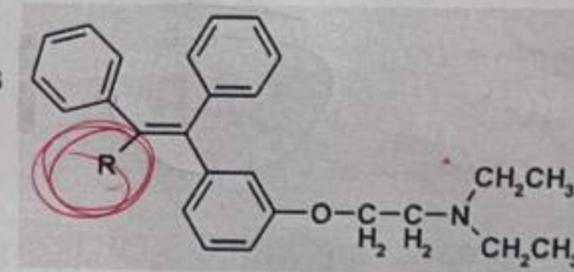
Tris(p-anisyl)chloroethene.
 Active orally

Tri anisyl



Antiestrogens

Triphenylethylene antagonists 3-phenyl



1. Clomiphene (clomid)

R = Cl

It acts as ovulation stimulant by increasing gonadotrophin hormone (GRH).

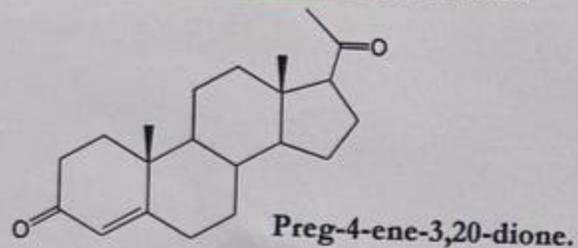
2. Tamoxifen (Nolvadex):

R = CH₃CH₂-

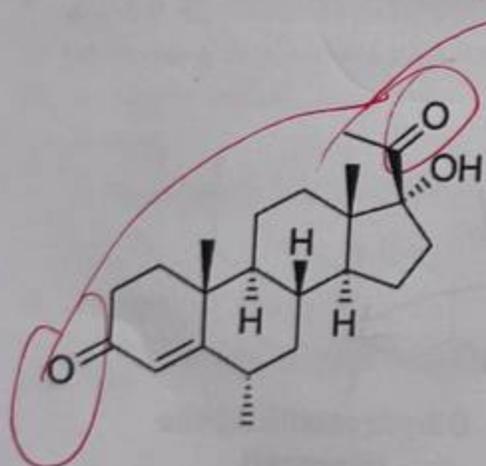
Used in treatment of early & advanced breast cancer in postmenopausal women.

Progestins

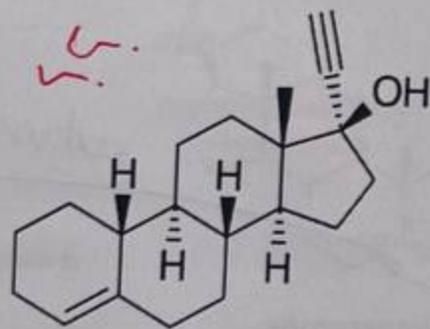
- **Progesterone** is the major natural progestin.
- **Secretion:** By the ovary mainly the corpus luteum during the second half of the menstrual cycle.
- **Physiological Effects:**
 - Development of the endometrium.
 - Development of the mammary gland during pregnancy.
 - Milk secretion starts when its level decrease with birth.
 - Thermogenic action.



Progestogenic Drugs

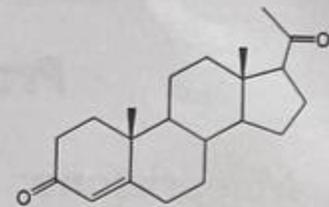


2. Medroxyprogesterone (provera)
Uses: Oral contraceptive.



Lynestrenol:
Semisynthetic progestin with pure progestogenic activity.

SAR



- Steroidal nucleus essential for activity.
- Have some androgenic activity.
- Removal of the 19 CH₃ increase activity.
- Unsaturation of ring B or C increase the activity.
- Removal of the keto function remove androgenic activity.

Uses:

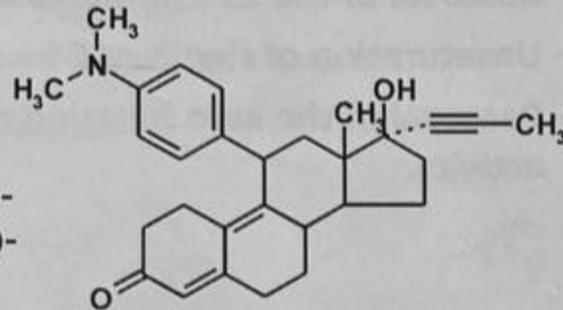
- ~~Contraceptive pills.~~
- ~~Uterine bleeding.~~
- ~~Prevention of abortion.~~
- Amenorrhea, dysmenorrhea, endometriosis.
- Suppression of lactation.
- Endometrial, renal and breast carcinoma.
- Enhance respiration (for Hypoventilation).

ليش صار (pure) منشان شلنا (C) . سوال هم ممكن يجي بالامتحان

Male Sex Hormones (Androgens)

Progestin Antagonists

- 1. Mifepristone:
 - Compete with the progestin receptors.
 - **Uses:**
 - Abortifacient.



11- β -(p-dimethylaminophenyl)-
17- β -hydroxy-17- α -(1-propynyl)-
estra-4,9-diene-3-one.

➤ Control:

- Luteinizing Hormone (LH) or Interstitial Cell-Stimulating Hormones (ICSH) stimulate the production of Androgens.

Androgenic Steroids – Physiological Activities

Primarily two activities – Androgenic and Anabolic

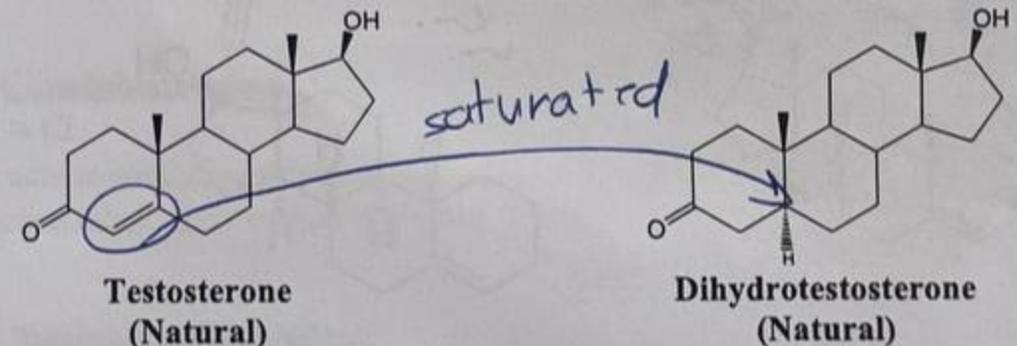
Androgenic Activity

- Growth and development of male sex organs
- Important for male sex drive and performance
- Development of secondary sexual characteristics
- Important role in spermatogenesis

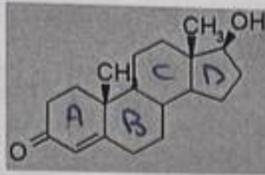
Anabolic Activity

- Development of muscle mass
- Reverse catabolic or tissue-depleting processes

• Natural Androgens:



SAR in Androgens



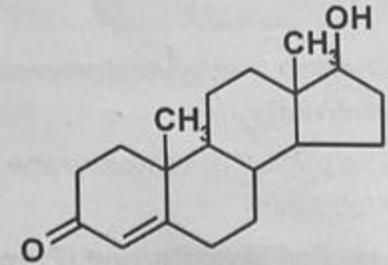
Steroid skeleton is necessary

- An electronegative (may not be oxygen) at 3 position is required
- A/B ring fusion should be either trans or presence of a double bond at position 4
- Alkyl group (CH_3) at 17 α -position is necessary for anabolic activity
- Alkyl group at 17 α - confers oral activity

Androgens & anabolic agents

1. Testosterone:

17- β -hydroxy-androst-4-ene-3-one



Medical Uses:

1. Treatment of hypogonadism {decreased functional activity of the gonads, thus resulting in lower amounts of testosterone}.
2. Androgens possess anabolic activity.
3. Treatment of breast cancer in menopausal women.
4. Dysmenorrhea but of no advantage over Progestins & estrogens.

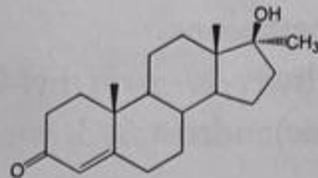
Androgenic Drugs

• 2. 17 α -methyltestosterone:

(17- β -hydroxy-17- α -methyl-androst-4-ene-3-one)

- Orally active.
- Prolonged action.
- Androgenic and anabolic effects.

بزرگ صبح اعضا

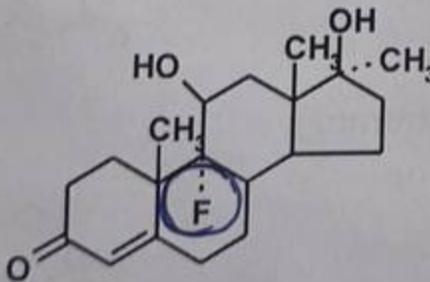


17 α -Methyltestosterone
(Semisynthetic)

Anabolic Steroids

3. Fluoxymestrone:

10 times more potent than testosterone.



- Class of steroid hormones related to the male hormone – testosterone
- Increase protein synthesis within cells which results in growth of muscle.
- Also have androgenic properties which include the development and maintenance of male's characteristics
- Have both medical and sport performance uses

Oral Anabolic Steroids

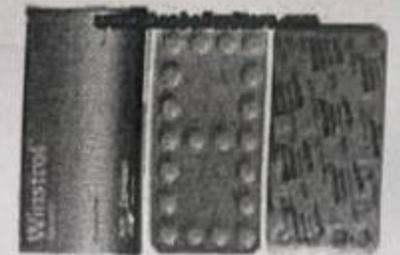
- 17-alpha methyl testosterone (Android)
- 17-alpha ethyl testosterone (Maxibolin)
- 1-methyl testosterone (Primobolan)
- Androstenediol ("Andro" food supplements)
- Androstenedione
- Dihydroepiandrosterone (DHEA)



طرق من حفظ
ليس للاسرفه ان بغير
(group alkyl) على (C-17)
ومنتجان هيت اعطرتنا
(anabolic effects)

Injectable Anabolic Steroids

- 19-nortestosterone ester derivatives (Durabolin)
- Testosterone ester derivatives (Oreton)
- Testosterone cypionate derivatives (Virilon)
- Boldenone
- Stanozolol (Winstrol) oral form as well

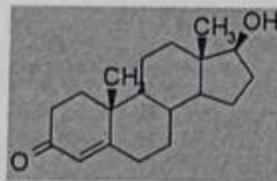


★ [كل اي قيد كانو (natural) (semisynthetic)]

Synthetic Anabolic Steroids:

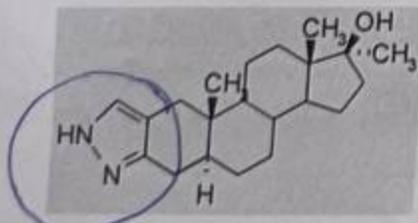
1. Norethandrolone

Orally active.
Anabolic effects.
C-10 CH₃ group removed eliminate androgenic effect.

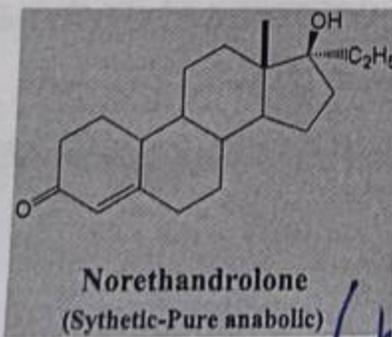


2. Stanozolol

Orally active.
Anabolic effects.



Stanozolol



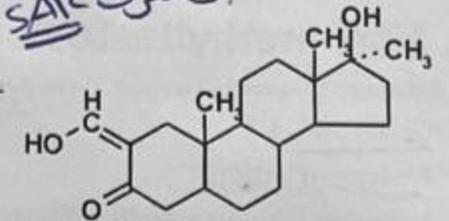
Norethandrolone
(Synthetic-Pure anabolic)

(hydrophobic group) / (C-17α) B 90

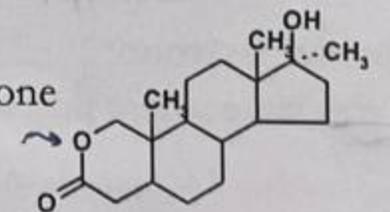
Anabolic agents

★ هاد برصو لكه من
حفظ : بس صرف SAR

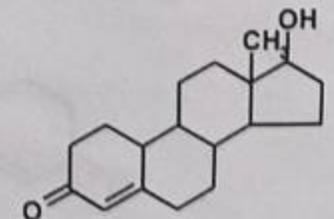
3. Oxymetholone:
17-β-hydroxy-17-α-methyl-2-(hydroxymethylene)androstane-3-one.



4. Oxandrolone:
17-β-hydroxy-17-α-methyloxandrostane-3-one



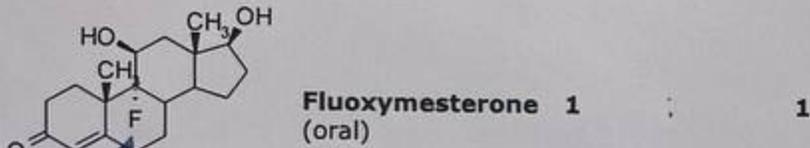
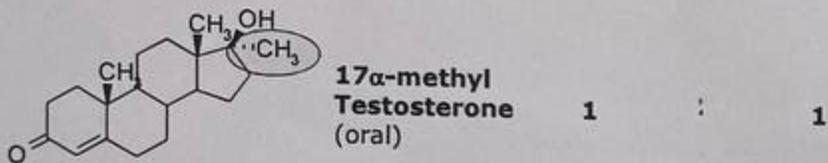
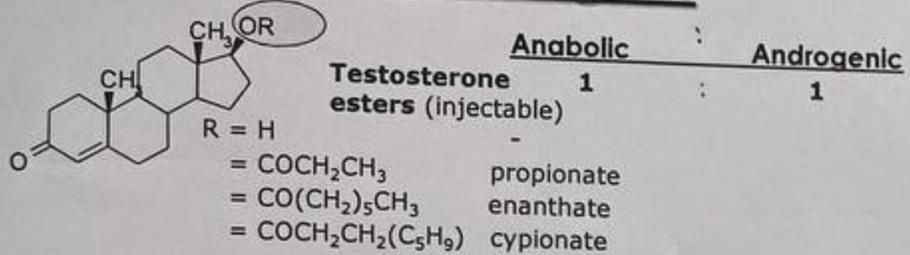
5. Nandrolone: (nortestosterone)
Used as ester (decanoate or phenylpropionate)



★ هاد الامتياز انه (anabolic effect)

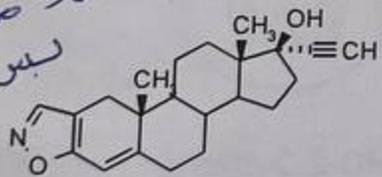
هاد تخيص لكل افنان

SAR in Androgens



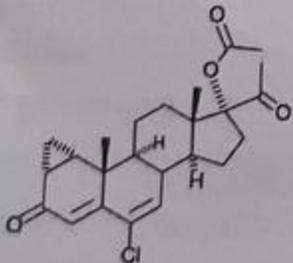
Androgen Antagonists

(potency) هاد موصوفون منا بس الستيرويدات هرقية

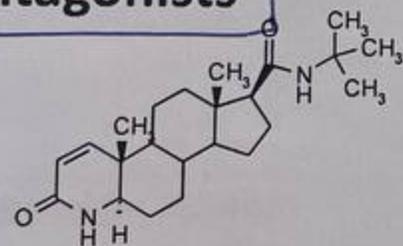


Danazol

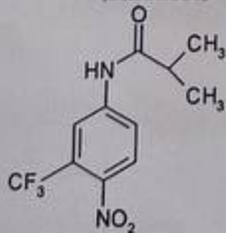
- Weak androgenic, anabolic, progestational & glucocorticoid action
- (endometriosis)



Cyproterone acetate
Has antiandrogenic and progestogenic activity.
(prostate cancer)

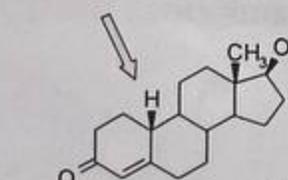
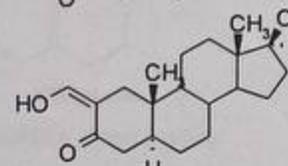
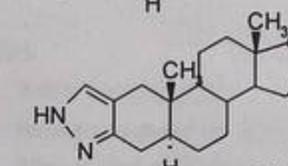
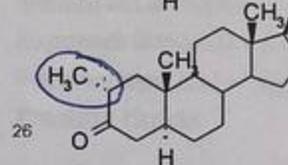


Finasteride (5 α reductase inhibitors)
They prevent conversion of testosterone into dihydrotestosterone (baldness)



Flutamide
Non steroidal antiandrogen.
(prostate cancer)

SAR in Androgens

	Anabolic	Androgenic
 Nandrolone (injectable)	2.5	1
 Oxymetholone (oral)	2.5	1
 Stanozolol (oral)	3	1
 Dromostanolone (oral)	4	1

(hydrophobic) هون لما زادت زادت (anabolic)