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MLS514 QUIZ

1a) A hormone is a chemical 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’. Hormones are found in all multicellular organisms and their role is to provide an internal communication system between cells located in distant parts of the body.

In the human body, hormones are used for two types of communication. The first is for communication between two endocrine glands, where one gland releases a hormone which stimulates another target gland to change the levels of hormones that it is releasing. The second is between an endocrine gland and a target organ, for example when the pancreas releases insulin which causes muscle and fat cells to take up glucose from the bloodstream.

Since hormones are released into the bloodstream and can therefore be carried around the entire body, they can perform both of these actions on many different targets. The complex interplay between the glands, hormones and other target organs is referred to as the endocrine system. Hormones affect many physiological activities including growth, metabolism, appetite, puberty and fertility.

**HORMONES OF THE ANTERIOR PITUITARY**

The pituitary gland is about the size of a bean, and it hangs by a stalk from the hypothalamus. Even though the gland is tiny, its power should not be underestimated. In fact, this gland is sometimes referred to as the 'master gland' because hormones from this gland affect the body's metabolism, growth and development, sexuality, and reproduction.

The pituitary gland hangs down from the hypothalamus. The anterior pituitary gland relies on regulatory hormones that come from the hypothalamus to tell it when to make and secrete its own hormones. There are six hormones produced directly from the anterior pituitary.

The anterior lobe releases hormones upon receiving releasing or inhibiting hormones from the hypothalamus. These hypothalamic hormones tell the anterior lobe whether to release more of a specific hormone or stop production of the hormone.

**Anterior Lobe Hormones:**

**Adrenocorticotropic hormone (ACTH):** ACTH stimulates the adrenal glands to produce steroid hormones, which regulate water and sodium balance, inflammation, and metabolism.

**Follicle-stimulating hormone (FSH):** FSH works with LH to ensure normal functioning of the ovaries and testes.

**Growth hormone (GH):** exerts direct effects on tissue growth and differentiation and indirect effects through the stimulation of insulin-like growth factor 1 production, which mediates some of the growth and differentiation effects of GH.GH is essential in early years to maintaining a healthy body composition and for growth in children. In adults, it aids healthy bone and muscle mass and affects fat distribution.

**Luteinizing hormone (LH):** LH works with FSH to ensure normal functioning of the ovaries and testes. It stimulate gonadal production of sex steroids, which mediate reproductive function and behavior

**Prolactin**: Prolactin stimulates breast milk production and breast development.

**Thyroid-stimulating hormone (TSH):** TSH stimulates the thyroid gland to release thyroid hormones that regulate growth, differentiation, and energy balance.

1b) **Letrozole:** Because estrogen contributes to the promotion and progression of breast cancer, a greater understanding of the role of estrogen in breast cancer has led to therapeutic strategies targeting estrogen synthesis, the estrogen receptor, and intracellular signaling pathways. The enzyme aromatase catalyses the final step in estrogen biosynthesis and was identified as an attractive target for selective inhibition. Modern third-generation aromatase inhibitors (AIs) effectively block the production of estrogen without exerting effects on other steroidogenic pathways by blocking the aromatase enzyme, which is responsible for the production of estrogen, inhibiting estrogen production, this lowers total serum estrogen levels in the body. The discovery of letrozole (Femara®) achieved the goal of discovering a highly potent and totally selective AI. Letrozole has greater potency than other AIs, including anastrozole, exemestane, formestane, and aminoglutethimide. Moreover, letrozole produces near complete inhibition of aromatase in peripheral tissues and is associated with greater suppression of estrogen than is achieved with other AIs. Letrozole inhibits the growth or induces the regression of hormone-responsive breast tumors in vivo. Estrogen is implicated as a major risk factor in the majority of breast cancers; therefore, use of the most potent AI is a logical treatment strategy.This will be useful to the breast cancer patient on the basis of such cancer often feeding off the estrogen hormone. It will be beneficial to the anabolic steroid user as excess estrogen often leads to some of the most commonly associated side effects of anabolic steroid use. Letrozole also carries the ability to increase natural testosterone production through an increase in Luteinizing Hormone (LH) and Follicle Stimulating Hormone (FSH).

By including Letrozole in a cycle that contains aromatizing anabolic steroids, this can prevent the estrogenic related side effects. This will protect the individual from gynecomastia and water retention. Further, while many steroids can promote high blood pressure despite aromatization, an AI will improve the individual’s odds when water retention is the culprit. Heavy excess water retention is normally the number one cause of high blood pressure among steroid users.

Undeniably, AI’s like Letrozole are the most effect means at combating estrogenic related side effects. However, they can also have a negative impact on cholesterol. Alone AI’s do not appear to have a strong, negative effect on cholesterol, but when coupled with an aromatizing steroid like testosterone the adverse cholesterol effect is enhanced.

With its ability to promote natural testosterone production, Letrozole is often an appealing choice for Post Cycle Therapy (PCT) plans. This can also make it appealing for low testosterone treatment, but it’s often not enough. However, for PCT purposes, while it can be effective it’s generally not recommended. The primary purpose of PCT is stimulating natural testosterone production, which Letrozole can do very well.

**Clomiphene:** CLOMID is indicated for the treatment of ovulation dysfunction in women desiring pregnancy. Impediments to achieving pregnancy must be excluded or adequately treated before beginning CLOMID therapy. Those patients most likely to achieve success with clomiphene therapy include patients with  polycystic ovary syndrome (PCOS), amenorrhea-galactorrhea syndrome, , post-oral-contraceptive amenorrhea, and certain cases of [secondary amenorrhea](https://www.rxlist.com/script/main/art.asp?articlekey=7939) of undetermined etiology.

Properly timed [coitus](https://www.rxlist.com/script/main/art.asp?articlekey=12430) in relationship to ovulation is important. A basal body temperature graph or other appropriate tests may help the patient and her physician determine if ovulation occurred. Once ovulation has been established, each course of CLOMID should be started on or about the 5th day of the cycle. Long-term cyclic therapy is not recommended beyond a total of about six cycles (including three ovulatory cycles). CLOMID is indicated only in patients with demonstrated ovulatory dysfunction who meet the conditions described below:

1. Patients who are not pregnant.
2. Patients without ovarian cyst. CLOMID should not be used in patients with ovarian enlargement except those with polycystic ovary syndrome, Pelvic examination is necessary prior to the first and each subsequent course of CLOMID treatment.
3. Patients without abnormal vaginal bleeding. If abnormal vaginal bleeding is present, the patient should be carefully evaluated to ensure that neoplastic lesions are not present.
4. Patients with normal liver function.

In addition, patients selected for CLOMID therapy should be evaluated in regard to the following:

1. Estrogen Levels. Patients should have adequate levels of endogenous biopsy (as estimated from vaginal smears, endometrial biopsy assay of urinary estrogen, or from bleeding in response to progesterone). Reduced estrogen levels, while less favorable, do not preclude successful therapy.
2. Priary Pituitary or Ovarian Failure. CLOMID therapy cannot be expected to substitute for specific treatment of other causes of ovulatory failure.
3. Endometriosis and Endometrial Carcinoma. The incidence of endometrosis and endometrial carcinoma increases with age as does the incidence of ovulatory disorders. Endometrial biopsy should always be performed prior to CLOMID therapy in this population.
4. Other Impediments to Pregnancy. Impediments to pregnancy can include thyroid disorders, adrenal disorders, hyperprolactinemia, and male factor infertility.
5. Uterine Fibroids. Caution should be exercised when using CLOMID in patients with uterine fibroids due to the potential for further enlargement of the fibroids.

There are no adequate or well-controlled studies that demonstrate the effectiveness of CLOMID in the treatment of male infertility. In addition, testicular tumors and have been reported in males using clomiphene. The cause and effect relationship between reports of testicular tumors and the administration of CLOMID is not known.

Although the medical literature suggests various methods, there is no universally accepted standard regimen for combined therapy (ie, CLOMID in conjunction with other ovulation-inducing drugs). Similarly, there is no standard CLOMID regimen for ovulation induction in *in vitro* fertilization programs to produce ova for fertilization and reintroduction. Therefore, CLOMID is not recommended for these uses.

Clomiphene is an antiestrogen, but acts as a partial agonist in that it also has weak estrogenic activity at high doses. In adult men and women, its antiestrogenic action predominates in vivo, resulting in increased secretion of GnRH and thereby LH and FSH. In prepubertal children with very low or negligible amounts of estrogen, it acts as an estrogen and inhibits LH and FSH. The usual protocol is to administer 100 mg of clomiphene orally each day for 5–7 days. Serum LH levels generally increase by 100% or more, while FSH levels show about a 50% increase over baseline. A normal response to clomiphene indicates normality of the hypothalamic–pituitary axis. However, an abnormal/absent response does not distinguish hypothalamic from pituitary disease.

**Menotrophin:** Menotropin (also called human menopausal gonadotropin or hMG) is a [hormonally](https://en.m.wikipedia.org/wiki/Hormone) active medication for the treatment of [fertility disturbances](https://en.m.wikipedia.org/wiki/Fertility_disturbances). Menotropins are a standardized mixture of follicle-stimulating hormones and luteinizing hormones. These chemicals are derived from the urine of postmenopausal women. Clomiphene is a synthetic ovulation stimulant. Urine of postmenopausal women reflects the hypergonadotropic state of menopause -levels of follicle stimulating hormone (FSH) and luteinizing hormone (LH) are high - and contain a mixture of these gonadotropins. It is used when clomiphene is not effective
**For induction of ovulation and assisted reproductive technologies (ART**): Menotropins prepare the ovarian follicle for ovulation. The combination of FSH and LH stimulates follicular growth and maturation. Chorionic gonadotropin, whose actions are nearly identical to those of LH, is administered following menotropins treatment to mimic the naturally occurring surge of LH that triggers ovulation.
**For treatment of male infertility:** Following administration of chorionic gonadotropin to increase testosterone concentrations in men with hypogonadotropic hypogonadism, administration of menotropins induces spermatogenesis.

2a)Menstruation is the regular monthly discharge of blood and mucosal tissue from the inner lining of the uterus through the vagina, which usually start between age 11 and 14 and continues until menopause at about age 51; they usually last from three to five days according to WHO.

For the case of this 24year old woman, who is not of the age of menopause and have not seen her period for 3months, this condition is called AMENORRHEA. It is condition whereby there is absence of menstruation in a woman of reproductive age. It could be primary or secondary.

**Primary amenorrhea** is a condition where there is total absence of menstruation in a woman of reproductive age. In this condition the woman has come of age for menstruation but has never menstruated.

**Secondary Amenorrhea** is a condition whereby a woman in her reproductive age has not menstruated for three consecutive months in the absence of pregnancy. In this condition, the reproductive woman has been menstruating over the years but it has been consecutively absent for the past three months.

**Symptoms of Amenorrhea**

The main symptom of amenorrhea is the absence of your monthly period. It often signifies a larger health problem or condition. Related symptoms can include: headache, vision changes, nausea, extra facial hair, hair loss, changes in breast size, milky fluid, or discharge, from breasts.

**Causes of Amenorrhea**

Pregnancy, breastfeeding, and menopause can cause secondary amenorrhea. Other possible causes include:

* **Contraceptives**: Some women who take birth control pills may not have periods. Even after stopping oral contraceptives, it may take some time before regular ovulation and menstruation return. Contraceptives that are injected or implanted also may cause amenorrhea, as can some types of intrauterine devices.
* **Medications**: Certain medications can cause menstrual periods to stop, including some types of: antipsychotics, cancer chemotherapy, antidepressants, blood pressure drugs, allergy medications
* **Lifestyle factors**: Sometimes lifestyle factors contribute to amenorrhea, for instance:
* **Low body weight.** Excessively low body weight — about 10 percent under normal weight — interrupts many hormonal functions in your body, potentially halting ovulation. Women who have an eating disorder, such as anorexia or bulimia, often stop having periods because of these abnormal hormonal changes.
* **Excessive exercise**. Women who participate in activities that require rigorous training, such as ballet, may find their menstrual cycles interrupted. Several factors combine to contribute to the loss of periods in athletes, including low body fat, stress and high energy expenditure.
* **Stress.** Mental stress can temporarily alter the functioning of your hypothalamus — an area of your brain that controls the hormones that regulate your menstrual cycle. Ovulation and menstruation may stop as a result. Regular menstrual periods usually resume after your stress decreases.
* **Hormonal imbalance**: Many types of medical problems can cause hormonal imbalance, including:
* **Polycystic ovary syndrome (PCOS)**. PCOS causes relatively high and sustained levels of hormones, rather than the fluctuating levels seen in the normal menstrual cycle.
* **Thyroid malfunction.** An overactive thyroid gland (hyperthyroidism) or underactive thyroid gland (hypothyroidism) can cause menstrual irregularities, including amenorrhea.
* **Pituitary tumor**. A noncancerous (benign) tumor in your pituitary gland can interfere with the hormonal regulation of menstruation.
* **Premature menopause**. Menopause usually begins around age 50. But, for some women, the ovarian supply of eggs diminishes before age 40, and menstruation stops.
* **Structural problems**: Problems with the sexual organs themselves also can cause amenorrhea. Examples include:
* **Uterine scarring.** Asherman’s syndrome, a condition in which scar tissue builds up in the lining of the uterus, can sometimes occur after a dilation and curettage (D&C), cesarean section or treatment for uterine fibroids. Uterine scarring prevents the normal buildup and shedding of the uterine lining.
* **Lack of reproductive organs**. Sometimes problems arise during fetal development that lead to a girl being born without some major part of her reproductive system, such as her uterus, cervix or vagina. Because her reproductive system didn’t develop normally, she can’t have menstrual cycles.
* **Structural abnormality of the vagina**. An obstruction of the vagina may prevent visible menstrual bleeding. A membrane or wall may be present in the vagina that blocks the outflow of blood from the uterus and cervix.
* Periods can also sometimes stop as a result of a long-term medical condition, such as heart disease, uncontrolled diabetes, an overactive thyroid, or premature ovarian failure.
* **Hypothalamic and pituitary causes**: The ovaries require physiologic stimulation by pituitary gonadotropins for appropriate follicular development and estrogen production. Functional hypothalamic amenorrhea occurs when the hypothalamic-pituitary-ovarian axis is suppressed due to an energy deficit stemming from stress, weight loss (independent of original weight), excessive exercise, or disordered eating. It is characterized by a low estrogen state without other organic or structural disease.
* **Primary ovarian insufficiency/premature ovarian failure**: Primary ovarian insufficiency, also called premature ovarian failure (menopause before age 40) can be caused by: abnormal chromosomes, immune disorders, damage to the ovaries from chemotherapy or radiation.

NOTE; any of these may be the cause of her condition, and the following investigations should be carried out;

* Urine or serum pregnancy test: **Pregnancy test should be negative. This is done to rule out pregnancy especially in cases of secondary amenorrhea.** Some patients with amenorrhea may have positive urine or serum pregnancy test, which is usually suggestive of pregnancy-induced amenorrhea.
* Thyroid Function Tests**:** Thyroid function tests in patients of amenorrhea include:
* Elevated TSH and reduced free thyroxine (T4), suggestive of hypothyroidism.
* Reduced TSH and elevated T4, suggestive of hyperthyroidism.
* Elevated anti-thyroglobulin antibodies and anti-thyroid peroxidase antibodies, suggestive of thyroiditis.
* Elevated anti-thyrotropin receptor antibodies, suggestive of Graves' disease.
* Prolactin (PRL):Some patients with amenorrhea may have elevated concentration of prolactin, which is usually suggestive of amenorrhea due to hyperprolactinemia (may be due to pituitary causes, such as prolactinoma).
* Basal plasma gonadotropins:Basal plasma gonadotropins in patients of amenorrhea include:
* Reduced luteinizing hormone (LH) and FSH, suggestive of hypothalamic and pituitary diseases or premature ovarian failure.
* Reduced LH, suggestive of complete androgen insensitivity syndrome.
* Estradiol:Estradiol interpretation in patients of amenorrhea include:
* Reduced estradiol, suggestive of ovarian failure or pituitary causes.
* Elevated estradiol, suggestive of androgen insensitivity syndrome.
* Progesterone:Some patients with amenorrhea may have reduced concentration of progesterone, which is usually suggestive of ovarian failure.
* Free and total testosterone:Some patients with amenorrhea may have elevated concentration of testosterone, which is usually suggestive of amenorrhea due to complete androgen insensitivity syndrome.
* Dehydroepiandrosterone sulfate (DHEAS):Some patients with amenorrhea may have elevated concentration of dehydroepiandrosterone sulfate (DHEAS), which is usually suggestive of amenorrhea due to polycystic ovary syndrome (PCOS).
* Delta 4-androstenedione: **Some patients with amenorrhea may have elevated concentration of** delta4-androstenedione**, which is usually suggestive of amenorrhea due to** polycystic ovary syndrome (PCOS)**.**
* 17-hydroxyprogesterone: **Some patients with amenorrhea may have elevated concentration of** 17-hydroxyprogesterone**, which is usually suggestive of amenorrhea due to** congenital adrenal hyperplasia (CAH)**.**
* Fasting insulin: **Some patients with amenorrhea may have elevated concentration of fasting** insulin**, which is usually suggestive of amenorrhea due to** polycystic ovary syndrome (PCOS)**.**
* Fasting glucose (FBS): **Some patients with amenorrhea may have elevated concentration of** fasting glucose (FBS)**, which is usually suggestive of amenorrhea due to** polycystic ovary syndrome (PCOS)**.**
* Insulin resistance indexes: **Some patients with amenorrhea may have elevated** insulin resistance **indexes, which is usually suggestive of amenorrhea due to** polycystic ovary syndrome (PCOS)**.**
* Adrenocorticotropic hormone (ACTH): **Some patients with amenorrhea may have elevated concentration of** adrenocorticotropic hormone (ACTH)**, which is usually suggestive of amenorrhea due to** pituitary **causes (**ACTH-secreting adenoma**).**
* Cortisol: **Some patients with amenorrhea may have elevated concentration of** cortisol**, which is usually suggestive of amenorrhea due to** pituitary **causes (**ACTH-secreting adenoma**).**
* Markers of ovarian tumors**: Some patients with amenorrhea may have elevated concentration of markers of** ovarian tumors**, which is usually suggestive of** ovarian failure **(due to** adenocarcinoma**).**
* Progesterone challenge test:Progesterone **challenge test is used in secondary amenorrhea with normal female** androgen **in order to measure circulating** estrogen**. It reveals the insufficient** endometrial **estrogenization. It is consisted of** Provera **10 mg PO for 7 days and then following for** bleeding**. If patient bleed it means that** estrogen **is repleted,** hypothalamic-pituitary-ovarian (HPO) axis **immaturity or** PCOS**.**
* Leptin: **Some patients with amenorrhea may have reduced concentration of** leptin**, which is usually suggestive of amenorrhea due to** hypothalamic **disorders.**
* Inhibin: **Some patients with amenorrhea may have reduced concentration of** inhibin**, which is usually suggestive of amenorrhea due to** ovarian failure**.**

2b).The woman is described to be on going menopause, which is a normal condition for her age.

Menopause is the end of a woman’s menstrual cycles. The term can describe any of the changes a woman go through just before or after she stop having her period, marking the end of your reproductive years.

## Menopause Causes

A woman is born with all of her eggs, which are stored in her ovaries. The ovaries also make the hormones estrogen and progesterone, which control her period (menstruation) and the release of eggs (ovulation). Menopause happens when the ovaries no longer release an egg every month and menstruation stops.

Menopause is a regular part of aging when it happens after the age of 40. But some women can go through menopause early. It can be the result of surgery, like if their ovaries are removed in a hysterectomy, or damage to their ovaries, such as from chemotherapy. If it happens before age 40, for any reason, it’s called premature menopause.

Cause Premature Menopause

Genes, some immune system disorders or medical procedures can cause premature menopause. Other causes include:

* [**Premature ovarian failure**:](https://www.webmd.com/content/article/51/40618.htm)When the ovaries prematurely stop releasing eggs, for unknown reasons, the levels of estrogen and progesterone change. When this happens before a woman is 40, it's called premature ovarian failure. Unlike premature menopause, premature ovarian failure isn’t always permanent.
* **Induced menopause**: This happens when ovaries are taken out due to medical reasons, such as uterine cancer or endometrioss.

 It can also happen when radiation or chemotherapy damages your ovaries.

## **Menopause Process**

Natural menopause is not caused by any type of medical or surgical treatment. It’s slow and has three stages:

* [**Perimenopause**](https://www.webmd.com/menopause/guide/guide-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 a woman had a period. Your ovaries have stopped releasing eggs and making most of their estrogen.
* [**Postmenopause.**](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.

## **Menopause Symptoms**

Most women nearing menopause will have hot flashes, sudden feelings of warmth that spread over the upper body, often with blushing and sweating. These flashes can range from mild in most women to severe in others.

Other symptoms include:Uneven or missed periods,Insomnia, Mood swings, Fatigue, Depression, Crankiness, Racing heart, Headaches, Joint and muscle aches and pains, Changes in libido (sex drive), Vaginal dryness, Trouble controlling the bladder

3a). Infertility is defined as the inability of a couple to conceive after one year of unprotected intercourse. Many factors can affect fertility, including the presence of sperm and egg at the right time in a receptive environment. Tests can evaluate these different aspects of fertility.

INVESTIGATION OF MALE INFERTILITY

Diagnosing male infertility problems usually involves:

• General physical examination: this includes overall body habitus (e.g obesity, muscular development, and virilisation). Location, size and consistency of the testes and presence and absence of ductal structures.

• **Medical history**: this includes medical illness and medications, surgical interventions in the past, sexual ability/ limitation, lifestyle factors (smoking drinking), supplement usage (vitamins, oral antioxidant) and history of malignancy.

* **Semen analysis**: At least two tests are performed, three weeks apart. This is the baseline investigation for male infertility. The results of semen analysis provide a guide to whether or not other investigations are needed.
* **Semen culture**: Semen culture is indicated in the presence of chronic infections of the genital tract. This is indicated by genital pain, painful ejaculation or the presence of white blood cells in semen (>5 per high-power field).
* **Male reproductive genetic profile:** This includes karyotype, Y chromosome microdeletions and cystic fibrosis gene mutations. However, there are numerous other genes involved in male fertility that have not yet been identified.
* **Hormonal profiles**: The basic hormones that are tested are FSH, LH, prolactin and testosterone. Other hormones may be tested if there is a clinical indication.
* **Imaging:** Scrotal ultrasound and colour Doppler is done to assess the testes and epididymi to detect their dimensions and exclude the presence of tumours or varicocele. A transrectal ultrasound scan may be performed if there is a suspicion of distal genital tract blockage or abnormality (Figures 2 and 3). Magnetic resonance imaging of the pelvis may help in diagnosing obstructions and abnormalities in the distal genital tract. It may also help in locating the testes in cases of undescended testes.

**• Post-ejaculation urinalysis**: Sperm in the urine can indicate that the sperm are traveling backward into the bladder instead of out the penis during ejaculation (retrograde ejaculation).

• **Testicular biopsy**: This test involves removing samples from the testicle with a needle. If the results of the testicular biopsy show that sperm production is normal, the problem is likely caused by a blockage or another problem with sperm transport

• **Chlamydia test**: Chlamydia can affect fertility, but antibiotics can treat it.

INVESTIGATION OF FEMALE INFERTILITY

• **Medical history**: this includes medical illness and medications, surgical interventions in the past, sexual ability/ limitation, lifestyle factors (smoking drinking), supplement usage (vitamins, oral antioxidant) and history of malignancy.

• **Ovulation testing:** An at-home, over-the-counter ovulation prediction kit detects the surge in luteinizing hormone (LH) that occurs before ovulation. A blood test for progesterone can also show if someone is ovulating. Other hormone levels, such as prolactin, also may be checked.

• **Hysterosalpingography**: evaluates the condition of your uterus and fallopian tubes and looks for blockages or other problems. X-ray contrast is injected into your uterus, and an X-ray is taken to determine if the cavity is normal and to see if the fluid spills out of your fallopian tubes.

Fluid is injected into the woman’s uterus and X-rays are taken to determine whether the fluid travels properly out of the uterus and into the fallopian tubes. If a blockage is present, surgery may be necessary.

• **Thyroid function test:** This may affect the hormonal balance

• **Genetic testing**: Genetic testing helps determine whether there is a genetic defect causing infertility. Some patients carry genetic diseases that can cause infertility, such as Fragile X syndrome. Some women can have rearrangements of their chromosomes such that their eggs and sperm can have abnormal chromosomes and this can lead to repeated miscarriage or infertility. These problems are rare but do exist.

**Ovarian reserve testing**: This testing helps determine the quality and quantity of eggs available for ovulation. This approach often begins with hormone testing early in the menstrual cycle.

**Other hormone testing**. Other hormone tests check levels of ovulatory hormones, as well as pituitary hormones that control reproductive processes.

**Imaging tests.** Pelvic ultrasound looks for uterine or ovarian disease. Sometimes a sonohysterogram, also called a saline infusion sonogram, is used to see details inside the uterus that are not seen on a regular ultrasound.

3b) How to support a couple in achieving conception, will be dependent on the cause of the inability to conceive (infertility), as this will determine the method used to solve the problem.

This can be done through any of the following;

Couple need to know when the woman is ovulating — and having sex regularly five days before and on the day of ovulation can improve the odds of conceiving.

Ovulation is the process in which a mature egg is released from the ovary. Those six days are important because the egg is able to be fertilized for about 12 to 24 hours after it's released. In addition, sperm can live inside the female reproductive tract as long as five days after sexual intercourse under the right conditions. The chance of getting pregnant is highest when live sperm are present in the fallopian tubes during ovulation.

**Maintain a normal weight.** Overweight and underweight women are at increased risk of ovulation disorders.

**Avoid smoking.**Tobacco has multiple negative effects on fertility

**Don't drink alcohol.**Heavy alcohol use might lead to decreased fertility. Generally, it's best to avoid alcohol in such period to conceive.

**Don't overdo strenuous exercise/ avoid stress:** Strenuous, intense exercise of more than five hours a week has been associated with decreased ovulation. Particularly for the woman, it is important that she is in the right state of mind, as this aids in achieving conception easily.

**Assisted reproductive technology (ART)** refers to any fertility treatment or procedure for assisting reproduction that includes the handling of human eggs, sperms or embryos. ART falls into the category of field endocrinology and cryopreservation, reproductive technology and infertility treatments. ART procedures involve surgically removing eggs from woman ovaries, combining them with sperm in the laboratory and returning them to the woman’s body or donating them to another woman. There are several forms of assisted reproductive technology and they include;

**In vitro fertilization (IVF):** In vitro fertilization is a technique which involves fertilization outside the body in an artificial environment. Sperm are placed with unfertilized eggs in a petri dish, where fertilization can take place. The embryo is then placed in the uterus to begin a pregnancy. Sometimes the embryo is frozen for future use.

• **Intracytoplasmic sperm injection (ICSI):** Intracytoplasmic sperm injection (ICSI) is the injection of single mature immobilized normal spermatozoa into the cytoplasm of a mature metaphase II oocyte. This procedure is most commonly used to overcome male infertility problems, although it may also be used where eggs cannot easily be penetrated by sperm and occasionally in addition to sperm donation. ICSI is the technique of choice in cases of obstructive azoospermia since it enables the best use of micro surgically retrieved spermatozoa from the epididymis or testis.

• **Intrauterine insemination**: Intrauterine Insemination (IUI) is a fertility treatment that involves placing sperm inside a woman’s uterus to facilitate fertilization. The goal of IUI is to increase the number of sperm that reach the fallopian tubes and subsequently increase the chance of fertilization.

• **Surrogacy:** Surrogacy is an arrangement, often supported by a legal agreement, whereby a woman (the surrogate mother) agrees to bear a child on behalf of another person who is will become the parent of the child. Surrogacy is considered one of many assisted reproductive technologies. Surrogacy may be either traditional or gestational, which are differentiated by the genetic origin of the egg.

• **Sperm or egg donation**: If necessary, sperm or eggs can be received from a donor. Fertility treatment with donor eggs is usually done using IVF.

Other assisted reproductive technology may include;

• Zygote intrafallopian transfer (ZIFT)

• Gamete intrafallopian transfer (GIFT)

• Artificial embryo twinning

• Embryo donation