

FIGURE 54-10. Two-cell, two-gonadotropin model. During the follicular phase, the major product of the follicle is estradiol, whereas during the luteal phase, the major products of the corpus luteum are the progestins, although estradiol synthesis is still substantial. In the follicular phase, LH primes the theca cell to convert cholesterol to androstenedione. Because the theca cell lacks aromatase, it cannot generate estradiol from this androstenedione. Instead, the androstenedione diffuses to the granulosa cell, whose aromatase activity has been stimulated by FSH. The aromatase converts the androstenedione to estradiol. In the luteal phase, the vascularization of the corpus luteum makes LDL available to the granulosa-lutein cells. Thus, both the theca-lutein and the granulosa-lutein cells can produce progesterone, the major product of the corpus luteum. For production of 17 α -hydroxyprogesterone (17 α -OH progesterone), some of the progesterone diffuses into the theca-lutein cell, which has the 17 α -hydroxylase activity needed for converting the progesterone to 17 α -hydroxyprogesterone. The theca-lutein cell can also generate the androstenedione, which diffuses into the granulosa-lutein cell for estradiol synthesis. AC, adenyl cyclase; ATP, adenosine triphosphate; cAMP, cyclic adenosine monophosphate; FSH, follicle stimulating hormone; HSD, hydroxysteroid dehydrogenase; LDL, low density lipoprotein; LH, luteinizing hormone

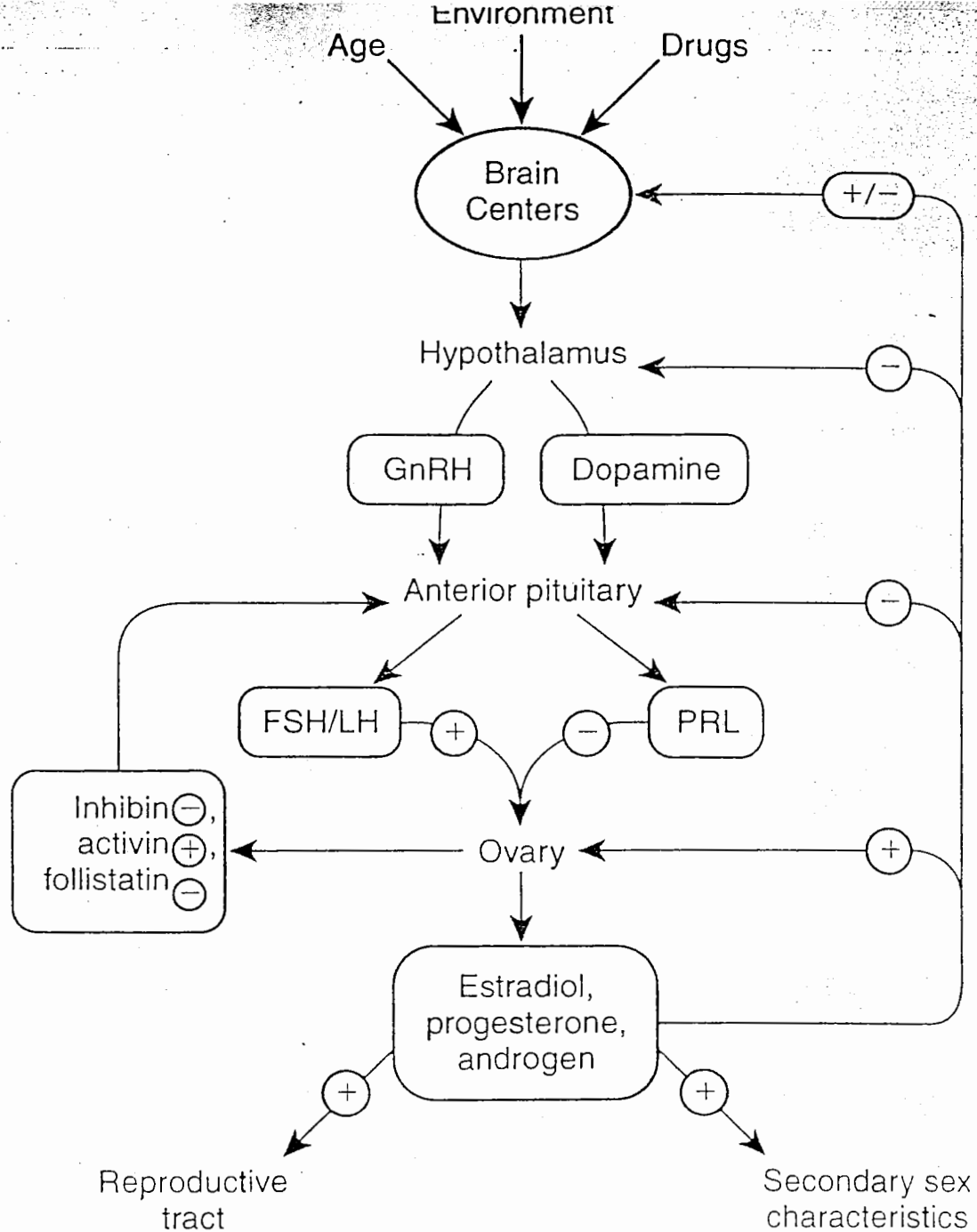


FIGURE 38.1 Regulation of the reproductive tract in the female. The main reproductive hormones are shown in boxes. Positive and negative regulations are depicted by plus and minus signs.

* Both LH and FSH regulate follicular steroidogenesis and androgen and estradiol secretion, and LH regulates the secretion of progesterone from the corpus luteum.

* **Inhibin** suppresses the secretion of FSH. **Activin** (an inhibin-binding protein) increases the secretion of FSH, and **follistatin** (an activin-binding protein) reduces the secretion of FSH.

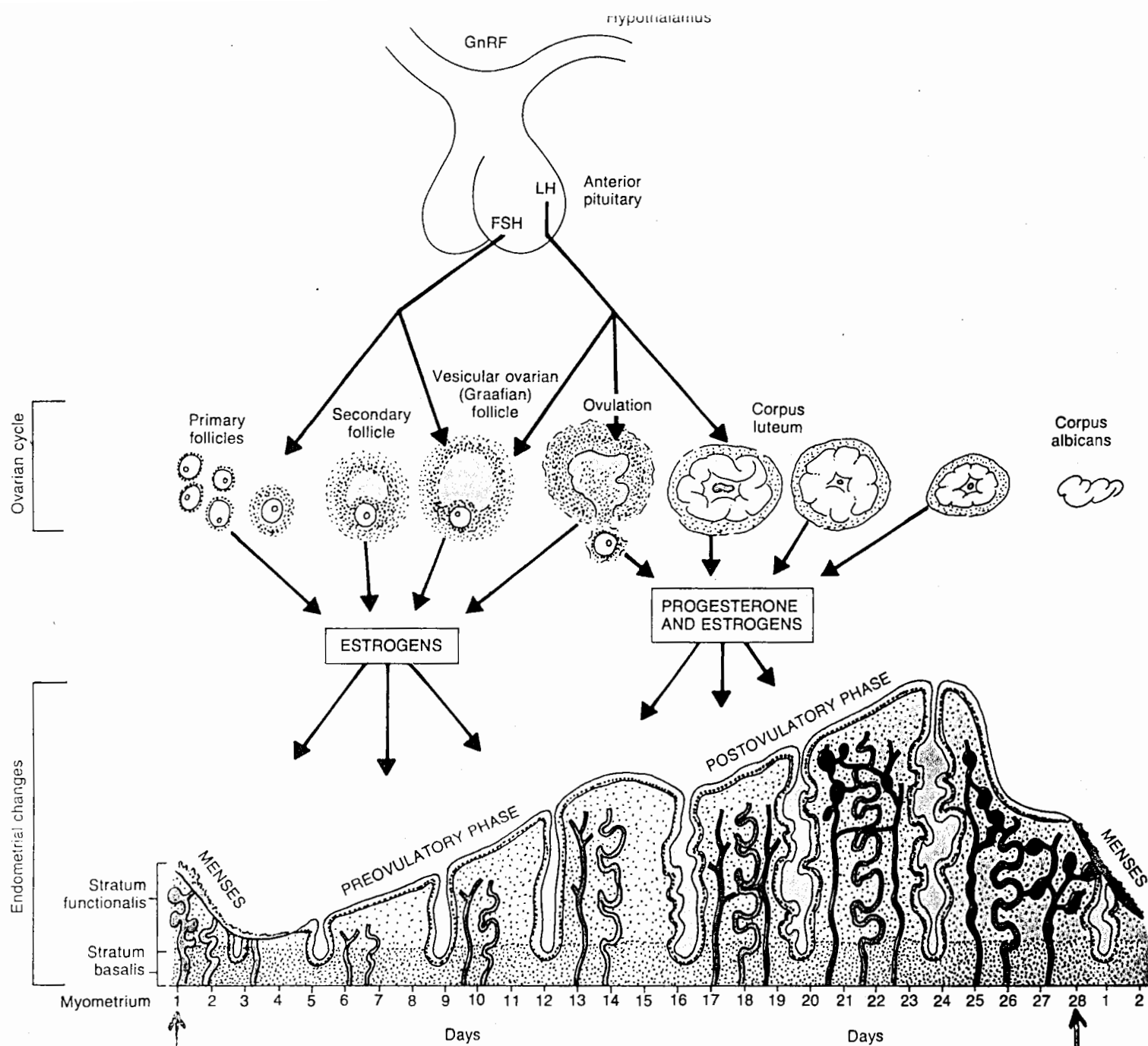


Figure 28-18
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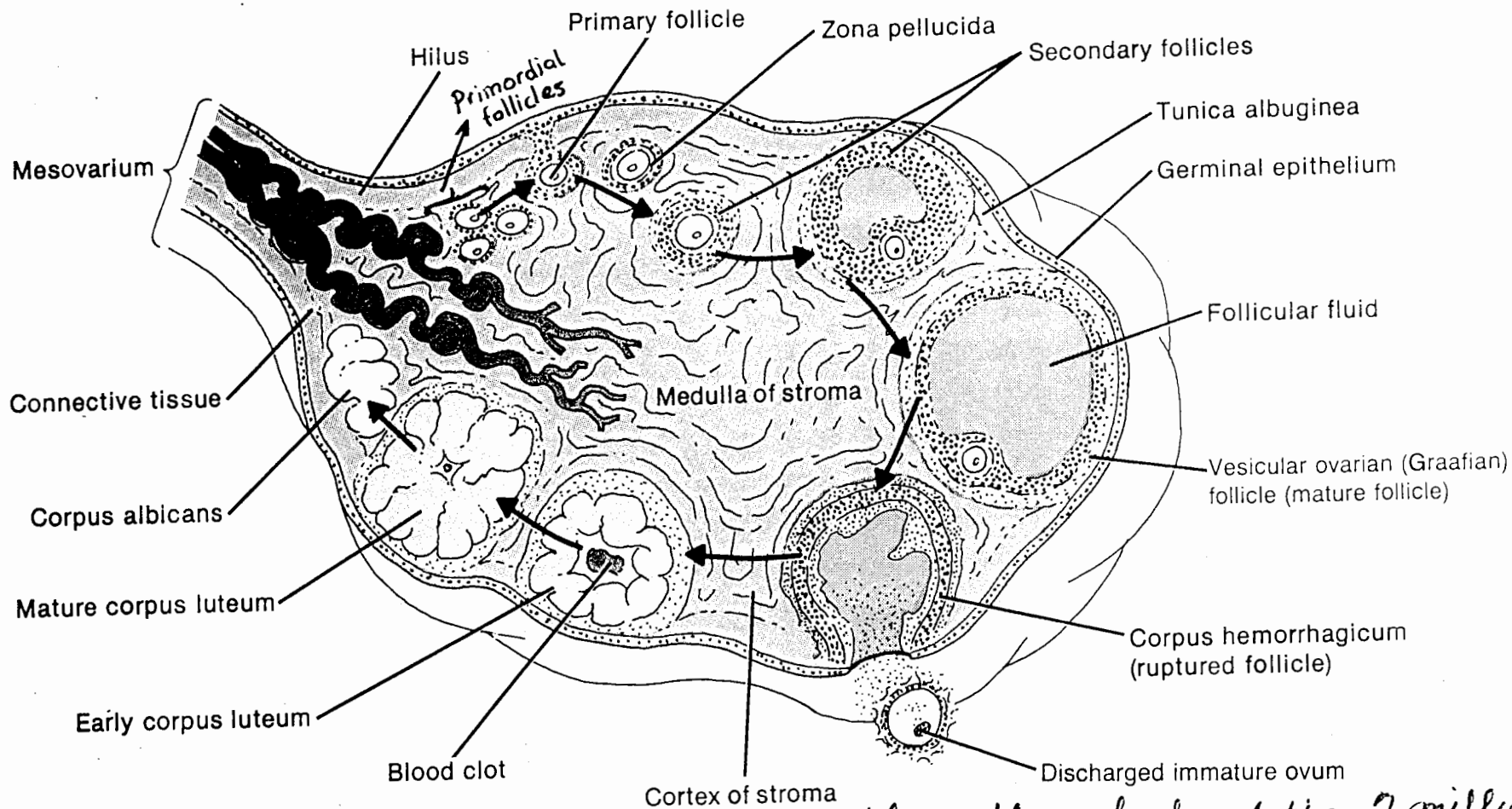


Figure 28-13a
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- (a)
- 1) At the 30th week of gestation 7 million ova are present in the two ovaries.
 - 2) 2 million at birth. The others degenerated.
 - 3) Only 300,000 - 400,000 reach puberty
 - 4) During all reproductive years (13-50) about 450 of these follicles develop to ovulation each month, the ovaries alternate.

Throughout reproductive life, 90% to 95% of all follicles are primordial follicles (nongrowing). At fetal life and childhood, some primordial follicles

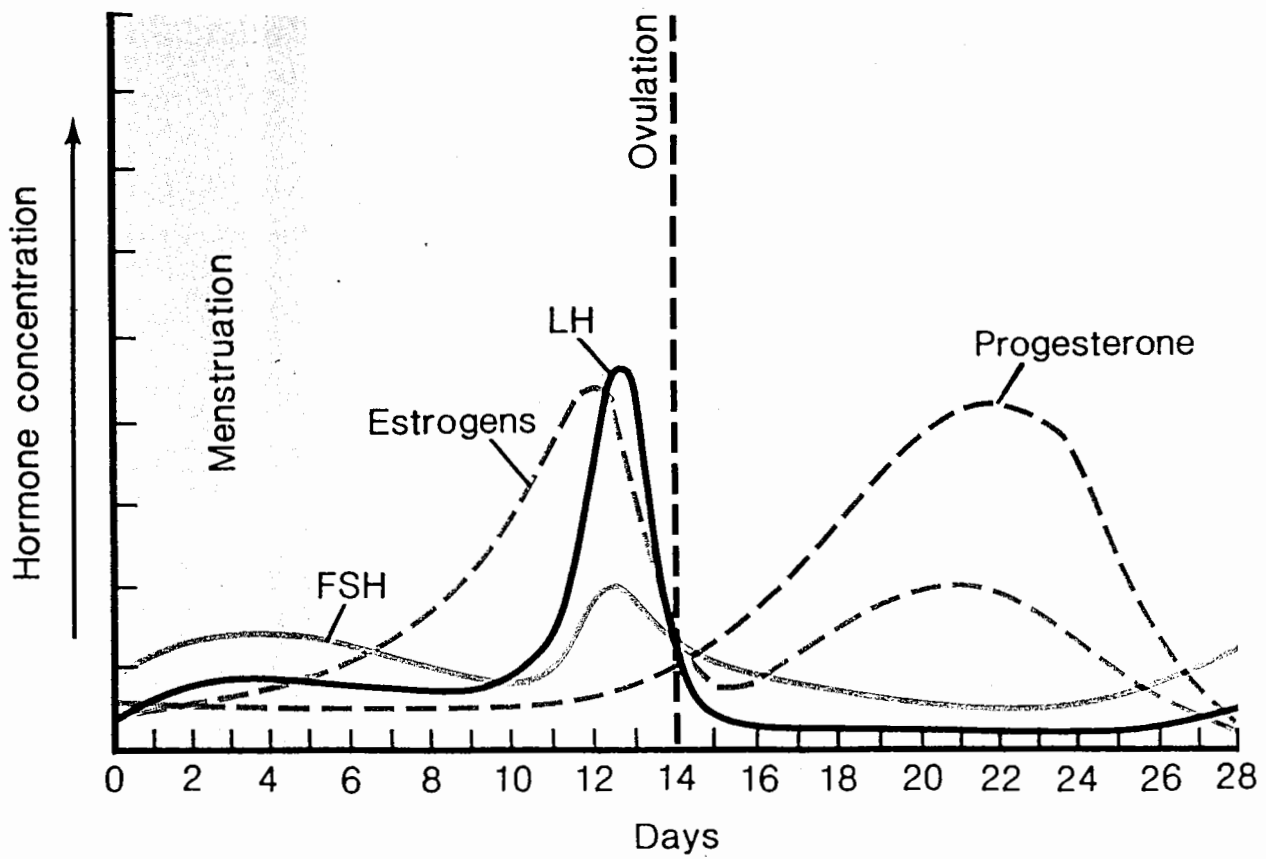


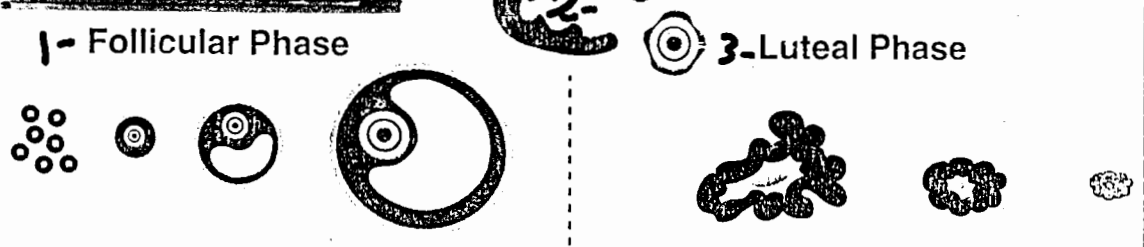
Figure 28-19

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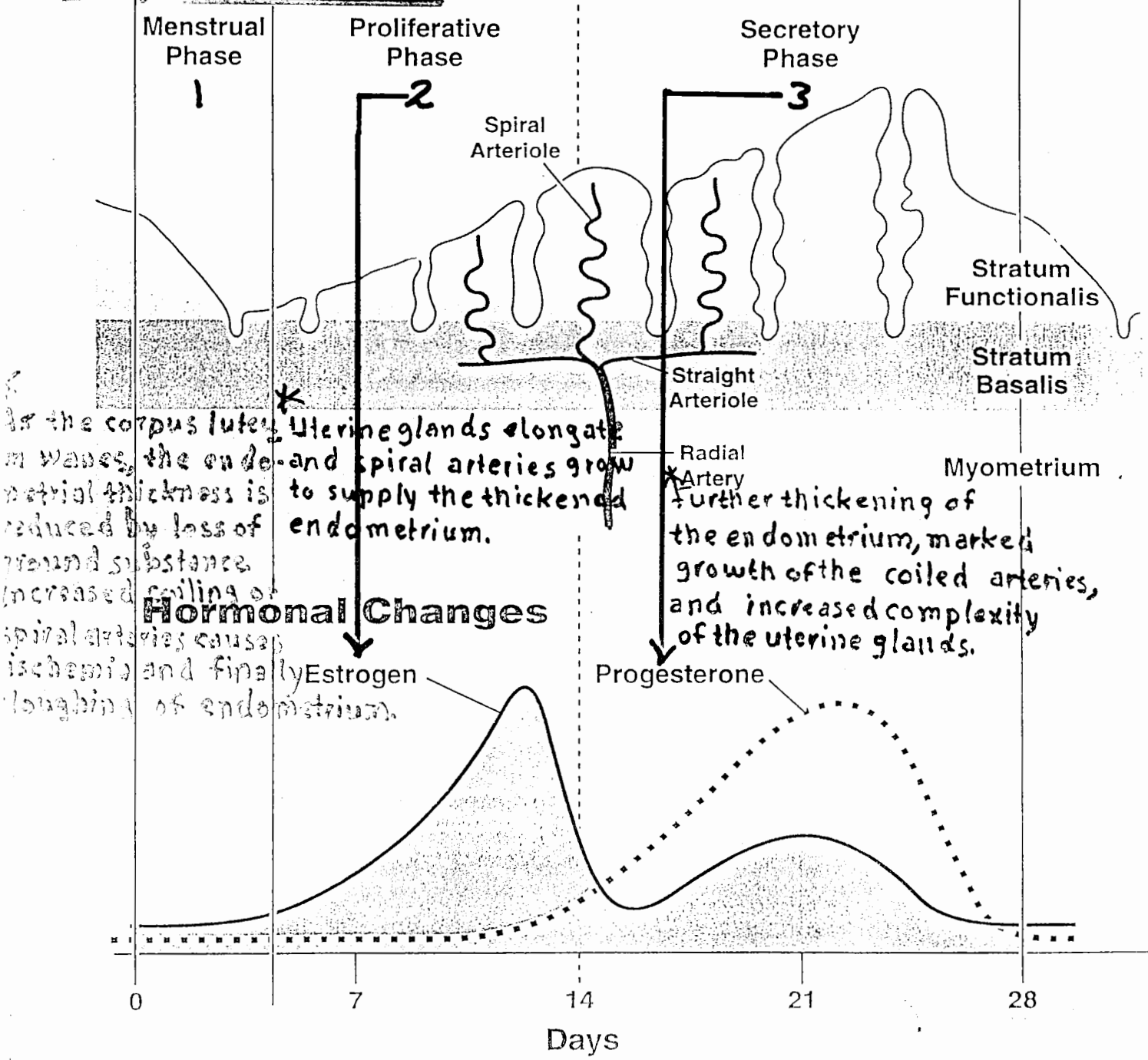
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FEMALE REPRODUCTIVE CYCLE

I - Ovarian Cycle



II. Uterine Cycle



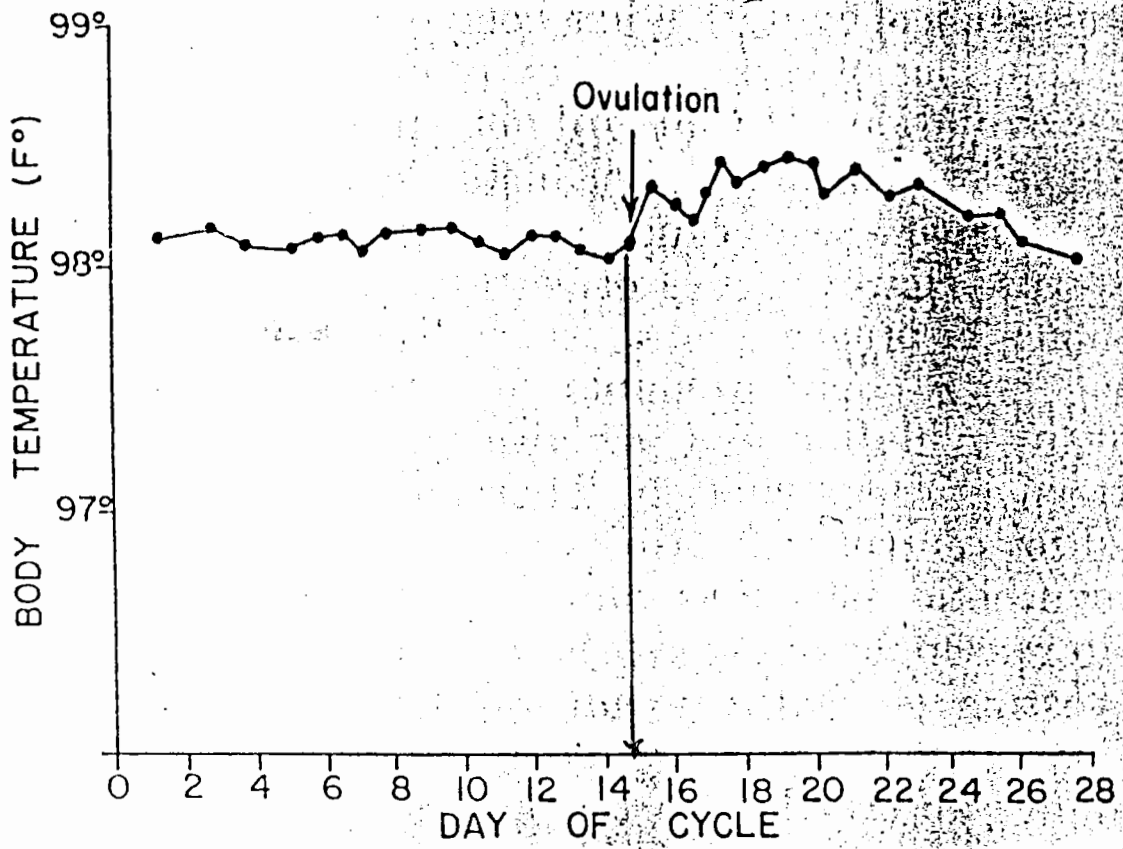
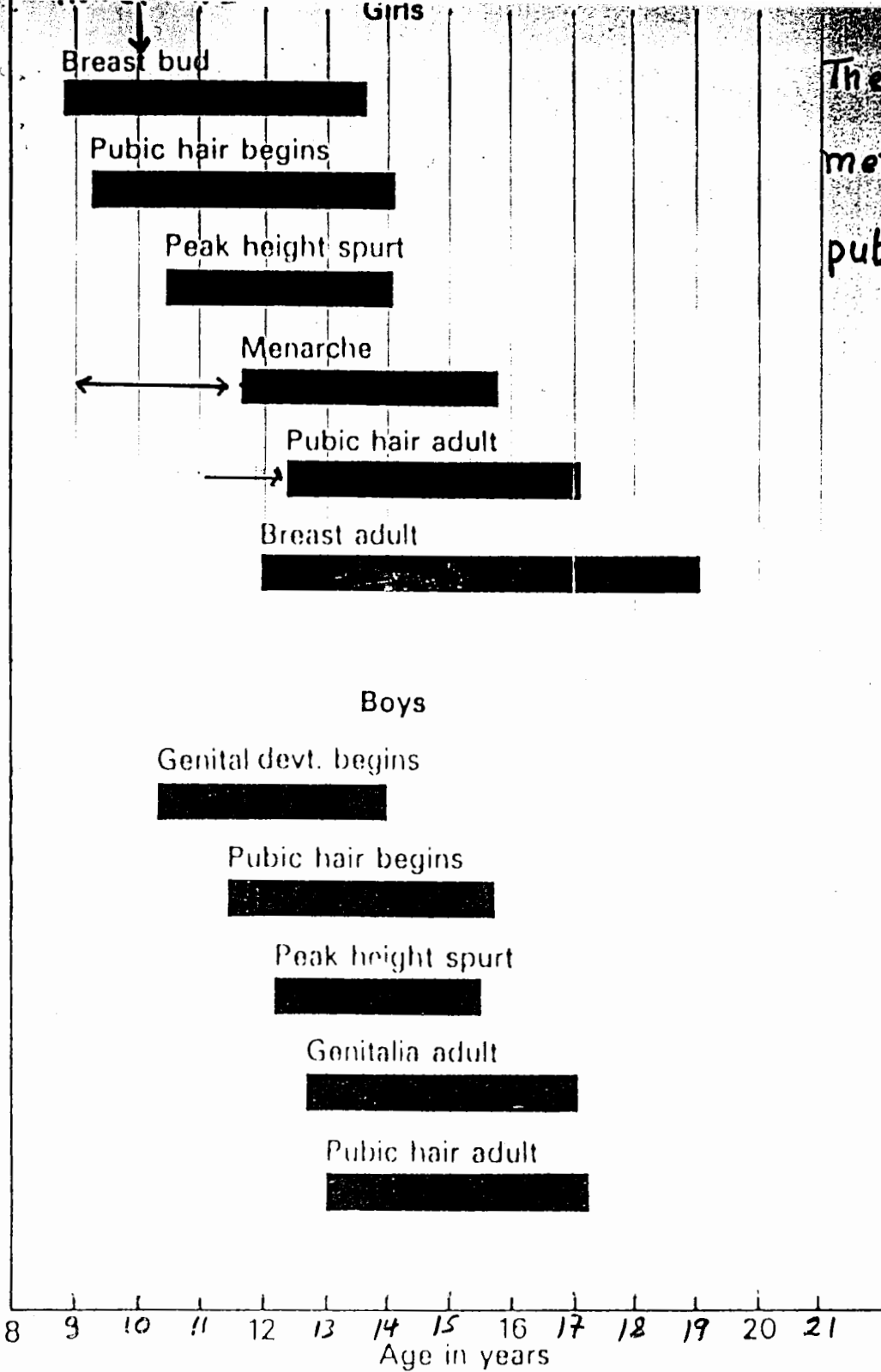


Figure 81-9. Elevation in body temperature shortly after ovulation.



Thelarche
 ↓
 menarche → 12 yr.
 ↓
 pubarche → 13 yr.

FIG. XI.21. Time of development of the different physical manifestations of puberty in boys and girls. (Redrawn from Sadow, J. I. D. *et al.* (1980). *Human reproduction*. Croom Helm, London.)

*The adrenal androgens are responsible in part for pubarche.

↑
 Adrenarche

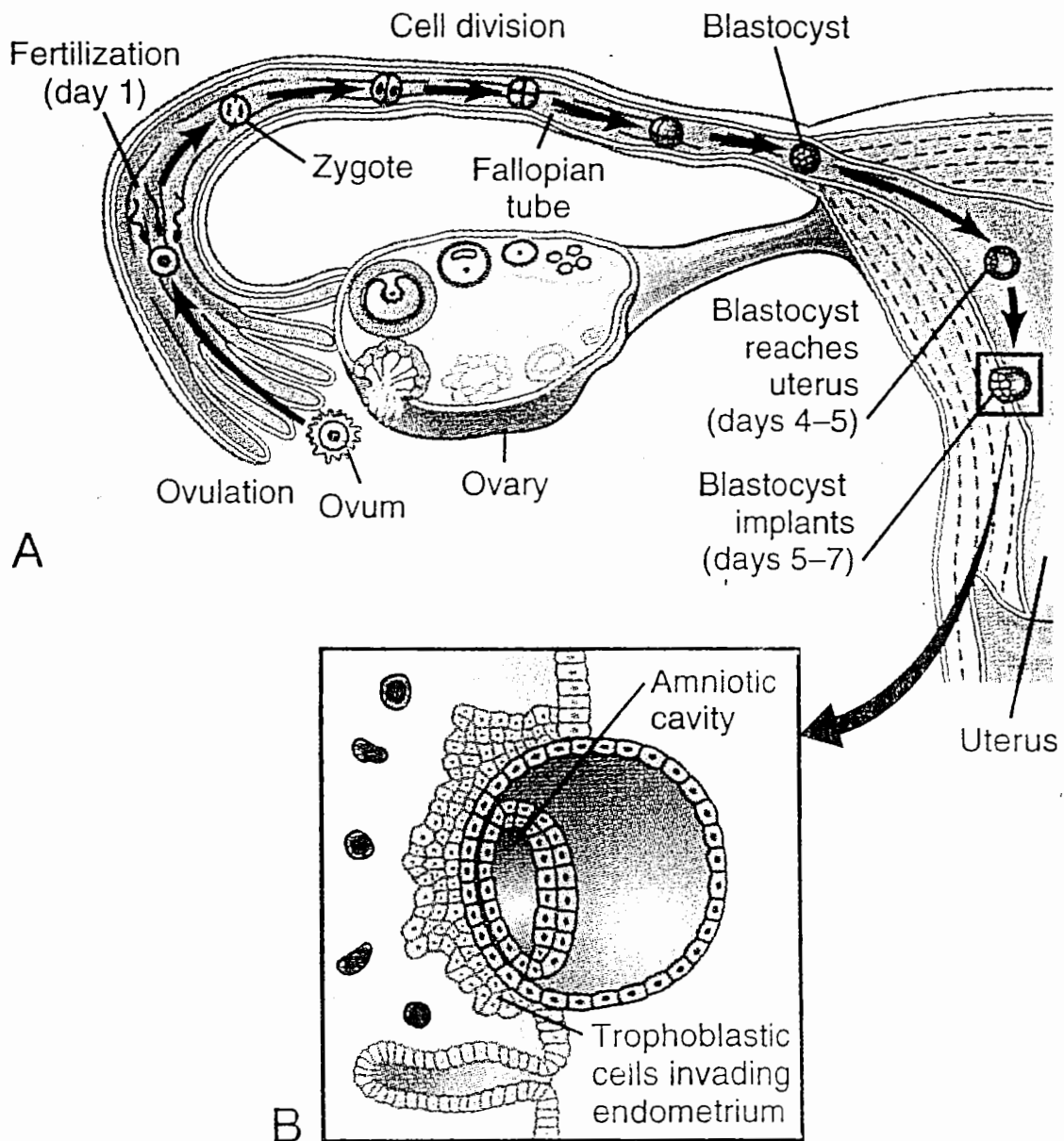


Figure 82-2 A, Ovulation, fertilization of the ovum in the fallopian tube, and implantation of the blastocyst in the uterus. B, Action of trophoblast cells in implantation of the blastocyst in the uterine endometrium.

* The oviducts transport the germ cells in two directions: sperm ascend toward the ampulla and the zygote descends toward the uterus. This requires coordination between smooth muscle contraction, ciliary movement, and fluid secretion, all of which are under hormonal and neuronal control.

OVARY in PREGNANCY

* When pregnancy occurs the ordinary ovarian cycle is suspended.

* After the first 14 days the developing placenta secretes a LUTEINIZING HORMONE (chorionic gonadotrophin).

* Under its influence the CORPUS LUTEUM continues to grow until it may come to occupy 30% to 50% of the total volume of the OVARY.

* The large amount of PROGESTERONE

helps to maintain the PREGNANCY in its early stages and is essential for development of the PLACENTA - the special structure through which the child receives its nourishment from the mother.

It also produces PROGESTERONE which gradually takes over from the

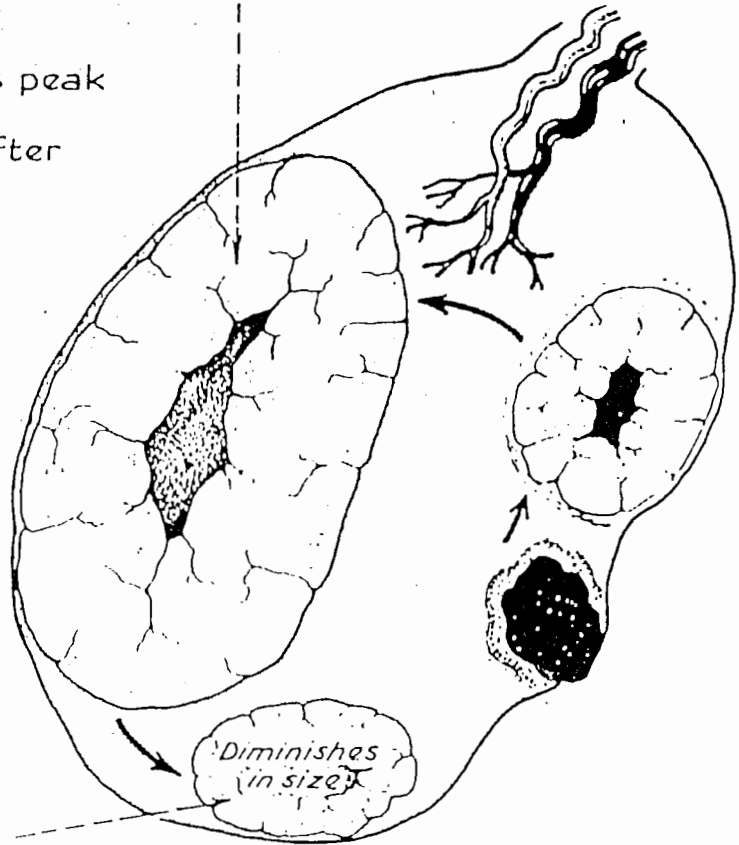
* CORPUS LUTEUM

* PLACENTAL PROGESTERONE

* reaches its peak at about 6 weeks after conception

falls off about 2nd. month

ceases to be active about 4th. month



takes over to maintain the PREGNANCY, and to help to prepare the mammary glands for Lactation.

TABLE 55-2**SUBSTANCES SECRETED BY THE BLASTOCYST****Immunosuppressive agents**

Platelet-activating factor (PAF)

Human chorionic gonadotropin (hCG)

Early pregnancy factor

Immunosuppressive factor

Prostaglandin E₂Interleukins 1 α and 6Interferon- α

Leukemia inhibitory factor

Colony-stimulating factor

Metalloproteases (facilitate invasion of trophoblast into the endometrium)

Collagenases: digest collagen types I, II, III, VII, and X

Gelatinases: 2 forms, digest collagen type IV and gelatin

Stromelysins: digest fibronectin, laminin, and collagens IV, V, and VII

Serine proteases (facilitate invasion of trophoblast into the endometrium)**Other factors or actions**

Ovum factor

Early pregnancy factor

Embryo-derived histamine-releasing factor

hCG: autocrine growth factor

Plasminogen activator and its inhibitors

Insulin-like growth factor type II (IGF-II): promotes trophoblast invasiveness

Estradiol

 β_1 Integrin

Fibroblast growth factor (FGF)

Transforming growth factor- α (TGF- α)

Inhibins

hCG is one of the most important of the factors secreted by the trophoblast of the blastocyst, both preimplantation and postimplantation. Besides rescuing the corpus luteum, hCG acts as an immunosuppressive agent, has growth-promoting activity, and acts as an autocrine growth factor that promotes trophoblast growth and placental development. Thus, hCG may have a role in the adhesion of the trophoblast to the epithelia of the endometrium. hCG has protease activity, and hCG levels are high in the area where the trophoblast faces the endometrium. •

TABLE 55-4

HORMONES MADE BY THE PLACENTA

Peptide Hormones and Neuropeptides

Human chorionic gonadotropin (hCG)

Thyrotropin (thyroid-stimulating hormone [TSH])

Placental-variant growth hormone

Human chorionic somatomammotropins 1 and 2 (hCS1 and hCS2), also known as human placental lactogen (hPL: hPL1 and hPL2)

Placental proteins PP12 and PP14

Thyrotropin-releasing hormone (TRH)

Corticotropin-releasing hormone (CRH)

Growth hormone-releasing hormone (GHRH)

Gonadotropin-releasing hormone (GnRH)

Substance P

Neurotensin

Somatostatin

Neuropeptide Y

(ACTH)-related peptide

The inhibins

Steroid Hormones

Progesterone

Estrone

Estradiol

Estriol

The most important of the placental peptide hormones is hCG. In the developing blastocyst, and later in the mature placenta, it is the syncytiotrophoblast cells that synthesize hCG, perhaps under the direction of progesterone and estrogens. The placenta also produces two human chorionic somatomammotropins, hCS 1 and hCS 2, also called *human placental lactogen* (hPL). hCS 1 and 2 are polypeptide hormones that are structurally related to growth hormone and placental-variant growth hormone, as well as to prolactin (see Table 47-1). They play a role in the conversion of glucose to fatty acids and ketones, thus coordinating the fuel economy of the fetoplacental unit. The fetus and placenta use fatty acids and ketones as energy sources and store them as fuels in preparation for the early neonatal period, when a considerable reservoir of energy is necessary for the transition from intra-uterine life to life outside the uterus. hCS 1 and 2 also promote development of maternal mammary glands during pregnancy.

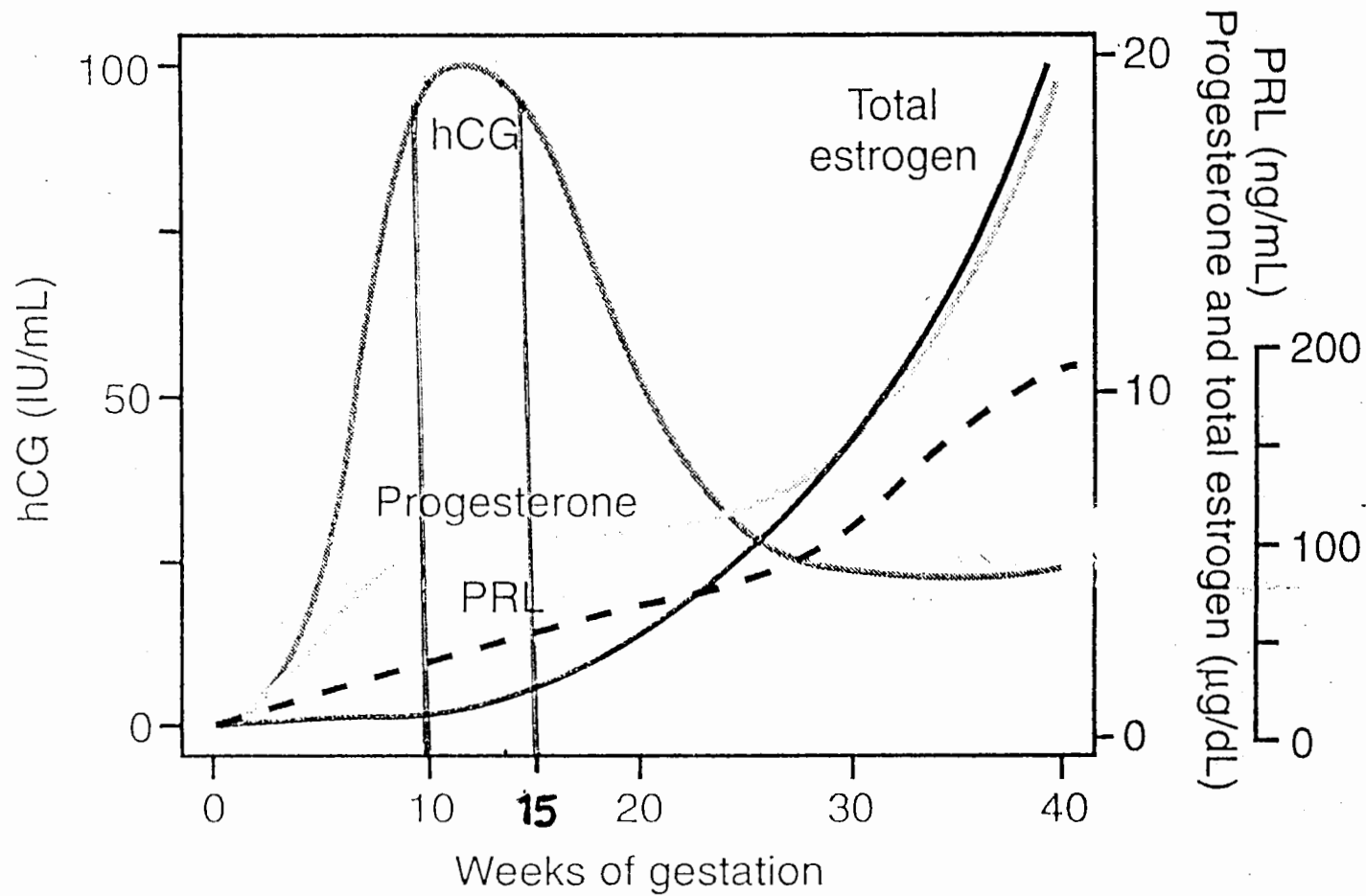


FIGURE 39.6 Profiles of hCG, progesterone, total estrogens, and PRL in the maternal blood throughout gestation.

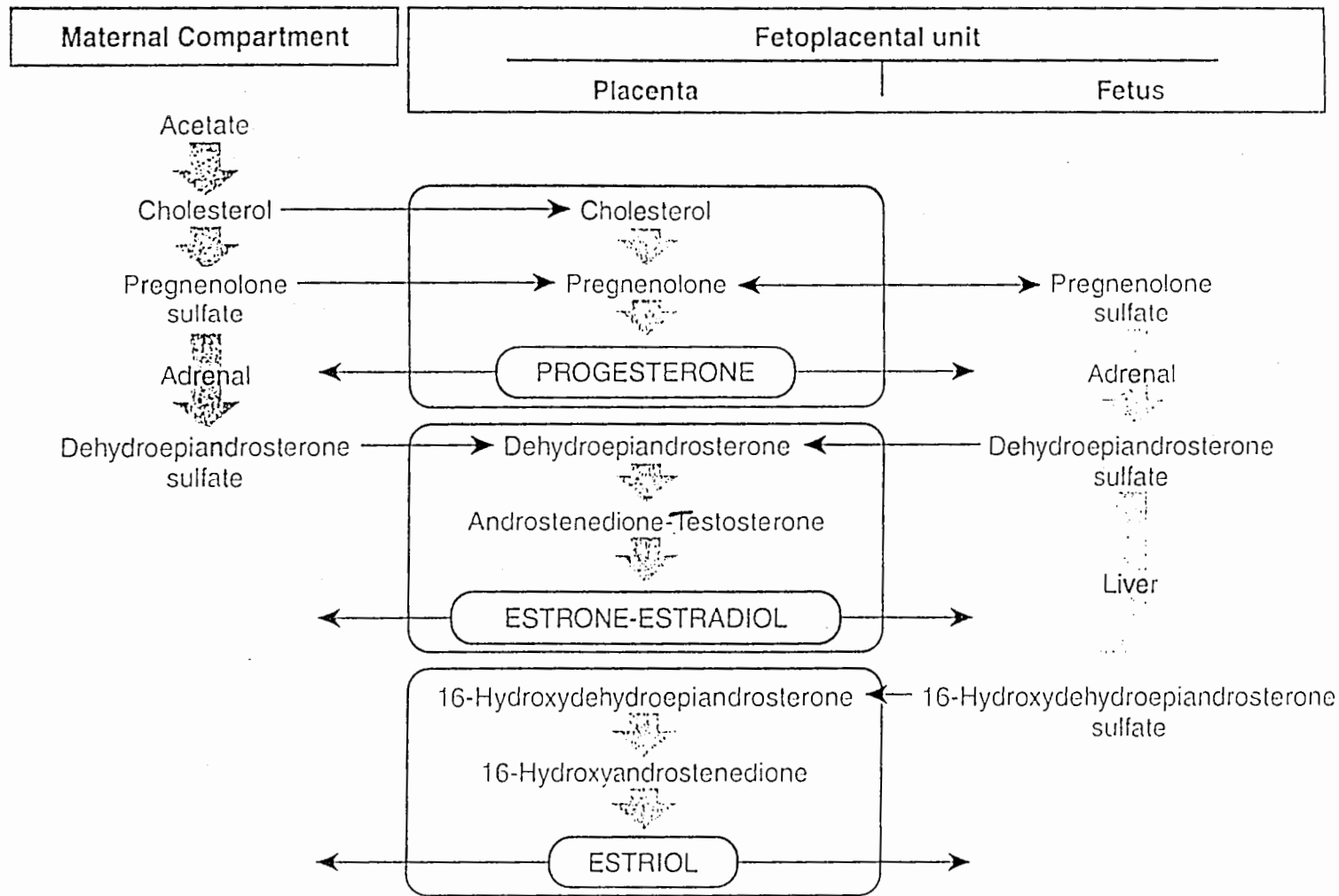


FIGURE 38.7 The fetoplacental unit and steroidogenesis. Note that estriol is the product of reactions occurring in the fetal adrenal, fetal liver, and placenta. (Modified from Goodman HM. Basic Medical Endocrinology. New York: Raven, 1988.)

* The levels of estriol in plasma, amniotic fluid, or urine are used as an index of fetal well-being. Low levels of estriol would indicate potential fetal distress, although rare inherited sulfatase deficiencies can also lead to low estriol.

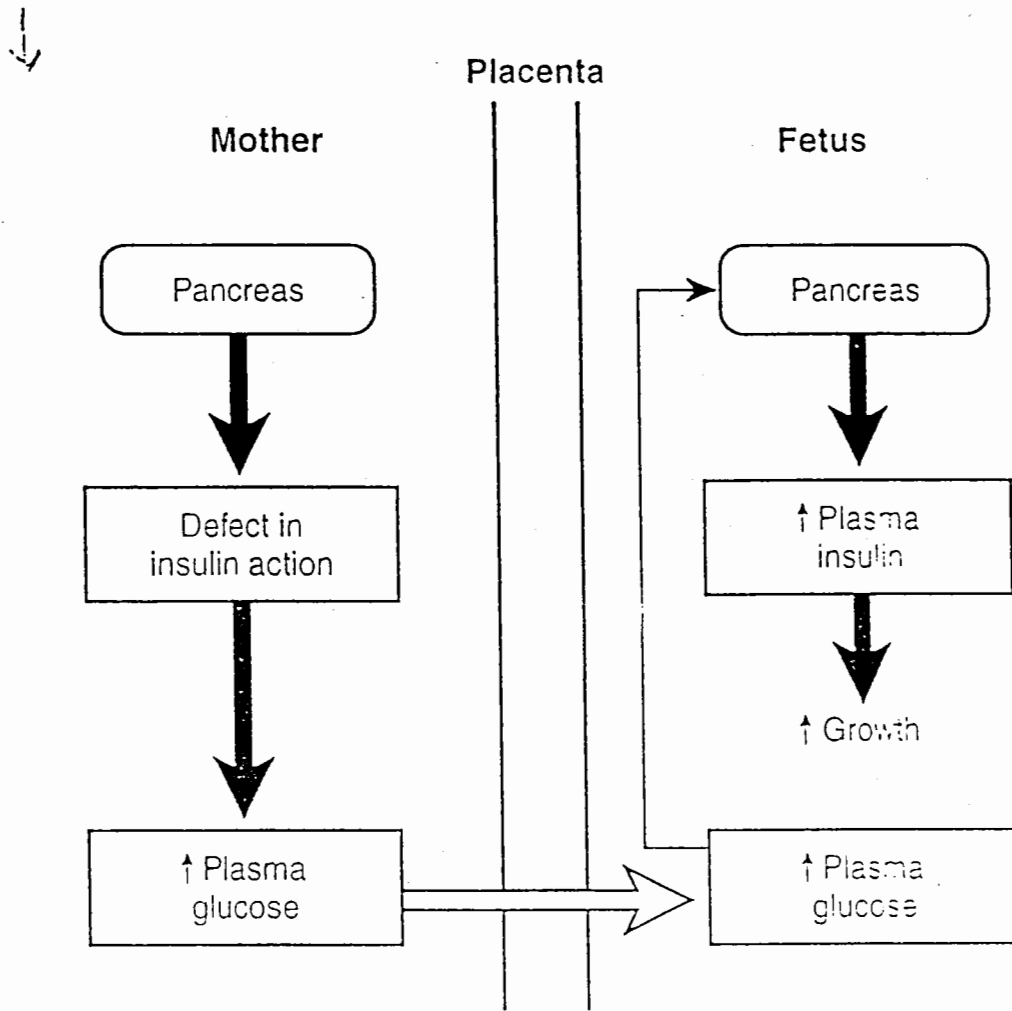
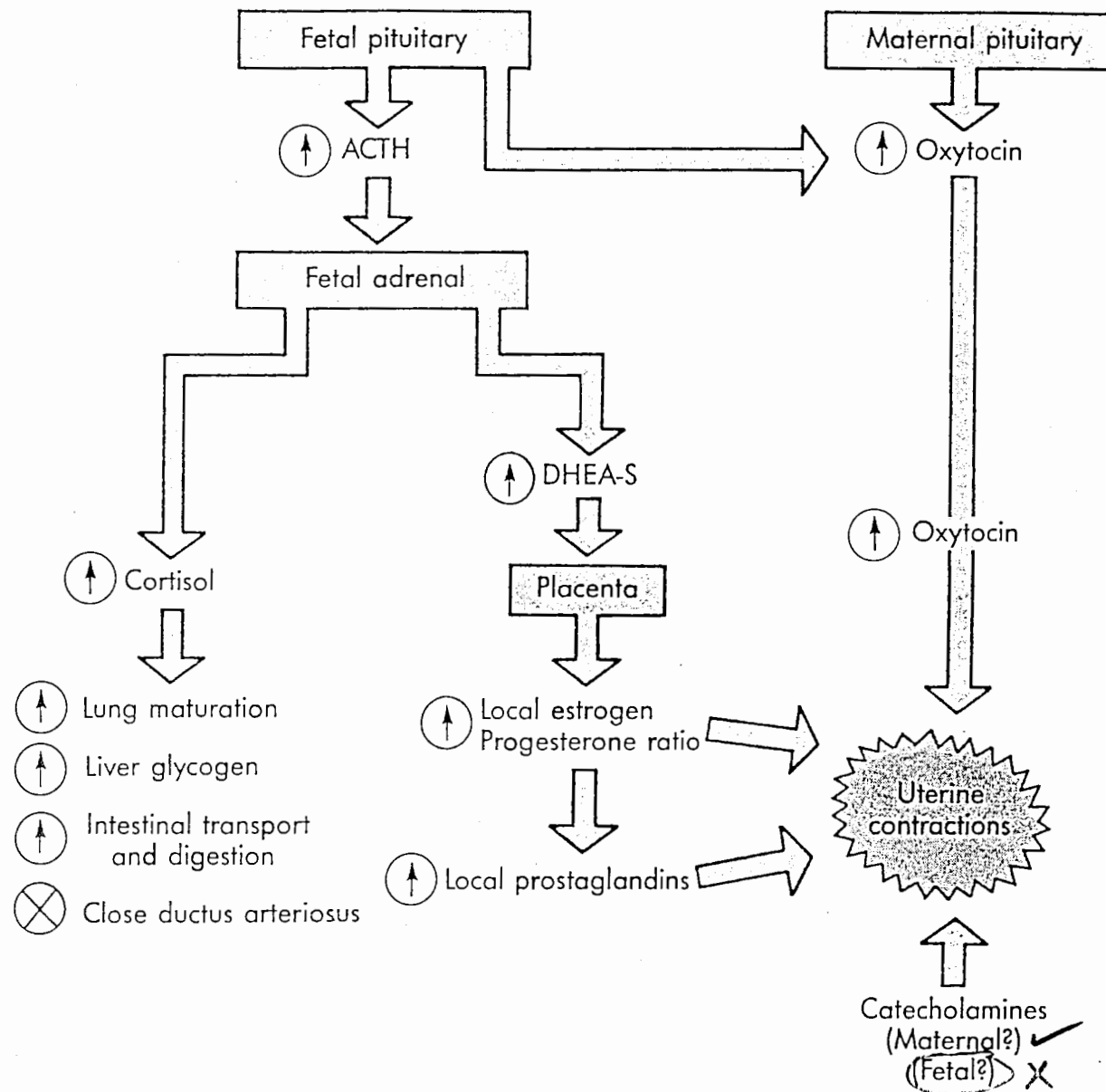


FIGURE 38.8 Effects of maternal diabetes on fetal growth.



■ Fig. 51-30 Endocrine regulation of parturition. The fetal pituitary-adrenal axis initiates signals that decrease the ratio of effective progesterone to estrogen in the myometrium. This leads to uterine contractions, which are mediated by prostaglandins. Oxytocin may contribute to labor but is not essential. However, oxytocin sustains uterine contractions after expulsion of the fetus so as to minimize maternal loss of blood. Cortisol prepares the fetus to adapt to extrauterine life successfully. *ACTH*, Adrenocorticotrophic hormone; *DHEA-S*, dehydroepiandrosterone sulfate.

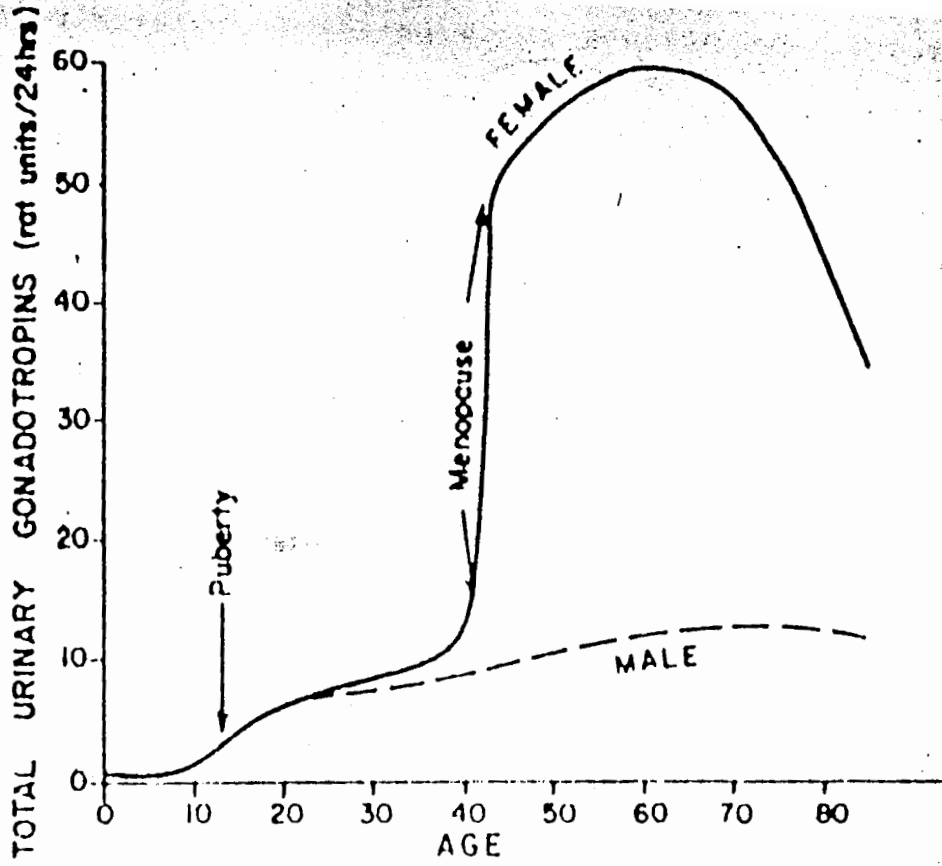


Figure 81-7. Total rates of secretion of gonadotropic hormones throughout the sexual lives of females and males, showing an especially abrupt increase in gonadotropic hormones at the menopause in the female.

TABLE 39.A**Contraceptive Use and Efficacy Rates
in the United States**

Method	Estimated Use (%)	Accidental Pregnancy in Year 1 (%)
Pill	32	3
Female sterilization	19	0.4
Condom	17	12
Male sterilization	14	0.15
Diaphragm	4-6	2-23
Spermicides	5	20
Rhythm	4	20
Intrauterine device	3	6

From *Developing New Contraceptives: Obstacles and Opportunities*. Washington, DC: National Academy Press, 1990.

BIRTH CONTROL

Methods	Examples	Comments
Hormones	Norplant Oral Contraceptive ("The Pill")	Estrogen and progesterone prevent follicle development and ovulation.
Barriers	Cervical Cap Condom Diaphragm Vaginal Pouch	Sperm are prevented from entering the uterine cavity. Male condoms protect against sexually transmitted diseases.
Spermicides	Contraceptive Sponge Creams Douches Foams Jellies Suppositories	These methods depend upon sperm-killing chemicals. The contraceptive sponge releases spermicide for up to 24 hours.
Timing	Rhythm Method Sympto-thermal Method	The avoidance of sexual intercourse for about 7 days (while a viable ovum is in the uterine tube).
Sterilization	Vasectomy (male) Tubal Ligation (female)	The severing of each ductus deferens in the male and both uterine tubes in the female.
Intrauterine Device (IUD)		An object placed in the uterine cavity prevents implantation.
Withdrawal (Coitus Interruptus)		The penis is withdrawn from the vagina before ejaculation occurs.
Abortion		Surgical or drug-induced removal of the embryo.

Types of hormonal contraceptive

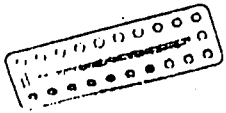



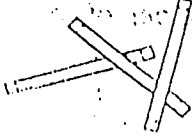
	Combined oral contraceptive pill (COCP)	Progestogen-only pill (POP)	Emergency pill	Depot (contraceptive injection)	Implants
					
Composition	synthetic oestrogens and progestogens	synthetic progestogens	high dose of synthetic oestrogens and progestogens	synthetic progestogens (medroxy-progesterone)	synthetic progestogens
Administration	oral, <u>daily for 21 days</u> with a 7-day gap before the next course of pills (during the 7 day gap a withdrawal bleed occurs)	oral, <u>daily without a break between packs</u> , and must be taken at the same time every day	oral, <u>must be taken within 72 h of coitus if no other contraception was used</u>	intramuscular injection, <u>lasts 8-12 weeks</u>	small soft tubes inserted under the skin, <u>lasts up to 5 years</u>
Mode of action	principal action = suppression of <u>ovulation</u>	does not reliably suppress <u>ovulation</u>	inhibits <u>implantation</u>	does not reliably suppress <u>ovulation</u>	prevents <u>ovulation</u>
Effectiveness if taken/applied according to instructions	>99%	99% (less effective in young women and if >70 kg)	>95%	>99%	>99%
Advantages	often decreases menstrual bleeding, pain, premenstrual tension, and acne, and may protect against ovarian cancer	useful for women who cannot use the COCP (because POP contains no oestrogen)	postcoital contraceptive	do not have to remember to take pills, may protect against endometrial cancer	same as for depot
Disadvantages	increased risk of thromboembolic disease (e.g. deep vein thrombosis, pulmonary embolism, cerebral thrombosis), dyslipidaemia, hypertension	side effects include: irregular uterine bleeding ('breakthrough bleeding' or amenorrhoea), breast discomfort, premenstrual tension, skin reactions, increased risk of ectopic pregnancy	same as for COCP, although risk is increased owing to high dose of oestrogen, often cause nausea and vomiting	side effects are same as for POP, plus: weight gain, loss of bone density	same as for depot, plus: often difficult to remove owing to fibrosis
Comments	not reliable if taken >12 h late, or after vomiting/diarrhoea	not reliable if taken >3 h late, or after vomiting/diarrhoea	should not be used as a regular form of contraception	not immediately reversible	

Fig.11.4 Types of hormonal contraceptive.

Types of non-hormonal contraceptive


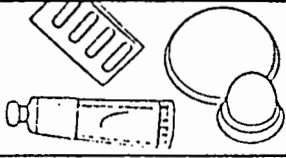
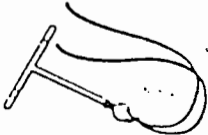
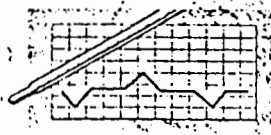
	Male condom	Diaphragm or cap with spermicide	Intrauterine contraceptive device (IUCD)	Natural (symptothermal) method
				
Description	rubber sheath, lubricated with spermicidal cream	flexible rubber device used with spermicide	small plastic or copper device (some contain progestagen)	avoid ovulation—unprotected sexual intercourse confined to the 'safe' infertile times of the menstrual cycle
Administration	put over the erect penis during intercourse	device is inserted into the vagina before intercourse and covers the cervix; it must stay in for at least 6 h after sex	inserted into the uterus and can stay there for 5 years	the fertile and infertile times of the menstrual cycle are identified by measuring monthly changes in body temperature and cervical mucus
Mode of action	prevents sperm from entering vagina	prevents sperm from entering uterus	inhibits sperm migration and prevents implantation	prevents sperm from encountering ovum
Effectiveness if taken/applied according to instructions	98%	92–94% depending on the type of device used	98–99% depending on the type of device used	98% (although much lower if the menstrual cycle is irregular)
Advantages	may protect both partners from sexually transmitted diseases, and may protect female against cervical cancer	female is in control of contraception (important if male is not motivated); reusable	immediately effective, requires little follow-up; hormone-containing IUCD cause lighter periods	no side effects
Disadvantages	requires high motivation and may interrupt spontaneity and sensitivity	less protection against sexually transmitted disease	may cause heavy, prolonged, painful periods and predispose to pelvic inflammatory disease	need to use alternative method during fertile days; requires close attention to symptoms of cycle

Fig. 11.5 Types of non-hormonal contraceptive.

Hormonal Therapy for Ladies and Maintaining Beauty

Hormonal therapy for ladies is necessary through out all stages of life especially after the age of 50 specifically in these cases:

1. To maintain the density of bones and stop osteoporosis.
Here, I'd like to assure that taking calcium and vitamin D is no good to help maintain good posture if this is accompanied by the lack of Estrogen or Testosterone.
2. To maintain the beauty of complexion and prevent wrinkles
I'd like to draw the attention that anti-wrinkles facial creams are no good for Estrogen is what creates collagen which is permanent unlike Botox which is temporary.
3. For the treatment of extreme facial and body hair.
4. For the low desire for sex compared to spouse.
5. For the maintaining of the size of breasts and preventing atrophy especially in menopause.
6. To prevent urine incontinence in ladies (unvoluntary)

I'd like to make sure that hormonal treatment has many kinds and different dozes and is not given by the public. In the west women take the right hormones by the supervision of the doctor.

I'd like to add the Estrogen has proved special importance in the treatment of Zheimer and Amnesia.
