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MATRIC NUMBER; 15/MHS06/012

MLS 514 OUIZ

OUESTION 1- Explain briefly the hormones of the anterior pituitary

1. A major organ of the endocrine system, the **anterior pituitary** (also called the **adenohypophysis** or **pars anterior**) is the glandular, anterior lobe that together with the [posterior](https://en.wikipedia.org/wiki/Anatomical_terms_of_location#Usage_in_human_anatomy) lobe ([posterior pituitary](https://en.wikipedia.org/wiki/Posterior_pituitary), or the neurohypophysis) makes up the [pituitary gland](https://en.wikipedia.org/wiki/Pituitary_gland) (hypophysis). The anterior pituitary regulates several [physiological](https://en.wikipedia.org/wiki/Physiological) processes, including [stress](https://en.wikipedia.org/wiki/Stress_%28medicine%29), [growth](https://en.wikipedia.org/wiki/Human_development_%28biology%29), [reproduction](https://en.wikipedia.org/wiki/Reproduction), and [lactation](https://en.wikipedia.org/wiki/Lactation). Proper functioning of the anterior pituitary and of the organs it regulates can often be ascertained via [blood tests](https://en.wikipedia.org/wiki/Blood_test) that measure [hormone](https://en.wikipedia.org/wiki/Hormone) levels. The anterior pituitary often is referred to as the “master gland” because, together with the hypothalamus, it orchestrates the complex regulatory functions of many other endocrine glands. The anterior pituitary gland produces six major hormones: (1) prolactin (PRL), (2) growth hormone (GH), (3) adrenocorticotropic hormone (ACTH), (4) luteinizing hormone (LH), (5) follicle-stimulating hormone (FSH), and (6) thyroid-stimulating hormone (TSH). Pituitary hormones are secreted in a pulsatile manner, reflecting stimulation by an array of specific hypothalamic releasing factors. Each of these pituitary hormones elicits specific responses in peripheral target tissues. The hormonal products of those peripheral glands, in turn, exert feedback control at the level of the hypothalamus and pituitary to modulate pituitary. The hormones of the anterior pituitary are;

**● Thyroid Stimulating Hormone** (TSH) causes the thyroid gland to produce and release thyroid hormones. Thyroid hormone controls the basal metabolic rate and plays an important role in growth and maturation. Thyroid hormones affect almost every organ in the body. Thyroid stimulating hormone is produced and released into the bloodstream by the [pituitary gland](https://www.yourhormones.info/glands/pituitary-gland/). It controls production of the thyroid hormones, [thyroxine](https://www.yourhormones.info/hormones/thyroxine/) and [triiodothyronine](https://www.yourhormones.info/hormones/triiodothyronine/), by the [thyroid gland](https://www.yourhormones.info/glands/thyroid-gland/) by binding to [receptors](https://www.yourhormones.info/glossary/r#receptors) located on cells in the thyroid gland. Thyroxine and triiodothyronine are essential to maintaining the body’s [metabolic rate](https://www.yourhormones.info/glossary/m#metabolic-rate), heart and digestive functions, muscle control, brain development and maintenance of bones.

* **Growth Hormone** (GH) regulates growth and metabolism. Growth hormone is a protein hormone of about 190 amino acids that is synthesized and secreted by cells called *somatotrophs* in the anterior pituitary. It is a major participant in control of several complex physiologic processes, including growth and metabolism. Growth hormone is also of considerable interest as a drug used in both humans and animals. Growth hormone affects:
* Carbohydrate metabolism as it upset insulin effect on glucose uptake by cells, thus excess growth hormone production leads to glucose intolerance
* Fat metabolism is also affected by growth hormone through lipolysis stimulation leading to high concentration of plasma free fatty acids which then antagonizes insulin action and secretion.
* Protein metabolism via Somatomedic C or IGF-I (insulin like growth factor-1), it increases protein production in concurrence with insulin by stimulating cell uptake of amino acids.
* Growth hormone promotes bone growth in both thickness and length by stimulating osteoblast activity and epiphyseal cartilage proliferation.
* **Adrenocorticotropic Hormone** (ACTH) triggers the adrenals to release the hormone cortisol, which regulates carbohydrate, fat, and protein metabolism and blood pressure. The adrenal glands sit above the kidneys and are also responsible for the body's fight or flight response. ACTH is made in the corticotroph cells of the [anterior](https://www.yourhormones.info/glossary/a#anterior) [pituitary gland](https://www.yourhormones.info/glands/pituitary-gland/), where it is released in bursts into the bloodstream and transported around the body. Like cortisol, levels of adrenocorticotropic hormone are generally high in the morning when we wake up and fall throughout the day (reaching their lowest level during sleep). This is called a diurnal (circadian) rhythm. Once adrenocorticotropic hormone reaches the adrenal glands, it binds on to [receptors](https://www.yourhormones.info/glossary/r#receptors) causing the adrenal glands to secrete more cortisol, resulting in higher levels of cortisol in the blood. It also increases production of the chemical compounds that trigger an increase in other hormones such as [adrenaline](https://www.yourhormones.info/hormones/adrenaline/) and noradrenaline.
* **Luteinizing Hormone** (LH) and Follicle Stimulating Hormone (FSH) control the production of sex hormones (estrogen and testosterone) and sperm and egg maturation and release.  It is crucial in regulating the function of the [testes](https://www.yourhormones.info/glands/testes/) in men and [ovaries](https://www.yourhormones.info/glands/ovaries/) in women. In men, luteinising hormone stimulates Leydig cells in the testes to produce [testosterone](https://www.yourhormones.info/hormones/testosterone/), which acts locally to support sperm production. Testosterone also exerts effects all around the body to generate male characteristics such as increased muscle mass, enlargement of the [larynx](https://www.yourhormones.info/glossary/l#larynx) to generate a deep voice, and the growth of facial and body hair. In women, luteinising hormone carries out different roles in the two halves of the [menstrual cycle](https://www.yourhormones.info/glossary/m#menstrual-cycle). In weeks one to two of the cycle, luteinising hormone is required to stimulate the ovarian follicles in the [ovary](https://www.yourhormones.info/glands/ovaries/) to produce the female sex hormone, [oestradiol](https://www.yourhormones.info/hormones/oestradiol/). Around day 14 of the cycle, a surge in luteinising hormone levels causes the ovarian follicle to tear and release a mature oocyte (egg) from the ovary, a process called [ovulation](https://www.yourhormones.info/glossary/o#ovulation). For the remainder of the cycle (weeks three to four), the remnants of the ovarian follicle form a [corpus luteum](https://www.yourhormones.info/glossary/c#corpus-luteum). Luteinising hormone stimulates the corpus luteum to produce [progesterone](https://www.yourhormones.info/hormones/progesterone/), which is required to support the early stages of pregnancy, if [fertilisation](https://www.yourhormones.info/glossary/f#fertilisation) occurs.
* **Melanocyte-Stimulating Hormone** (MSH) regulates the production of melanin, a dark pigment, by melanocytes in the skin. Increased melanin production produces pigmentation or tanning of the skin; in certain conditions excessive production of melanocyte-stimulating. Melanocyte-stimulating hormone is a collective name for a group of peptide hormones produced by the skin, [pituitary gland](https://www.yourhormones.info/glands/pituitary-gland/) and [hypothalamus](https://www.yourhormones.info/glands/hypothalamus/). In response to ultraviolet (UV) [radiation](https://www.yourhormones.info/glossary/r#radiation) its production by the skin and pituitary is enhanced, and this plays a key role in producing coloured [pigmentation](https://www.yourhormones.info/glossary/p#pigmentation) found in the skin, hair and eyes. It does this by inducing specialised skin cells called melanocytes to produce a pigment called melanin; melanin protects cells from [DNA](https://www.yourhormones.info/glossary/d#%3Ca%20href=)-(1)'>DNA damage, which can lead to skin cancer (melanoma).  Melanocyte-stimulating hormone is produced from the same precursor molecule as [adrenocorticotropic hormone](https://www.yourhormones.info/hormones/adrenocorticotropic-hormone/) called pro-opiomelanocortin (POMC).  Although named for its stimulatory effect on pigment cells, melanocyte-stimulating hormone produced in the hypothalamus can also suppress appetite by acting on [receptors](https://www.yourhormones.info/glossary/r#receptors) in the hypothalamus in the brain. This effect is enhanced by [leptin](https://www.yourhormones.info/hormones/leptin/), a hormone released from [fat](https://www.yourhormones.info/glands/adipose-tissue/) cells. Melanocyte-stimulating hormone also affects a range of other processes in the body; it has anti-inflammatory effects, can influence the release of the hormone [aldosterone](https://www.yourhormones.info/hormones/aldosterone/), which controls salt and water balance in the body, and also has an effect on sexual behaviour. This hormone can cause darkening of the skin.
* **Prolactin** (PRL) stimulates production of breast milk and is necessary for normal milk production during breast feeding. Prolactin is a hormone named originally after its function to promote milk production ([lactation](https://www.yourhormones.info/glossary/l#lactation)) in mammals in response to the suckling of young after birth. It has since been shown to have more than 300 functions in the body. These can be divided into a number of areas: reproductive, metabolic, regulation of fluids (osmoregulation), regulation of the immune system (immunoregulation) and behavioural functions. In humans, prolactin is produced both in the front portion of the [pituitary gland](https://www.yourhormones.info/glands/pituitary-gland/) ([anterior](https://www.yourhormones.info/glossary/a#anterior) pituitary gland) and in a range of sites elsewhere in the body. Lactotroph cells in the pituitary gland produce prolactin, where it is stored and then released into the bloodstream. Human prolactin is also produced in the uterus, immune cells, brain, breasts, prostate, skin and [adipose tissue](https://www.yourhormones.info/glands/adipose-tissue/).

1b. Use of the following in the treatment of some dieseases. These drugs are all for the treatment of infertility in females;

i. Letrozole: Letrozole, an aromatase inhibitor, has been demonstrated to be effective as an ovulation induction and controlled ovarian hyperstimulation agent. However, dose administration has generally been limited to 5 days at 2.5 to 7.5 mg daily. Studies show a retrospective review of over 900 treatment cycles using letrozole in doses as high as 12.5 mg per day. Results indicate that such doses do indeed offer benefit to patients; in that there is increased follicular growth and a higher number of predicted ovulations with higher doses of the drug. However, increasing doses does not produce a detrimental effect upon endometrial thickness. High-dose letrozole may be of value in women who fail to respond adequately to lower doses. Furthermore, randomized trials are needed to determine whether high-dose letrozole might actually be optimal as a starting dose for certain treatment groups. Letrozole is an orally active, nonsteroidal its primary action is suppression of the 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.

ii. Clomiphene: This is commonly known as clomid. It is indicated for the treatment of [ovulatory](https://www.rxlist.com/script/main/art.asp?articlekey=25229) 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](https://www.rxlist.com/script/main/art.asp?articlekey=4981) [amenorrhea](https://www.rxlist.com/script/main/art.asp?articlekey=6993)-[galactorrhea](https://www.rxlist.com/script/main/art.asp?articlekey=9665) syndrome, [psychogenic](https://www.rxlist.com/script/main/art.asp?articlekey=5108) amenorrhea, post-oral-contraceptive amenorrhea, and certain cases of [secondary amenorrhea](https://www.rxlist.com/script/main/art.asp?articlekey=7939) of undetermined [etiology](https://www.rxlist.com/script/main/art.asp?articlekey=3334). 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](https://www.rxlist.com/script/main/art.asp?articlekey=11805) [cysts](https://www.rxlist.com/script/main/art.asp?articlekey=53354). CLOMID should not be used in patients with ovarian enlargement except those with polycystic ovary syndrome. [Pelvic](https://www.rxlist.com/script/main/art.asp?articlekey=4822) 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](https://www.rxlist.com/script/main/art.asp?articlekey=22632) 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](https://www.rxlist.com/script/main/art.asp?articlekey=3239) [estrogen](https://www.rxlist.com/script/main/art.asp?articlekey=3329) (as estimated from vaginal smears, [endometrial biopsy](https://www.rxlist.com/script/main/art.asp?articlekey=7736), assay of urinary estrogen, or from bleeding in response to [progesterone](https://www.rxlist.com/script/main/art.asp?articlekey=5060)). 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 [endometriosis](https://www.rxlist.com/script/main/art.asp?articlekey=3240) and endometrial [carcinoma](https://www.rxlist.com/script/main/art.asp?articlekey=20677) 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](https://www.rxlist.com/script/main/art.asp?articlekey=19509) disorders, adrenal disorders, hyperprolactinemia, and male factor [infertility](https://www.rxlist.com/script/main/art.asp?articlekey=3977).
5. Uterine Fibroids. Caution should be exercised when using CLOMID in patients with [uterine fibroids](https://www.rxlist.com/script/main/art.asp?articlekey=16048) due to the potential for further enlargement of the [fibroids](https://www.rxlist.com/script/main/art.asp?articlekey=53396).

A serious side effect that can occur from using CLOMID is multiple pregnancy.

iii. Metatrophins/Gonadotrophins: Menotropins are a mixture of follicle-stimulating hormone (FSH) and luteinizing hormone (LH). FSH and LH are important in the development of follicles (eggs) that are produced by the ovaries in women.Menotropins are used to help your body produce multiple eggs during ovulation, in preparation for in-vitro fertilization. Gonadotropins are fertility drugs that contain follicle stimulating hormone, luteinizing hormone or combination of the two. These drugs are used to stimulate ovulation. Early in the menstrual cycle, a woman with low hormone level who is not ovulating have daily human menopausal gonadotropin or recombinant human FSH injections for the average of 12 days. This helps in the development of mature follicle making the ovary ready to ovulate. One dose of human chorionic gonadotropin is then used to stimulate ovulation.

2. The cessation and lack of menstruation for at least 3months in a 24 year old woman is a condition known as amenorrhea. A person is diagnosed with “amenorrhea,” when they are not getting their periods, although they have been through [puberty](https://teens.webmd.com/default.htm), aren’t [pregnant](https://www.webmd.com/baby/default.htm), and haven’t gone through menopause. It’s not about having [irregular periods](https://www.webmd.com/infertility-and-reproduction/guide/absence-periods).

## Types

There are two types of amenorrhea:

**Primary amenorrhea. This** is when a young woman has not had her [first period](https://www.webmd.com/parenting/features/daughters-first-period-how-to-prepare) by the age of 16.

**Secondary amenorrhea. This** is when a woman who has had normal menstrual cycles stops getting her monthly period for 3 or more months.

## Causes

Many things could cause amenorrhea.

Common causes of secondary amenorrhea (when a 23 woman who has had [normal periods](https://www.webmd.com/women/tc/normal-menstrual-cycle-topic-overview) stops getting them) include:

* Premature [Menopause](https://www.webmd.com/menopause/ss/slideshow-menopause-overview)
* Some [birth control methods](https://www.webmd.com/sex/birth-control/default.htm), such as Depo-[Provera](https://www.webmd.com/drugs/2/drug-6996/provera%2Boral/details) or certain types of intrauterine devices (IUDs)

Other causes of secondary amenorrhea include:

* [Stress](https://www.webmd.com/balance/stress-management/default.htm)
* Poor [nutrition](https://www.webmd.com/diet/rm-quiz-nutrition-iq)
* [Depression](https://www.webmd.com/depression/default.htm)
* Certain [prescription drugs](https://www.webmd.com/drugs/index-drugs.aspx)
* Extreme [weight loss](https://www.webmd.com/diet/default.htm)
* Over-[exercising](https://www.webmd.com/fitness-exercise/default.htm)
* Ongoing illness
* [Sudden weight gain](https://www.webmd.com/diet/ss/slideshow-weight-gain-shockers) or being very [overweight](https://www.webmd.com/diet/obesity/features/am-i-obese) ([obesity](https://www.webmd.com/diet/obesity/video/obesity-risks))
* Hormonal imbalance due to [polycystic ovarian syndrome](https://www.webmd.com/women/tc/polycystic-ovary-syndrome-pcos-topic-overview) ([PCOS](https://www.webmd.com/women/ss/slideshow-pcos-overview))
* [Thyroid](https://www.webmd.com/women/picture-of-the-thyroid) gland disorders
* Tumors on the ovaries or [brain](https://www.webmd.com/brain/rm-quiz-amazing-brain) (rare)

Evaluation of secondary amenorrhea

* History: includes a complete description of menstrual patterns, medications prescribed, nutritional history, patterns of exercise, previous contraceptive use, weight changes, stress and chronic disease.
* Microscopic, culture and sensitive.

 Amenorrhea can be a sign of a complex set of hormonal problems. Finding the underlying cause can take time and may require more than one kind of testing. A series of laboratory tests will be carried out to determine the cause of this amenorrhea. They include:

* **Pregnancy test.** This will be the first test suggested, to rule out or confirm a possible pregnancy.
* **Thyroid function test.** Measuring the amount of thyroid-stimulating hormone (TSH) in the blood can determine if the thyroid is working properly.
* **Ovary function test.** Measuring the amount of follicle-stimulating hormone (FSH) in her blood can determine if the ovaries are working properly.
* **Prolactin test.** Low levels of the hormone prolactin may be a sign of a pituitary gland tumor which can cause amenorrhea.
* **Male hormone test.** If she is showing increased facial hair and a lowered voice, the level of male hormones in her blood will be checked.
* **Hormone challenge test** For this test, one takes a hormonal medication for seven to 10 days to trigger menstrual bleeding. Results from this test can tell whether the periods have stopped due to a lack of estrogen.

### **Imaging tests**

Depending on the signs and symptoms — and the result of any blood tests done more imaging tests can be recommended, including:

* **Ultrasound.** This test uses sound waves to produce images of internal organs. Then an ultrasound test to check for any abnormalities in the reproductive organs.
* **Computerized tomography (CT).** CT scans combine many X-ray images taken from different directions to create cross-sectional views of internal structures. A CT scan can indicate whether the uterus, ovaries and kidneys look normal.
* **Magnetic resonance imaging (MRI).** MRI uses radio waves with a strong magnetic field to produce exceptionally detailed images of soft tissues within the body. An MRI can be ordered to check for a pituitary tumor.

### Scope tests can also be performed: If other testing reveals no specific cause, a hysteroscopy can be recommend — a test in which a thin, lighted camera is passed through the vagina and cervix to look at the inside of the uterus.

b. A woman who is 60 years old and complains of amenorrhea is likely due to be experiencing this because she is menopausal. This is a natural decline in reproductive hormones when a woman reaches her 40s or 50s. Menopause is signalled by 12 months since last menstruation. Common symptoms include hot flashes and vaginal dryness. There may also be sleep disturbances. The combination of these symptoms can cause anxiety or depression. Menopause is a natural process with treatments that focus on symptomatic relief. Vaginal dryness is treated with topical lubricants or oestrogen. Medications can reduce the severity and frequency of hot flushes. In special circumstances, oral hormone therapy may be used. I will go ahead and explain to her that a woman is born with all of her [eggs](https://www.webmd.com/content/article/51/40619.htm), which are stored in her ovaries. The ovaries also make the hormones [estrogen](https://www.webmd.com/women/guide/normal-testosterone-and-estrogen-levels-in-women) and [progesterone](https://www.webmd.com/vitamins-and-supplements/progesterone-uses-and-risks), which control her period ([menstruation](https://www.webmd.com/menopause/guide/menopause-basics)) and the release of eggs ([ovulation](https://www.webmd.com/baby/ss/slideshow-understanding-fertility-ovulation)). Menopause happens when the ovaries no longer release an egg every month and [menstruation](https://www.webmd.com/women/rm-quiz-period-normal) 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](https://www.webmd.com/women/guide/hysterectomy), or damage to their ovaries, such as from [chemotherapy](https://www.webmd.com/content/article/51/40618.htm). If it happens before age 40, for any reason, it’s called premature menopause.

**Menopause Process**

Natural menopause isn’t 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 your ovaries slowly make less [estrogen](https://www.webmd.com/drugs/2/drug-6028/esterified%2Bestrogens%2Boral/details). [Perimenopause](https://www.webmd.com/women/video/corio-perimenopause) lasts until menopause, the point at which your ovaries stop releasing eggs. In the last 1 to 2 years of this stage, estrogen levels fall faster. Many women have [menopause symptoms](https://www.webmd.com/menopause/guide/understanding-menopause-symptoms).
* **Menopause.** This is when it's been a year since you 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](https://www.webmd.com/content/article/51/40612.htm) usually ease. But health risks related to the loss of estrogen increase as you get older.

**3. Discuss critically how you will set to investigate a case of infertility in a couple**

A case of infertility is resolved first by careful history taking and examination followed by laboratory investigations of both parties involved. They will both undergo a general physical examination, and ask about their medical histories, medications, menstruation cycle for the female, and sexual habits (like how frequently they are involved). The intial history should cover menstrual history, timing and frequency of intercourse, previous use of contraception, previous pregnancies and outcomes, pelvic infections, medication use, occupational exposures, substances abuse, alcohol intake, tobacco use, accidents and previous surgery on reproductive organs for the couple appropriately. A review of systems and physical examination of the endocrine, oncologic and gynaecologic systems should be performed. Other considerations include preconception screening and vaccination for preventable diseases such as rubella and varicella, sexually transmitted infections and cervical cancer, based on appropriate guidelines and risk.

The woman will also undergo a gynaecologic examination and a number of tests like;

**● Hormone assessment:** Hormone tests checks levels of ovulatory hormones e.g prolactin, oestrogen, progesterone, follicle stimulating hormone etc, as well as pituitary hormones that control reproductive processes.

**Procedure In progesterone hormone assessment test**

Women with regular menstrual cycles are likely to be ovulating and should be offered serum progesterone testing at day 21 to confirm ovulation. If a woman has irregular cycles, the testing should be conducted later in the cycle, starting seven days before presumed onset of menses, and repeated weekly until menstruation and repeated weekly until the women’s period. A progesterone of 5ng per mL (15.9 nmol per L) or greater implies ovulation. Anovulatory women should have further investigation to determine treatable causes such as thyroid disorders or hyperprolactinemia based on symptoms. A high serum FSH level (greater than 30 to 40 mIU per mL [30 to 40 IU per L] with a low estradiol level can distinguish ovarian failure from hypothalamic pituitary failure, which typically revels a low or normal FSH level (less than 10 mlU per mL lower normal FSH level or normal FSH level (less than 10 mIU per mL [10 IU per L]) and a low estradiol level. Basal body temperatures are no longer considered a reliable indicator of ovulation, and are not recommended for evaluating ovulation.

A high FSH level (10 to 20 mIU per mL [10 to 20 IU per L]) drawn on day 3 of the menstrual cycle is associated with infertility. A high serum estradiol level (greater than 60 to 80 pg per mL [220 to 294 pmol per L]) in conjunction with a normal FSH level has also been associated with lower pregnancy rates. This combination of laboratory test results may indicate ovarian insufficiency or diminished ovarian reserve. Other tests of ovarian reserve, such as the clomiphene (Clomid) challenge test, antral follicle count, and antimüllerian hormone level, are also generally performed to predict response to ovarian stimulation with exogenous gonadotropins and assisted reproductive technology. However, these tests have only poor to moderate predictive value despite widespread use.

**● Hysterosalpingography (HSG):** It is a procedure in which a small amount of radio-opaque fluid is injected into the uterus and fallopian tubes and then visualized with x-rays. It is useful to diagnose intrauterine structures and lesions and evaluate status of the tubes in the proximal, distal, and intra-pelvic region. 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. Additionally, data suggest that the HSG may be associated with increased rates following its use. Disadvantages of HSG include pain and discomfort, radiation exposure, infection, dye embolism and iodine hypersensitivity.

**● Laparoscopy**: A thin, flexible tube with a camera at the end is inserted into the abdomen and pelvis, allowing a doctor to look at the fallopian tubes, uterus, and ovaries. This can reveal signs of endometriosis, scarring, blockages, and some irregularities of the uterus and fallopian tubes. This may be performed to identify ovarian follicles and irregularities related to normal ovulation. The finding of a follicular cyst on the ovary or corpus luteum is suggestive of ovulation. The presence of multiple small follicles confirms the presence of PCO II.

**● Genetic testing**: to see if a genetic abnormality is interfering with fertility.

**● Chlamydia test**: which may indicate the need for antibiotic treatment.

**● Thyroid function test**: as this may affect the hormonal balance and has a high relationship to hyperprolactinaemia.

**● Ovarian reserve testing:** This testing helps determine the quantity of the eggs available for ovulation. This approach often begins with hormone testing early in the menstrual cycle. Ovarian reserve testing, to find out how effective the eggs are after ovulation.

**● Pelvic examination and vagina ultrasound:** Examination of the pelvis may reveal an enlarged uterus or mass, which can be confirmed by ultrasound, the gold standard evaluation tool for uterine fibroids. Its widespread availability allows easy and inexpensive confirmation in almost all instances. One of its advantages is the ability to reconstruct the coronal plane of the uterus by three‐dimensional imaging technology.

**● Magnetic resonance imaging:** Magnetic resonance imaging (MRI) provides information on the number of fibroids, their size and location, vascularization, relationship with the endometrial cavity and serosal surface and boundaries with normal myometrium.

**● Endometrial Biopsy**: An endometrial biopsy in the mid to late luteal phase (post-ovulatory day 7 to 12) can provide the confirmatory information to the BBT and serum progesterone testing, as well as diagnose endometritis. It is the gold standard for diagnosing luteal phase defect. Multiple endometrial biopsies are not necessary to monitor response to ovulatory drugs.

**● Urinary Luteinizing Hormone Detection**: This predicts LH surge, the urinary LH surge usually occurs about one to two days prior to the rise in BBT and 12 to 60 hours before ovulation. A shorter range is 22 to 44 hours, with a mean of 30 hours. The most sensitive use of the test requires a woman to empty her bladder in the morning, restrict fluids, and then perform the test between 10 AM and 12 PM.

**● Hysteroscopy**: This is an operative procedure performed as a diagnostic procedure or as a therapeutic intervention used to do tubal catheterization to open the blocked tubes, and, visualize the internal structure of the tubes. This diagnostic test may be very useful in determining the functional status of the fallopian tubes. Disadvantages of the procedure include adhesions and potential surgical and anesthetic complications. Scarce evidence on the effectiveness of hysteroscopic surgery in sub-fertile women with polyps, fibroids, septate/ bipartite uterus or intrauterine adhesions exist, therefore, it is suggested to conduct Randomized Control Trials (RCTs) to provide general recommendations.

**● Cervical Factor Investigation**: If gynaecologist and midwife suspects that the source of infertility may be related to the interactions of the cervical mucus with the sperm, then the following investigations can be performed.

**● Post-Coital Test**: This is the standard test for evaluating cervical factor infertility. The test can help to identify difficulty in timing intercourse, sexual dysfunction, poor cervical mucus, cervical infection, low sperm count and/or motility, and the presence of antibodies; but this test is not very accurate. It must be carefully timed to be performed at ovulation or the results are not interpretable.

**● Antisperm Antibody Tests**: Antisperm antibody tests may be helpful in selected patients with shaking sperm motion on the semen analysis or post-coital test, or a history of testicular operation or injury.

The man will also undergo an oncologic examination and a number of tests like;

* **Semen analysis.** Semen samples can be obtained in a couple of different ways. You can provide a sample by masturbating and ejaculating into a special container at the doctor's office. Because of religious or cultural beliefs, some men prefer an alternative method of semen collection. In such cases, semen can be collected by using a special condom during intercourse.

Your semen is then sent to a laboratory to measure the number of sperm present and look for any abnormalities in the shape (morphology) and movement (motility) of the sperm. The lab will also check your semen for signs of problems such as infections.

Often sperm counts fluctuate significantly from one specimen to the next. In most cases, several semen analysis tests are done over a period of time to ensure accurate results. If your sperm analysis is normal, your doctor will likely recommend thorough testing of your female partner before conducting any more male infertility tests.

* **Hormone testing.** Hormones produced by the pituitary gland, hypothalamus and testicles play a key role in sexual development and sperm production. Abnormalities in other hormonal or organ systems also might contribute to infertility. A blood test measures the level of testosterone and other hormones.
* **Scrotal ultrasound.** This test uses high-frequency sound waves to produce images inside your body. A scrotal ultrasound can help your doctor see if there is a varicocele or other problems in the testicles and supporting structures.
* **Post-ejaculation urinalysis.** Sperm in your urine can indicate your sperm are traveling backward into the bladder instead of out your penis during ejaculation (retrograde ejaculation).
* **Genetic tests.** When sperm concentration is extremely low, there could be a genetic cause. A blood test can reveal whether there are subtle changes in the Y chromosome — signs of a genetic abnormality. Genetic testing might be ordered to diagnose various congenital or inherited syndromes.
* **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, your problem is likely caused by a blockage or another problem with sperm transport.
* **Specialized sperm function tests.** A number of tests can be used to check how well your sperm survive after ejaculation, how well they can penetrate an egg and whether there's any problem attaching to the egg. Generally, these tests are rarely performed and often do not significantly change recommendations for treatment.
* **Transrectal ultrasound.** A small, lubricated wand is inserted into your rectum. It allows your doctor to check your prostate and look for blockages of the tubes that carry semen (ejaculatory ducts and seminal vesicles).

**b. How would you support the couple in achieving conception**

To support a support in achieving conception, advices will be given to be adhered to and in other cases, clinical procedures can be carried out. The type of support that will be given to the couple depends on the party that has the conception problem, male or female.

Life Style changes and assisted reproductive technology can be applicable to both the male and female

**● Lifestyle changes**, such as weight loss in overweight women or weight gain in underweight women, can help promote ovulation. Quitting smoking also improves the chance of pregnancy. Diet change and change of environment if one is in a toxic and dangerous place. Increased sexual intercourse will also be adviced.

**● Assisted reproductive technology** Assisted reproductive technology (ART) is any fertility treatment in which the egg and sperm are handled. There are several types of ART. In vitro fertilization (IVF) is the most common ART technique. IVF involves stimulating and retrieving multiple mature eggs, fertilizing them with sperm in a dish in a lab, and implanting the embryos in the uterus several days after fertilization. Other techniques are sometimes used in an IVF cycle, such as:

* **Intracytoplasmic sperm injection (ICSI):** A single healthy sperm is injected directly into a mature egg. ICSI is often used when there is poor semen quality or quantity, or if fertilization attempts during prior IVF cycles failed (Boulet *et al*., 2015).
* **Assisted hatching:** This technique assists the implantation of the embryo into the lining of the uterus by opening the outer covering of the embryo (hatching).
* **Donor eggs or sperm:** Most ART is done using a couple's own eggs and sperm. However, if there are severe problems with either the eggs or the sperm, you may choose to use eggs, sperm or embryos from a known or anonymous donor (Vandermeeren *et al*., 2012).
* **Surrogacy:** Women who don't have a functional uterus or for whom pregnancy poses a serious health risk might choose IVF using a gestational carrier. In this case, the couple's embryo is placed in the uterus of the carrier for pregnancy (Ciccarelli, 2005).

 **For the Female:**

* **Stimulating ovulation with fertility drugs.** Fertility drugs are the main treatment for women who are infertile due to ovulation disorders. These medications regulate or induce ovulation. Talk with your health giver about fertility drug options — including the benefits and risks of each type.
* **Surgery to restore fertility.** Uterine problems such as endometrial polyps, a uterine septum, intrauterine scar tissue and some fibroids can be treated with hysteroscopic surgery (Adamson and Pasta, 2004).. Endometriosis, pelvic adhesions, and larger fibroids may require laparoscopic surgery or surgery with a larger incision of the abdomen (Ahmad *et al*., 2009).
* **Rest**: A stressful life, particularly in hard-working women, may contribute to cause infertility since symptoms related to anxiety and depression are described as more frequent in infertile than in fertile females. A well-rested individual has a higher chance of fertility than a stressed individual. Rest is essential for proper functioning of the body.

 **For the male:**

* **Surgery.** For example, a varicocele can often be surgically corrected or an obstructed vas deferens repaired. Prior vasectomies can be reversed. In cases where no sperm are present in the ejaculate, sperm can often be retrieved directly from the testicles or epididymis using sperm-retrieval techniques.
* **Treating infections.** Antibiotic treatment might cure an infection of the reproductive tract, but doesn't always restore fertility but increases the chances.
* **Treatments for sexual intercourse problems.** Medication or counseling can help improve fertility in conditions such as erectile dysfunction or premature ejaculation.
* **Hormone treatments and medications.** Your doctor might recommend hormone replacement or medications in cases where infertility is caused by high or low levels of certain hormones or problems with the way the body uses hormones.