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**15/MHS06/023**

**MLS514**

**QUESTIONS**

1. Briefly describe the hormones of the anterior pituitary. Explain the principle behind the use of letrozole, clomiphene and menotropin/gonadotrophins in the management of some ailments
2. A woman of about 24 years went to a hospital to complain of her lack of menstruation for about 3 months. Describe her condition and the laboratory findings that may likely be seen.

b. how would you have described it if the woman is 60years of age

1. Discuss critically how you would set to investigate a case of infertility in a couple.

b. How would you support the couple in achieving conception

**ANSWER**

1. A hormone is a chemical substance that is made by specialist cells, usually within an endocrine gland, and it is released into the bloodstream to send a message to another part of the body. It is often referred to as a chemical messenger. The major endocrine glands are the pituitary, pineal, thymus, thyroid, adrenal glands, and pancreas.

**Pituitary gland**

The pituitary gland is a small pea-sized gland that plays a major role in regulating vital body functions and general wellbeing. It is referred to as the body's 'master gland' because it controls the activity of most other hormone-secreting glands. The pituitary gland can be divided into two; Anterior pituitary gland and posterior pituitary gland.

**Anterior pituitary gland**

The anterior pituitary gland also known as adenohypophysis or pars anterior is the glandular, anterior lobe that together with the posterior lobe (posterior pituitary or the neurohypophysis) makes up the pituitary gland (hypophysis). The anterior pituitary regulates several physiological processes, including stress, growth, reproduction, and lactation. The anterior pituitary gland produces the following hormones and releases them into the bloodstream:

* Adrenocorticotropic hormone, which stimulates the adrenal glands to secrete steroid hormones, principally cortisol
* Growth hormone, which regulates growth, metabolism and body composition
* Luteinizing hormone and follicle stimulating hormone, also known as gonadotrophins. They act on the ovaries or testes to stimulate sex hormone production, and egg and sperm maturity
* Prolactin, which stimulates milk production
* Thyroid stimulating hormone, which stimulates the [thyroid](https://www.yourhormones.info/glands/thyroid-gland/) gland to secrete thyroid hormones.

b. **letrozole**

It is an aromatase inhibitor whose primary action is suppression of estrogen production, thereby decreasing the negative feedback of estrogens in the hypothalamus leading to increased GnRH production and FSH secretion, and subsequent ovarian follicular development. Letrozole also has a significantly shorter half-life than clomiphene, so it is no longer present at the time of implantation. Letrozole has become more widespread and common in its used in ovulation induction and is considered by many to be first-line therapy.

**Clomiphene**

Clomiphene is a non-steroidal fertility medicine. It causes the pituitary gland to release hormones needed to stimulate ovulation (the release of an egg from the ovary). Clomiphene is used to cause ovulation in women with certain medical conditions (such as polycystic ovary syndrome) that prevent naturally occurring ovulation.

**Menotropin**

Menotropin (also called human menopausal gonadotropin or hMG) is a hormonally active medication for the treatment of fertility disturbances. It is used as the medication for the mixture of gonadotropins. Menotropins are extracted from the urine of postmenopausal women. Being a combination drug, menotropins bind to the follicle stimulating hormone receptor (FSH), which results in ovulation in the absence of sufficient endogenous luteinizing hormone (LH). It also binds the LH receptor, thereby stimulating proper hormone release. The drug contains both FSH and LH, therefore, it induces ovarian follicular growth and development as well as gonadal steroid production in women who do not have ovarian failure. FSH is the primary driver of follicular recruitment and growth in early folliculogenesis, while LH is important for ovarian steroidogenesis and is involved in the physiological events leading to development of a competent pre-ovulatory follicle.

1. **Menstruation**, or period, is normal vaginal bleeding that occurs as part of a woman's monthly cycle. Every month, your body prepares for pregnancy. If no pregnancy occurs, the uterus, or womb, sheds its lining. The menstrual blood is partly blood and partly tissue from inside the uterus. It passes out of the body through the vagina.

**Menstruation cycle**

Menstrual cycle occurs due to the rise and fall of hormones. This cycle results in the thickening of the lining of the uterus, and the growth of an egg, (which is required for pregnancy). The egg is released from an ovary around day fourteen in the cycle; the thickened lining of the uterus provides nutrients to an embryo after implantation. If pregnancy does not occur, the lining is released as what is known as menstruation. menstrual cycle can be divided into four phases:

**Menstrual phase**: This is the first stage of menstrual cycle. This phase occurs when an egg from the previous cycle isn’t fertilized due to absences of pregnancy. The levels of the hormones estrogen and progesterone decreases. The thickened lining of your uterus, which would support a pregnancy, is no longer needed, so it sheds through your vagina. During this period, there is combined release of blood, mucus, and tissue from the uterus.

**Follicular phase**: The follicular phase starts on the first day of menstruation (so there is some overlap with the menstrual phase) and ends when there is ovulation. It starts when the hypothalamus sends a signal to the pituitary gland to release follicle-stimulating hormone (FSH). This hormone stimulates the ovaries to produce around 5 to 20 small sacs called follicles. Each follicle contains an immature egg. Only the healthiest egg will eventually mature. Some women may have more than one mature egg. The remaining follicles will be reabsorbed into the body. The maturing follicle sets off a surge in estrogen that thickens the lining of the uterus. This creates a nutrient-rich environment for an embryo to grow. An average follicular phase lasts for about 16 days. It can range from 11 to 27 days, depending on the cycle.

**Ovulation phase**: Rising levels of estrogen during the follicular phase triggers the pituitary gland to release luteinizing hormone (LH). This is what starts the process of ovulation. Ovulation is when the ovary releases a mature egg. The egg travels down the fallopian tube toward the uterus to be fertilized by sperm. The ovulation phase is the only time during the menstrual cycle when pregnancy can occur. Signs of ovulation can include: slight rise in basal body temperature, thicker discharge that has the texture of egg whites. Ovulation occurs at around day 14 if a woman has a 28-day cycle — right in the middle of the menstrual cycle. It last for about 24 hours. After a day, the egg will die or dissolve if not fertilized.

**Luteal phase**: After the follicle releases its egg, it changes into the corpus luteum. This structure releases hormones, mainly progesterone and some estrogen. The rise in hormones keeps the uterine lining thick and ready for a fertilized egg to implant. If a woman gets pregnant, the body will produce human chorionic gonadotropin (hCG). This is the hormone pregnancy tests detect. It helps maintain the corpus luteum and keeps the uterine lining thick. If there is no pregnancy, the corpus luteum will shrink away and be resorbed. This leads to decreased levels of estrogen and progesterone, which causes the onset of menstruation. The uterine lining will shed during menstruation. During this phase, if there is no pregnancy, symptoms of premenstrual syndrome (PMS) may occur. These include: bloating, breast swelling, pain, or tenderness, mood changes, headache, weight gain, changes in sexual desire, food cravings, trouble sleeping. The luteal phase lasts for 11 to 17 days. The average length is 14 days.

Each phase differs from woman to woman, and it can change over time.

**Amenorrhea**

Amenorrhea is the absence of menstrual bleeding for at least 3 months.

**Classification of Amenorrhea**

It can be classified as

**Primary amenorrhea**: This is when a woman has come of age but has never menstruated before.

**Secondary amenorrhea**: This is when a woman has been menstruating but it ceases for more than 3 months. It occurs in approximately 3–5 percent of adult women.

**Causes of secondary amenorrhea**

**Hormonal imbalances**: Hormonal imbalance is the most common cause of secondary amenorrhea. It can occur as a result of tumors on the pituitary gland**,** overactive thyroid gland**,** low estrogen levels**,** high testosterone levels**.** Hormonal birth control can also contribute to secondary amenorrhea. Depo-Provera, a hormonal birth control shot, and hormonal birth control pills, may cause cease in menstrual period. Certain medical treatments and medications, such as chemotherapy and antipsychotic drugs, can also cause amenorrhea.

**Structural issues**: Conditions such as polycystic ovary syndrome (PCOS) can cause hormonal imbalances that lead to the growth of ovarian cysts. Ovarian cysts are benign, or noncancerous, masses that develop in the ovaries. PCOS can also cause amenorrhea. Scar tissue that forms due to pelvic infections or multiple dilation and curettage (D and C) procedures can also prevent menstruation. D and C involves dilating the cervix and scraping the uterine lining with a spoon-shaped instrument called a curette. This surgical procedure is often used to remove excess tissue from the uterus. It’s also used to diagnose and treat abnormal uterine bleeding.

**Lifestyle factors**: Body weight can affect menstruation. Women who are overweight or who have less than 15 percent body fat may stop getting menstrual periods. This is especially true for athletes who train extensively or excessively. Emotional stress is another possible cause of secondary amenorrhea. The body may respond to extreme stress by disrupting the normal menstrual cycle. The menstrual periods will most likely resume once there is no longer any tension and anxiety.

**Investigation of secondary amenorrhea**

* Secondary amenorrhea can be investigated by
* history taking
* Ruling out of pregnancy by carrying out a pregnancy test
* Series of blood tests can be carried out. These tests can measure the levels of testosterone, estrogen, and other hormones in your blood.
* Imaging tests can be used in diagnosis secondary amenorrhea. MRI, CT scans, and ultrasound tests allow the medical professional to view the internal organs. The medical professional can use this to check for cysts or other growths on the ovaries or in the uterus.

**Treatment for secondary amenorrhea**

The treatment for secondary amenorrhea varies depending on the underlying cause of the condition.

* Hormonal imbalances can be treated with supplemental or synthetic hormones.
* Removal of ovarian cysts, scar tissue, or uterine adhesions can cause miss of menstrual periods.
* lifestyle changes may also be recommended if weight or exercise routine is contributing to the condition.
* Referral to a nutritionist or dietitian can be recommended, if necessary.

b. **Menopause**

Menopause is the time that marks the end of a woman’s menstrual cycles. It's diagnosed after 12 months without a menstrual period. Menopause can happen in your 40s or 60s. Menopause is a natural biological process. But the physical symptoms, such as hot flashes, and emotional symptoms of menopause may disrupt sleep, lower energy or affect emotional health. There are many effective treatments available, from lifestyle adjustments to hormone therapy.

**Menopause Process**

Natural menopause isn’t caused by any type of medical or surgical treatment and has three stages:

* **Perimenopause:** This phase usually begins several years before menopause, when the ovaries slowly make less estrogen. Perimenopause lasts until menopause, the point at which the ovaries stop releasing eggs. In the last 1 to 2 years of this stage, estrogen levels fall faster. Many women have menopause symptoms.
* **Menopause:** This is when it's been a year since menstruation occurs. The ovaries have stopped releasing eggs and making most of their estrogen.
* [**Post-menopause**](https://www.webmd.com/content/article/51/40639.htm)These are the years after menopause. Menopausal symptoms such as hot flashes usually ease. But health risks related to the loss of estrogen increase as a woman get older.
1. **Infertility** is defined as not being able to get pregnant despite having frequent, unprotected sex for at least a year. Infertility may result from an issue with either the man or the woman, or a combination of factors that prevent pregnancy. Women who are able to conceive but not carry a pregnancy to term may also be diagnosed with infertility. A woman who’s never been able to get pregnant will be diagnosed with primary infertility. A woman who’s had at least one successful pregnancy in the past will be diagnosed with secondary infertility. Infertility isn’t just a woman’s problem. Men can be infertile too. In fact, men and women are equally likely to have [fertility problem](https://www.healthline.com/health/pregnancy/signs-of-infertility)s.

**Causes of infertility**

**Male infertility** can be due to the following factors: Effective [production of sper](https://www.healthline.com/health/how-is-sperm-produced)m, S[perm count](https://www.healthline.com/health/mens-health/normal-sperm-count), or the number of sperm, [shape of the sperm](https://www.healthline.com/health/sperm-morphology), [movement of the sperm](https://www.healthline.com/health/fertility/sperm-motility), which includes both the wiggling motion of the sperm themselves and the transport of the sperm through the tubes of the [male reproductive system](https://www.healthline.com/human-body-maps/male-reproductive-system). There are a variety of risk factors such as old age, smoking cigarettes, heavy use of alcohol, being overweight or obese, exposure to toxins (pesticides, herbicides, and heavy metals). Medical conditions like hormonal imbalance, retrograde ejaculation, [varicocele](https://www.healthline.com/health/varicocele), or the swelling of the veins around the [testicles](https://www.healthline.com/human-body-maps/testis), testicles that [haven’t descended](https://www.healthline.com/symptom/undescended-testicle) into the [scrotum](https://www.healthline.com/human-body-maps/scrotum), having antibodies that attack your sperm and destroy them and medications that can also affect fertility.

**Female infertility** can be caused by a variety of factors that affect or interfere with the following biological processes: Ovulation, when the mature egg is released from theovary, fertilization, which occurs when sperm meets the egg in thefallopian tube after traveling through thecervix anduterus, Implantation, which occurs when a fertilized egg attaches to the lining of the uterus where it can then grow and develop into a baby. Risk factors for female infertility include: Increasing age, smoking cigarettes, heavy use ofalcohol, beingoverweight or obese or significantlyunderweight, having certainsexually transmitted infections (STIs) that can damage thereproductive system. Medical conditions that can lead to female infertility are: Ovulation disorders, which can be caused bypolycystic ovary syndrome (PCOS) orhormonal imbalances, Pelvic inflammatory disease (PID), Endometriosis, Uterine fibroids, Premature ovarian failure, Scarring from a previous surgery.

**Investigations of infertility**

There are various steps in the investigation of infertility in both male and female, and the steps are:

* History taking: this is done get information about the man or woman. Information like: Age, occupation of the man or woman, if he/she have children or there is intake of drug that can lead to infertility.
* Assessment of dehydration or anemia
* Hormonal assessment: Blood test to determine the levels of hormones such as testosterone, Estrogen and other reproductive hormones.
* Sperm analysis: This is done to get an overview on the morphology, volume, PH, color and consistency of the sperm.
* Imaging test: this is used to see the inside of the uterus, trans-rectal or scrotal, or a test of the vas deferens to check for any abnormalities.

b. To support couples in achieving conception, the following advises can be given:

* Maintaining a normal weight because underweight or overweight can increase the risk of ovulation disorders.
* Understanding the ovulation period of the woman, and having sex few days before and on the ovulating day of the woman will increase the odds of conceiving.
* Lifestyle changes: These may include Quit smoking, reduced caffeine intake, improve diet and exercise habits.

Infertility in both male and female can be treated with assisted reproductive technology (ART). Several types of ART:

* GIFT (gamete intrafallopian transfer) and ZIFT (zygote intrafallopian transfer): With GIFT, both sperm and eggs are placed into the fallopian tube. With the ZIFT, the sperm and eggs are brought in a lab and then a fertilized egg is placed into the tube at 24hours.
* IUI (intrauterine insemination): Sperm is collected and placed directly inside the woman’s uterus while she is ovulating.
* IVF (in-vitro fertilization): The sperm and egg are collected and brought together in a lab. The fertilized egg grows for 3 to 5 days. Then the embryo is placed in the women’s uterus.