* The doctor showed graph for testosterone concentration in plasma during different ages.
* You remember we said from week( 8-18) there is high concentration of the testosterone for two reasons :
1. The formation of the male genital organ.
2. For the descending of the testes in the scrotum.
* Testosterone secretion or production is under the effect of human chorionic gonadotropin (HCG) from the placenta.
* And we said the HCG hormone is also released or found in the pituitary gland, testes and other non-placental tissues.
* Testosterone is a prohormone

🡪 it is present as a" testosterone" in its original structure: testes, pituitary and muscle.

🡪 But it presents as "estradiol" in : fat , liver , skin , hair , CNS under the effect of the aromatase enzymes.

🡪α reductase produces "dihydrotestosterone" another form of testosterone which is present in: the prostate, scrotum, penis and bone.

 🡪Under the effect of another enzyme dehydrogenase "ketosteroids" another form of testosterone is found in: liver and kidney, and it will be conjugated with enzymes of the liver and kidney to be destroyed.

-High concentration of dihydrotestosterone may produce prostate cancer therefore if we permit formation of dihydrotestosterone it may reduce prostate cancer.

* Dihydrotestosterone is very active (30-50) times higher than that of the testosterone.
* Several other tissues including adipose tissue, brain, muscle, skin and adrenal cortex they have testosterone, either by producing the hormone by themselves or from other sources.
* **Methods that prevent or reduce the prostate cancer:**

1-prevent the formation of "dihydrotestosterone".

2-another method we call it "chemical therapy OR chemical castration" we inject the individual with gonadotropin releasing hormone continuously, the result is reducing in testosterone production consequently dihydrotestosterone…..**BUT HOW??** More and more gonadotropin releasing hormone will result in a decrease in LH and FSH concentration this is called "receptors desensitization", and if we continue injecting gonadotropin releasing hormone then the receptors on the pituitary gland to produce FSH and LH won't respond."the same as insulin and down regulation".

**PLEASE look at figure 44-6 page 10 in the booklet.**

* **Testosterone functions on:**
1. Intrauterine formation of the male genital organs, the differentiation is genetically determined.
2. Imprint male pattern as gonadotropins(estradiol, testosterone and dihydrotestosterone), sex drive, behavior.
3. On larynx (male voice).
4. On upper body fat, on muscle mass and on production of the red blood cells... (These physical characteristics make us differentiate between males and females.)
5. On the derivatives of cholesterol " LDL, HDL and VLDL"
6. On sperm production and pubertal development.
* Unlike most species, which mate only to produce offspring, in human sexual activity and procreation are not tightly related. Superimposed on the basic reproductive mechanism dictated by hormones are numerous psychological and societal factors, in normal men no correlation is found between circulating testosterone level and sexual drive frequency of intercourse or sexual balances…similarly there is no correlation between testosterone level and impotence or homosexuality, castration of adult men results in slow decline but not a complete elimination of sexual interest and activity.

🡪In the last statement from the paragraph above, about the castration of an adult, it's true that it will result in slow decline but not complete elimination of sexual interest however, it's not 100% true concerning the activity because there will be **complete** elimination of sexual activity \*meaning that: this castrated male cannot have a baby \* (there is a difference between the interest and activity).

 "The male needs normal level of testosterone, above the normal level will not lead to increased activity, **BUT** below it will affect ".

* The growth and secretory activity of sebaceous gland on the face, upper back and chest are stimulated by androgens (primarily dihydrotestosterone) and inhibited by estrogens, increased sensitivity of target cells to androgen action is especially during puberty and after it, this is the cause of "acne vulgaris" in both males and females. (Acne vulgaris🡪 حب الشباب)

**Please look at figure 23-16 page 15**

* This figure shows the normal sperm which consist of head, middle and tail.
* In the head there is nucleus which contains the chromosomes "chromosome number 23 is X and Y"…in front of the head there is acrosome containing enzymes which lysis the tissue around the ovum,in the middle there is mitochondria and the tail is for movement and there are proteins activated by calcium.
* The acrosome contains many enzymes such as proteolytic enzymes, hyaluronidase, acrosin, neuraminidase, phospholipase A and esterases ,, they are inactive until the acrosome reaction occurs this is when there is contact between sperm head and the egg🡪so they are not activated unless the sperm contact the ovum "not just the sperm that enters the ovum, all of the sperms contacted the ovum will release these enzymes".
* The age of puberty in girls 8-13 and in boys 9-14 and ofcourse it depends on many factors such as environmental, race, and nutrition.
* Spermarche: the first appearance of sperms in the early morning urine occurs at average age 13-14 years old.

**Please look at table 8.10 page 26**

* **The causes of delayed puberty:**
1. Normal variant, this is of two subtypes either familial or racial.
2. Coincidental serious illness like; mumps, typhus fever or tuberculosis.
3. Psychological stresses such as orphans.
4. Hypogonadism from any cause.
5. Hyperprolactinemia.
* **Two terms you have to differentiate between them :**

1-Impotence: is the inability of an adult male to hold an erection.

 2-infertility or sterility: is the inability to fertilize the ovum.

 **\*\***impotence is sterility/infertility but infertility/sterility doesn't mean impotence.

* **Please look at table 8.6 page 28 >> about the Causes of impotence>>exactly as in the slide.**

🡪Heart diseases are another cause of impotence especially after surgery.

* **The doctor showed a slide about the mechanism of erection, and explained the following:**

Nitric oxide from parasympathetic division activate guanylate cyclase this produces guanosine monophosphate (GMP) from guanosine triphosphate (GTP), GMP decreases cytoplasmic calcium in the penile smooth muscle and reductation occurs then the penile muscle become full of blood this is the erection after sometime phosphodiesterase enzyme convert GMP to 5GMP this is the normal process, this is the role of "Viagra"….Viagra destroy the phosphodiesterase enzyme to prolong the action of GMP.

* Now there is another group of drugs that function similar to the function of Viagra by destroying the phosphodiesterase enzyme.
* **Please look at pages 68 and 69 ,, the doctor read it.**

**And here are important points about Viagra added to that in pages 68, 69.**

1-Viagra (Sildenafil Citarate) takes its sublimity from this point that the individual takes Viagra but no signs of erection unless he is stimulated. "Sildenafil citrate is not an aphrodisiac, sexual stimulation is essential for its activity."

2-Precautions should be exercised while giving Sildenafil to patients with severe renal, lung and heart diseases.

3- Sildenafil is contraindicate\* in patients taking organic nitrates "some people with heart disease they take organic nitrate drug, however sildenafil and Viagra must not be taken at the same time as these drugs as they will act together and may cause death" Solution 🡪 not be taken together.

\*Contraindicate means (of a condition or circumstance) suggest or indicate that (a particular technique or drug) should not be used in the case in question.

3- Sildenafil should not be taken with some anti hypertensive drug >>so when Viagra is taken with these hypertensive drugs Viagra won't work neither hypertensive drugs will.

\*\*70-80% of peoples who use Viagra are young people.

**Please look at figure 16-16 page 21**

* After the sexual intercourse the sperms reach the fertilization site after one hour maximally, and of these sperms just 0.001 reach the fertilization site, some females suffer from this problem: the sperms do not reach the fertilization site within an hour so physicians advice the female to stay in bed longer.
* The semen contains chemical substances including enzymes, vitamins, proteins….60% from the seminal vesicles 20% from the prostate ,10% sperms and 10% from the other sources.
* Hyaluronidase: very important enzyme, is not a product of the accessory glands but it's found in the sperm acrosome.
* The secretions of the accessory gland promote sperm survival and fertility.
* When the semen is ejaculated in the female reproductive system it coagulates immediately, the coagulum form of the sperms minimizing the expulsion of the sperm from the vagina, after that the semen is liquefied, the liquefaction has to be completed within 50 minutes so as the sperms to become free to reach the fertilization site.
* The semen is liquefied by enzymes; one of them is acid phosphatase.
* To establish the causes of reproductive dysfunction, vesicle examination, medical history, semen analysis, hormone determinations, hormone stimulation test and genetic analysis.
* **SEMEN ANALYSIS**

**(Table8.2 but I couldn’t find the table in the booklet however, page 20 in the booklet talks about semen analysis.)**

🡪One step of evaluation fertility is semen analysis; semen is analyzed on specimens collected after 3-5 days of sexual abstinence.

1-First they measure the volume of the semen normally 3-4 ml. "range from 1-7 ml" normally each 1ml contain 100 million sperm "range from 20million to 120 million".

2-Then motility: ideal at least 70% of sperms are motile, it may be 10-20% >>this depend on sperms count.

3-Morphology: also normal morphology reaches 70%

\*\*the doctor showed us figure80-4 about the normal morphology of the sperms. (Sperm on the right is the ideal morphology)

4-liquefaction: has to be completed within 15 minutes, above half an hour indicates infertility in the individual.

5-fructose: sugar presence in a normal ejaculate.

Oligospermia>>low sperm count.

Azoospermia>>no sperms at all.

