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MAILING ADDRESS:
P.O. Box 485
Weimar, CA 95736-0485

E-MAIL: iridology@netzero.net
WEB SITE: http://www.joyfullivingservices.com
TELEPHONES: 530-878-1119 or 800-704-9800, **FAX**: 530-878-1119

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From The Author

Time sure flies when we're having fun doesn't it? It's just about the middle of October and Halloween is just around the corner. Children will be knocking at our doors in their ghoulish costumes yelling "Trick or Treat". What treat will you give out this year? I don't enjoy giving out candy. I think about all the tooth decay that I will be promoting with each chew. This year how about handing out quarters, dimes or raisins. Children love change and they're excited about putting it in their piggy bank to watch it grow. They also love raisins and they are healthy snacks. Promote good health this Halloween and children will thank you when they look in their pumpkin. I always think of Charlie Brown in the video "Charlie Brown's Halloween". Everyone goes door to door and gets great things. Of course after each house they all have to look in their bags to find out what they received. Everyone receives a great candy but Charlie Brown. He always says "I got a rock". Wouldn't it be fun to give something healthy? Have a wonderful and safe Halloween! Brenda

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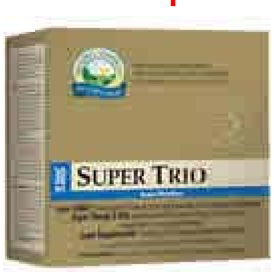
SUPER TRIO (60 PACKETS)

Super Nutrition, Super Easy



Good health comes through nutrition; it's what you put in your body that counts. With our fast-paced world, nutritionally lacking snacks and meals on the go—if we even get meals—obtaining adequate nutrition is not an easy task. But now, with Super Trio, you can take good nutrition with you—in your purse, in your pocket, in the palm of your hand—wherever you go. **Super Trio makes proper nutrition simple and convenient.**

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NSP Health Analyzer

Like the musicians who make up an orchestra, the body systems—digestive, intestinal, circulatory, nervous, immune, respiratory, urinary, glandular and structural—must all work in harmony. When a concern in one body system arises, other systems are affected. Total health requires that all body systems be balanced.

The majority of NSP's products are categorized in nine body systems to allow you to easily select the products that will help you achieve your personal health goals. This Lifestyle Analysis will help you target your body systems most in need of nutritional supplementation.

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Answering the following questions will help to determine your health profile. You will then be able to choose those Nature's Sunshine Products that will help you strengthen your weakest body systems. When you have finished click "view results" to calculate your results. Go to:
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☐ Lack of energy	☐ Illness more than twice a year
☐ Body odor and/or bad breath	☐ Difficulty digesting certain foods
☐ Eat meat more than 3 times a week	☐ Monthly female concerns
☐ Recent or frequent use of antibiotics	☐ Regular consumption of alcohol
☐ Frequent mood swings	☐ Food allergies
☐ Bags under eyes	☐ Smoking
☐ Poor concentration or memory	☐ Poor resistance to disease
☐ Belching or gas after meals	☐ Stressful lifestyle
☐ Skin/complexion problems	☐ Cravings for sweets, salt or junk foods
☐ Regular consumption of dairy products	☐ Feeling low, uninterested or depressed
☐ Too little sleep or restless sleep	☐ Menopausal concerns
☐ Frequent urination or urinary concerns	☐ Hair loss
☐ Sore or painful joints	☐ Difficulty in maintaining ideal weight
☐ Low endurance/stamina	☐ Lack of a balanced diet
☐ Slow recovery from illness	☐ Less than 2 bowel movements per day
☐ Lack of appetite	☐ Low sex drive
☐ Brittle or easily broken fingernails	☐ Dry, damaged or dull hair
☐ High-fat diet	☐ Unsettled, apprehensive, pressured
☐ Low-fiber diet	☐ Muscle cramps or spasms
☐ Exposure to air pollution daily	☐ Caffeinated beverage (16 oz.) daily
☐ Feeling out of control	☐ Food/chemical sensitivities
☐ Recurrent yeast/fungal infections	☐ Weak bones, teeth or cartilage
☐ Suffer from anxiety or worry	☐ Easily irritated or angered
☐ Don't exercise regularly	☐ Respiratory, sinus or allergy problems

Vitamin Supplements Help Protect Children from Heavy Metals, Reduce Behavioral Disorders

(OMNS October 8, 2007) The ability of vitamin C to protect animals from heavy metal poisoning is well established. Recent controlled trials with yeast, fish, mice, rats, chickens, clams, guinea pigs, and turkeys all came to the same conclusion: Vitamin C protects growing animals from heavy metals poisoning. [1-7]

Benefits with an animal model do not always translate to equal benefits for humans. In this case, however, the benefit has been proven for a wide range of animals. The odds that vitamin C will protect human children are high.

There is a virtual epidemic of behavior problems, learning disabilities, ADHD and autism, and the number of children receiving special education services continues to rise steeply. Although not all causes are yet identified, growing evidence suggests that heavy metal pollution is a significant factor, and vitamin C is part of the solution.

Dr. Erik Paterson, of British Columbia, reports: "When I was a consulting physician for a center for the mentally challenged, a patient showing behavioral changes was found to have blood lead some ten times higher than the acceptable levels. I administered vitamin C at a dose of 4,000 mg/day. I anticipated a slow response. The following year I rechecked his blood lead level. It had gone up, much to my initial dismay. But then I thought that perhaps what was happening was that the vitamin C was mobilizing the lead from his tissues. So we persisted. The next year, on rechecking, the lead levels had markedly dropped to well below the initial result. As the years went by, the levels became almost undetectable, and his behavior was markedly improved."

World-wide, coal and high sulfur fuel oil combustion release close to 300,000 tons per year of heavy metals, 100,000 tons of which are considered hazardous air pollutants by the US Environmental Protection Agency. [8] This includes arsenic, beryllium, cadmium, cobalt, chromium, mercury, manganese, nickel, lead, antimony, selenium, uranium, and thorium. These metals are also released to the air by the industrial processes that mine and refine metal-containing ores.

Heavy metals dispersed in the air as invisible particles are blown by the winds and therefore become widely dispersed. Few mothers or children can avoid both contaminated air and food, helping to explain why behavior problems are striking rich and poor alike.

University of Victoria professor Harold Foster, PhD, says, "Pregnant women need special protection because their fetus may be poisoned in the womb, so interfering with its development. In addition to vitamin C, nutrient minerals are also protective against heavy metal toxins. For example, selenium is antagonistic to (and so protective against) arsenic, mercury and cadmium."

Metals have always been a part of the environment, and our bodies have evolved methods to protect against them. This process involves vitamin-dependent metabolic pathways. [9] Additional vitamin intake, through the use of nutrient supplementation, can help speed up the removal process. Daily consumption of additional vitamin C and selenium is likely to protect children by helping to eliminate heavy metals from their bodies. One easy and inexpensive way to increase intake of these nutrients is by taking a vitamin C supplement with each meal, along with a multivitamin containing selenium. Vitamin supplements are remarkably safe for children. [10]

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http://www.doctoryourself.com/testimony.htm

Vitamins are safe. There is not even one death per year from vitamin supplementation.
http://orthomolecular.org/resources/omns/v03n04.shtml

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"The significant problems we face cannot be solved at the same level of thinking we were at when we created them."
- Albert Einstein

Anatomy & Physiology

This is our second article on anatomy & physiology section in our newsletter. This month is about the endocrine and reproductive systems. I've been doing a lot of in-person and long-distance muscle testing and I'm finding that most people have weakness in their endocrine system. The following is taken from our anatomy & physiology course.

Introduction to the Endocrine System

The endocrine system, along with the nervous system, functions in the regulation of body activities. The nervous system acts through electrical impulses and neurotransmitters to cause muscle contraction and glandular secretion. The effect is of short duration, measured in seconds, and localized. The endocrine system acts through chemical messengers called hormones that influence growth, development, and metabolic activities. The action of the endocrine system is measured in minutes, hours, or weeks and is more generalized than the action of the nervous system. There are two major categories of glands in the body - exocrine and endocrine.

Exocrine Glands

Exocrine glands have ducts that carry their secretory product to a surface. These glands include the sweat, cebaceous, and mammary glands and, the glands that secrete digestive enzymes.

Endocrine Glands

The endocrine glands do not have ducts to carry their product to a surface. They are called ductless glands. The word endocrine is derived from the Greek terms "endo," meaning within, and "krine," meaning to separate or secrete. The secretory products of endocrine glands are called hormones and are secreted directly into the blood and then carried throughout the body where they influence only those cells that have receptor sites for that hormone.

Chemical Nature of Hormones

Chemically, hormones may be classified as either proteins or steroids. All of the hormones in the human body, except the sex hormones and those from the adrenal cortex, are proteins or protein derivatives.

Mechanism of Hormone

Action Hormones are carried by the blood throughout the entire body, yet they affect only certain cells. The specific cells that respond to a given hormone have receptor sites for that hormone. This is sort of a lock and key mechanism. If the key fits the lock, then the door will open. If a hormone fits the receptor site, then there will be an effect. If a hormone and a receptor site do not match, then there is no reaction. All the cells that have receptor sites for a given hormone make up the target tissue for that hormone. In some cases, the target tissue is localized in a single gland or organ. In other cases, the target tissue is diffused and scattered throughout the body so that many areas are affected. Hormones bring about their characteristic effects on target cells by modifying cellular activity.

Protein hormones react with receptors on the surface of the cell, and the sequence of events that results in hormone action is relatively rapid. Steroid hormones typically react with receptor sites inside a cell. Because this method of action actually involves synthesis of proteins, it is relatively slow.

Control of Hormone Action

Hormones are very potent substances, which means that very small amounts of a hormone may have profound effects on metabolic processes. Because of their potency, hormone secretion must be regulated within very narrow limits in order to maintain homeostasis in the body.

Many hormones are controlled by some form of a negative feedback mechanism. In this type of system, a gland is sensitive to the concentration of a substance that it regulates. A negative feedback system causes a reversal of increases and decreases in body conditions in order to maintain a state of stability or homeostasis. Some endocrine glands secrete hormones in response to other hormones. The hormones that cause secretion of other hormones are called tropic hormones. A hormone from gland A causes gland B to secrete its hormone. A third method of regulating hormone secretion is by direct nervous stimulation. A nerve stimulus causes gland A to secrete its hormone.

Endocrine Glands

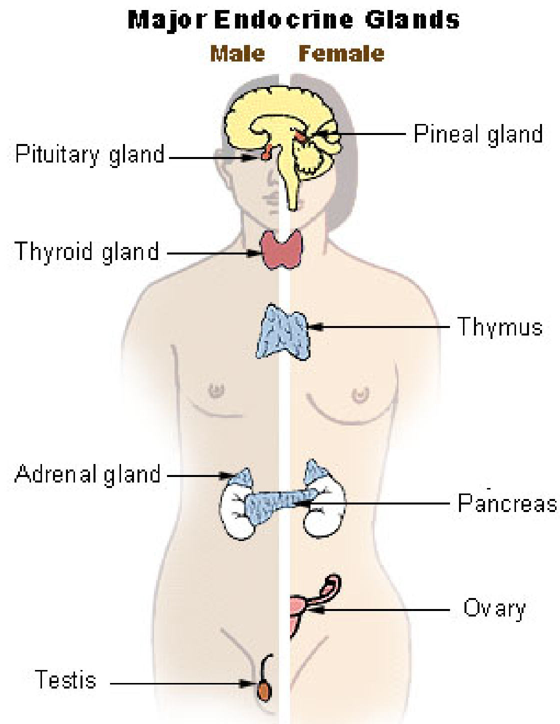
The endocrine system is made up of the endocrine glands that secrete hormones. Although there are eight major endocrine glands scattered throughout the body, they are still considered to be one system because they have similar functions, similar mechanisms of influence, and many important interrelationships.

Some glands also have non-endocrine regions that have functions other than hormone secretion. For example, the pancreas has a major exocrine portion that secretes digestive enzymes and an endocrine portion that secretes hormones. The ovaries and testes secrete hormones and also produce the ova and sperm. Some organs, such as the stomach, intestines, and heart, produce hormones, but their primary function is not hormone secretion.

Pituitary and Pineal Glands

The pituitary gland or hypophysis is a small gland about 1 centimeter in diameter or the size of a pea. It is nearly surrounded by bone as it rests in the sella turcica, a depression in the sphenoid bone. The gland is connected to the hypothalamus of the brain by a slender stalk called the infundibulum.

There are two distinct regions in the gland: the anterior lobe (adenohypophysis) and the posterior lobe (neurohypophysis). The activity of the adenohypophysis is controlled by releasing hormones from the hypothalamus. The neurohypophysis is controlled by nerve stimulation.



Hormones of the Anterior Lobe (Adenohypophysis)

Growth hormone is a protein that stimulates the growth of bones, muscles, and other organs by promoting protein synthesis. This hormone drastically affects the appearance of an individual because it influences height. If there is too little growth hormone in a child, that person may become a pituitary dwarf of normal proportions but small stature. An excess of the hormone in a child results in an exaggerated bone growth, and the individual becomes exceptionally tall or a giant.

Thyroid-stimulating hormone, or thyrotropin, causes the glandular cells of the thyroid to secrete thyroid hormone. When there is a hypersecretion of thyroid-stimulating hormone, the thyroid gland enlarges and secretes too much thyroid hormone.

Adrenocorticotropic hormone reacts with receptor sites in the cortex of the adrenal gland to stimulate the secretion of cortical hormones, particularly cortisol.

Gonadotropic hormones react with receptor sites in the gonads, or ovaries and testes, to regulate the development, growth, and function of these organs.

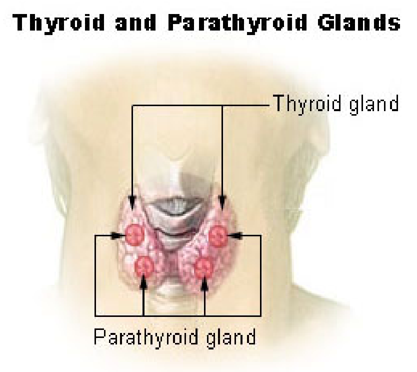
Prolactin hormone promotes the development of glandular tissue in the female breast during pregnancy and stimulates milk production after the birth of the infant.

Hormones of the Posterior Lobe (Neurohypophysis)
Antidiuretic hormone promotes the reabsorption of water by the kidney tubules, with the result that less water is lost as urine. This mechanism conserves water for the body. Insufficient amounts of antidiuretic hormone cause excessive water loss in the urine.

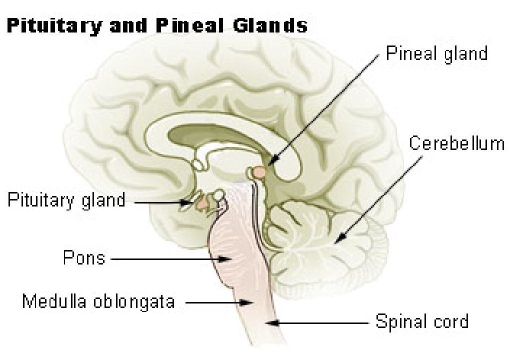
Oxytocin causes contraction of the smooth muscle in the wall of the uterus. It also stimulates the ejection of milk from the lactating breast.

Pineal Gland
The pineal gland, also called pineal body or epiphysis cerebri, is a small cone-shaped structure that extends posteriorly from the third ventricle of the brain. The pineal gland consists of portions of neurons, neuroglial cells, and specialized secretory cells called pinealocytes. The pinealocytes synthesize the hormone melatonin and secrete it directly into the cerebrospinal fluid, which takes it into the blood. Melatonin affects reproductive development and daily physiologic cycles.

Thyroid Gland
The thyroid gland is a very vascular organ that is located in the neck. It consists of two lobes, one on each side of the trachea, just below the larynx or voice box. The two lobes are connected by a narrow band of tissue called the isthmus. Internally, the gland consists of follicles, which produce thyroxine and triiodothyronine hormones. These hormones contain iodine.



About 95 percent of the active thyroid hormone is thyroxine, and most of the remaining 5 percent is triiodothyronine. Both of these require iodine for their synthesis. Thyroid hormone secretion is regulated by a negative feedback mechanism that involves the amount of circulating hormone, hypothalamus, and adenohypophysis.



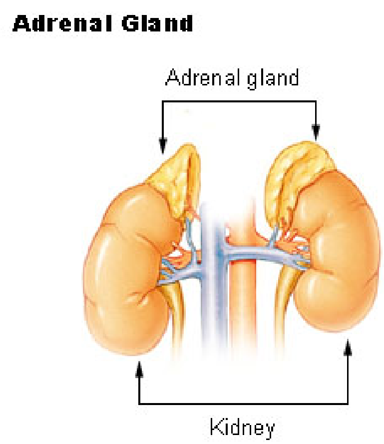
If there is an iodine deficiency, the thyroid cannot make sufficient hormone. This stimulates the anterior pituitary to secrete thyroid-stimulating hormone, which causes the thyroid gland to increase in size in a vain attempt to produce more hormones. But it cannot produce more hormones because it does not have the necessary raw material, iodine. This type of thyroid enlargement is called simple goiter or iodine deficiency goiter.

Calcitonin is secreted by the parafollicular cells of the thyroid gland. This hormone opposes the action of the parathyroid glands by reducing the calcium level in the blood. If blood calcium becomes too high, calcitonin is secreted until calcium ion levels decrease to normal.

Parathyroid Gland
Four small masses of epithelial tissue are embedded in the connective tissue capsule on the posterior surface of the thyroid glands. These are parathyroid glands, and they secrete parathyroid hormone or parathormone. Parathyroid hormone is the most important regulator of blood calcium levels. The hormone is secreted in response to low blood calcium levels, and its effect is to increase those levels.

Hypoparathyroidism, or insufficient secretion of parathyroid hormone, leads to increased nerve excitability. The low blood calcium levels trigger spontaneous and continuous nerve impulses, which then stimulate muscle contraction.

Adrenal Gland
The adrenal, or suprarenal, gland is paired with one gland located near the upper portion of each kidney. Each gland is divided into an outer cortex and an inner medulla. The cortex and medulla of the adrenal gland, like the anterior and posterior lobes of the pituitary, develop from different embryonic tissues and secrete different hormones. The adrenal cortex is essential to life, but the medulla may be removed with no life-threatening effects.



The hypothalamus of the brain influences both portions of the adrenal gland but by different mechanisms. The adrenal cortex is regulated by negative feedback involving the hypothalamus and adrenocorticotropic hormone; the medulla is regulated by nerve impulses from the hypothalamus.

Hormones of the Adrenal Cortex
The adrenal cortex consists of three different regions, with each region producing a different group or type of hormones. Chemically, all the cortical hormones are steroid. Mineralocorticoids are secreted by the outermost region of the adrenal cortex. The principal mineralocorticoid is aldosterone, which acts to conserve sodium ions and water in the body. Glucocorticoids are secreted by the middle region of the adrenal cortex. The principal glucocorticoid is cortisol, which increases blood glucose levels.

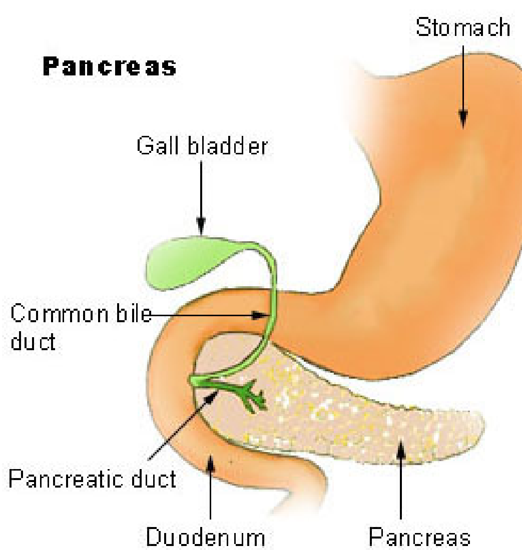
The third group of steroids secreted by the adrenal cortex is the gonadocorticoids, or sex hormones. These are secreted by the innermost region. Male hormones, androgens, and female hormones, estrogens, are secreted in minimal amounts in both sexes by the adrenal cortex, but their effect is usually masked by the hormones from the testes and ovaries. In females, the masculinization effect of androgen secretion may become evident after menopause, when estrogen levels from the ovaries decrease.

Hormones of the Adrenal Medulla

The adrenal medulla develops from neural tissue and secretes two hormones, epinephrine and norepinephrine. These two hormones are secreted in response to stimulation by sympathetic nerve, particularly during stressful situations. A lack of hormones from the adrenal medulla produces no significant effects. Hypersecretion, usually from a tumor, causes prolonged or continual sympathetic responses.

Pancreas

The pancreas is a long, soft organ that lies transversely along the posterior abdominal wall, posterior to the stomach, and extends from the region of the duodenum to the spleen. This gland has an exocrine portion that secretes digestive enzymes that are carried through a duct to the duodenum. The endocrine portion consists of the pancreatic islets, which secrete glucagons and insulin.



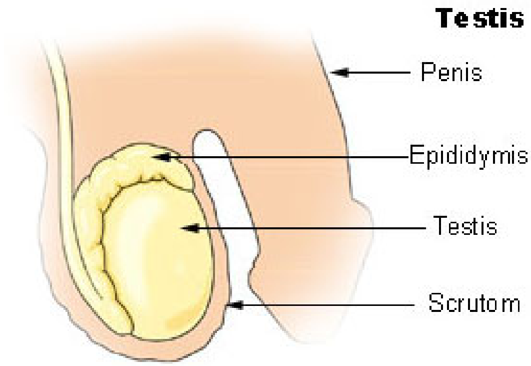
Alpha cells in the pancreatic islets secrete the hormone glucagons in response to a low concentration of glucose in the blood. Beta cells in the pancreatic islets secrete the hormone insulin in response to a high concentration of glucose in the blood.

Gonads

The gonads, the primary reproductive organs, are the testes in the male and the ovaries in the female. These organs are responsible for producing the sperm and ova, but they also secrete hormones and are considered to be endocrine glands.

Testes

Male sex hormones, as a group, are called androgens. The principal androgen is testosterone, which is secreted by the testes. A small amount is also produced by the adrenal cortex. Production of testosterone begins during fetal development, continues for a short time after birth, nearly ceases during childhood, and then resumes at puberty. This steroid hormone is responsible for:

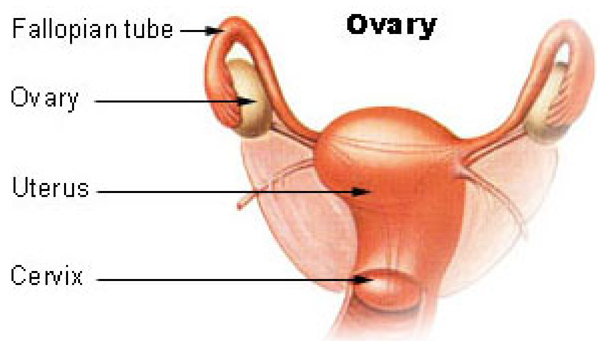


- The growth and development of the male reproductive structures
- Increased skeletal and muscular growth
- Enlargement of the larynx accompanied by voice changes
- Growth and distribution of body hair
- Increased male sexual drive

Testosterone secretion is regulated by a negative feedback system that involves releasing hormones from the hypothalamus and gonadotropins from the anterior pituitary.

Ovaries

Two groups of female sex hormones are produced in the ovaries, the estrogens and progesterone. These steroid hormones contribute to the development and function of the female reproductive organs and sex characteristics. At the onset of puberty, estrogens promotes:



- The development of the breasts
- Distribution of fat evidenced in the hips, legs, and breast
- Maturation of reproductive organs such as the uterus and vagina

Progesterone causes the uterine lining to thicken in preparation for pregnancy. Together, progesterone and estrogens are responsible for the changes that occur in the uterus during the female menstrual cycle.

Other

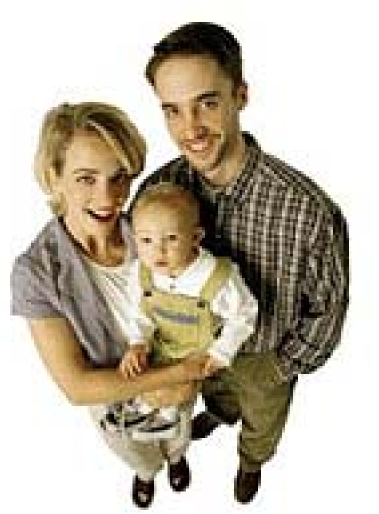
In addition to the major endocrine glands, other organs have some hormonal activity as part of their function. These include the thymus, stomach, small intestines, heart, and placenta.

Thymosin, produced by the thymus gland, plays an important role in the development of the body's immune system.

The lining of the stomach, the gastric mucosa, produces a hormone, called gastrin, in response to the presence of food in the stomach. This hormone stimulates the production of hydrochloric acid and the enzyme pepsin, which are used in the digestion of food.

The mucosa of the small intestine secretes the hormones secretin and cholecystokinin. Secreting stimulates the pancreas to produce a bicarbonate-rich fluid that neutralizes the stomach acid. Cholecystokinin stimulates contraction of the gallbladder, which releases bile. It also stimulates the pancreas to secrete digestive enzyme.

The heart also acts as an endocrine organ in addition to its major role of pumping blood. Special cells in the wall of the upper chambers of the heart, called atria, produce a hormone called atrial natriiuretic hormone, or atriopeptin.



The placenta develops in the pregnant female as a source of nourishment and gas exchange for the developing fetus. It also serves as a temporary endocrine gland. One of the hormones it secretes is human chorionic gonadotropin, which signals the mother's ovaries to secrete hormones to maintain the uterine lining so that it does not degenerate and slough off in menstruation.

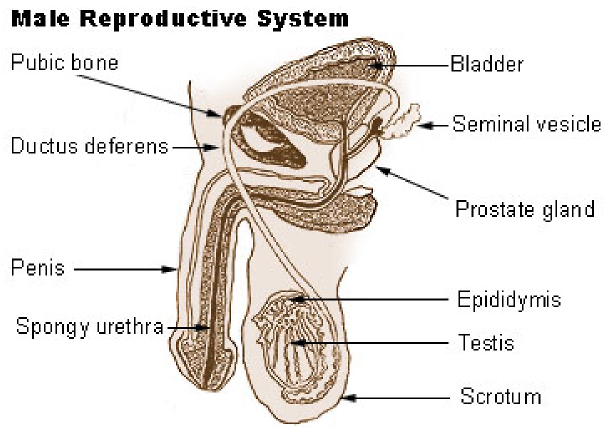
Introduction to the Reproductive System
The major function of the reproductive system is to ensure survival of the species. Other systems in the body, such as the endocrine and urinary systems, work continuously to maintain homeostasis for survival of the individual. An individual may live a long, healthy, and happy life without producing offspring, but if the species is to continue, at least some individuals must produce offspring.

Within the context of producing offspring, the reproductive system has four functions:

- To produce egg and sperm cells
- To transport and sustain these cells
- To nurture the developing offspring
- To produce hormones

These functions are divided between the primary and secondary, or accessory, reproductive organs. The primary reproductive organs, or gonads, consist of the ovaries and testes. These organs are responsible for producing the egg and sperm cells, (gametes), and for producing hormones. These hormones function in the maturation of the reproductive system, the development of sexual characteristics, and have important roles in regulating the normal physiology of the reproductive system. All other organs, ducts, and glands in the reproductive system are considered secondary, or accessory, reproductive organs. These structures transport and sustain the gametes and nurture the developing offspring.

The Male Reproductive System
The male reproductive system, like that of the female, consists of those organs whose function is to produce a new individual, i.e., to accomplish reproduction. This system consists of a pair of testes and a network of excretory ducts (epididymis, ductus deferens (vas deferens), and ejaculatory ducts), seminal vesicles, the prostate, the bulbourethral glands, and the penis.



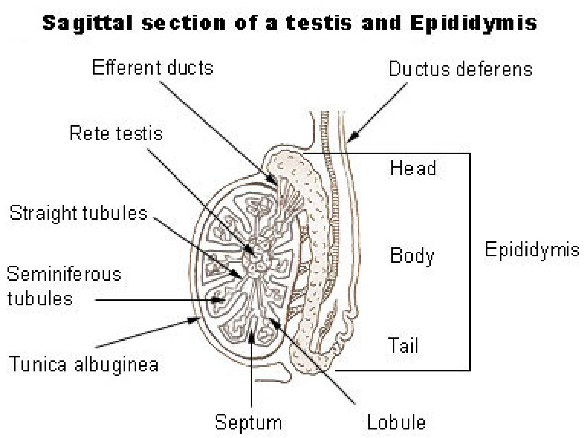
Testes
The male gonads, testes, or testicles, begin their development high in the abdominal cavity, near the kidneys. During the last two months before birth, or shortly after birth, they descend through the inguinal canal into the scrotum, a pouch that extends below the abdomen, posterior to the penis. Although this location of the testes, outside the abdominal cavity, may seem to make them vulnerable to injury, it provides a temperature about 3° C below normal body temperature. This lower temperature is necessary for the production of viable sperm. The scrotum consists of skin and subcutaneous tissue. A vertical septum, or partition, of subcutaneous tissue in the center divides it into two parts, each containing one testis. Smooth muscle fibers, called the dartos muscle, in the subcutaneous tissue contract to give the scrotum its wrinkled appearance. When these fibers are relaxed, the scrotum is smooth. Another muscle, the cremaster muscle, consists of skeletal muscle fibers and controls the position of the scrotum and testes. When it is cold or a man is sexually aroused, this muscle contracts to pull the testes closer to the body for warmth.

Structure
Each testis is an oval structure about 5 cm long and 3 cm in diameter. A tough, white fibrous connective tissue capsule, the tunica albuginea, surrounds each testis and extends inward to form septa that partition the organ into lobules. There are about 250 lobules in each testis. Each lobule contains 1 to 4 highly coiled seminiferous tubules that converge to form a single straight tubule, which leads into the rete testis. Short efferent ducts exit the testes. Interstitial cells (cells of Leydig), which produce male sex hormones, are located between the seminiferous tubules within a lobule.

Spermatogenesis
Sperm are produced by spermatogenesis within the seminiferous tubules. A transverse section of a seminiferous tubule shows that it is packed with cells in various stages of development. Interspersed with these cells, there are large cells that extend from the periphery of the tubule to the lumen. These large cells are the supporting, or sustentacular cells (Sertoli's cells), which support and nourish the other cells.

Early in embryonic development, primordial germ cells enter the testes and differentiate into spermatogonia, immature cells that remain dormant until puberty. Spermatogonia are diploid cells, each with 46 chromosomes (23 pairs) located around the periphery of the seminiferous tubules. At puberty, hormones stimulate these cells to begin dividing by mitosis. Some of the daughter cells produced by mitosis remain at the periphery as spermatogonia. Others are pushed toward the lumen, undergo some changes, and become primary spermatocytes. Because they are produced by mitosis, primary spermatocytes, like spermatogonia, are diploid and have 46 chromosomes.

Each primary spermatocytes goes through the first meiotic division, meiosis I, to produce two secondary spermatocytes, each with 23 chromosomes (haploid). Just prior to this division, the genetic material is replicated so that each chromosome consists of two strands, called chromatids, that are joined by a centromere. During meiosis I, one chromosome, consisting of two chromatids, goes to each secondary spermatocyte. In the second meiotic division, meiosis II, each secondary spermatocyte divides to produce two spermatids. There is no replication of genetic material in this division, but the centromere divides so that a single-stranded chromatid goes to each cell. As a result of the two meiotic divisions, each primary spermatocyte produces four spermatids. During spermatogenesis there are two cellular divisions, but only one replication of DNA so that each spermatid has 23 chromosomes (haploid), one from each pair in the original primary spermatocyte. Each successive stage in spermatogenesis is pushed toward the center of the tubule so that the more immature cells are at the periphery and the more differentiated cells are nearer the center.



Spermatogenesis (and oogenesis in the female) differs from mitosis because the resulting cells have only half the number of chromosomes as the original cell. When the sperm cell nucleus unites with an egg cell nucleus, the full number of chromosomes is restored. If sperm and egg cells were produced by mitosis, then each successive generation would have twice the number of chromosomes as the preceding one.
The final step in the development of sperm is called spermiogenesis. In this process, the spermatids formed from spermatogenesis become mature spermatozoa, or sperm. The mature sperm cell has a head, midpiece, and tail. The head, also called the nuclear region, contains the 23 chromosomes surrounded by a nuclear membrane. The tip of the head is covered by an acrosome, which contains enzymes that help the sperm penetrate the female gamete. The midpiece, metabolic region, contains mitochondria that provide adenosine triphosphate (ATP). The tail, locomotor region, uses a typical flagellum for locomotion. The sperm are released into the lumen of the seminiferous tubule and leave the testes. They then enter the epididymis where they undergo their final maturation and become capable of fertilizing a female gamete.

Sperm production begins at puberty and continues throughout the life of a male. The entire process, beginning with a primary spermatocyte, takes about 74 days. After ejaculation, the sperm can live for about 48 hours in the female reproductive tract.

Duct System

Sperm cells pass through a series of ducts to reach the outside of the body. After they leave the testes, the sperm passes through the epididymis, ductus deferens, ejaculatory duct, and urethra.

Epididymis

Sperm leave the testes through a series of efferent ducts that enter the epididymis. Each epididymis is a long (about 6 meters) tube that is tightly coiled to form a comma-shaped organ located along the superior and posterior margins of the testes. When the sperm leave the testes, they are immature and incapable of fertilizing ova. They complete their maturation process and become fertile as they move through the epididymis. Mature sperm are stored in the lower portion, or tail, of the epididymis.

Ductus Deferens

The ductus deferens, also called vas deferens, is a fibromuscular tube that is continuous (or contiguous) with the epididymis. It begins at the bottom (tail) of the epididymis then turns sharply upward along the posterior margin of the testes. The ductus deferens enters the abdominopelvic cavity through the inguinal canal and passes along the lateral pelvic wall. It crosses over the ureter and posterior portion of the urinary bladder, and then descends along the posterior wall of the bladder toward the prostate gland. Just before it reaches the prostate gland, each ductus deferens enlarges to form an ampulla. Sperm are stored in the proximal portion of the ductus deferens, near the epididymis, and peristaltic movements propel the sperm through the tube.

The proximal portion of the ductus deferens is a component of the spermatic cord, which contains vascular and neural structures that supply the testes. The spermatic cord contains the ductus deferens, testicular artery and veins, lymph vessels, testicular nerve, cremaster muscle that elevates the testes for warmth and at times of sexual stimulation, and a connective tissue covering.

Ejaculatory Duct

Each ductus deferens, at the ampulla, joins the duct from the adjacent seminal vesicle (one of the accessory glands) to form a short ejaculatory duct. Each ejaculatory duct passes through the prostate gland and empties into the urethra.

Urethra

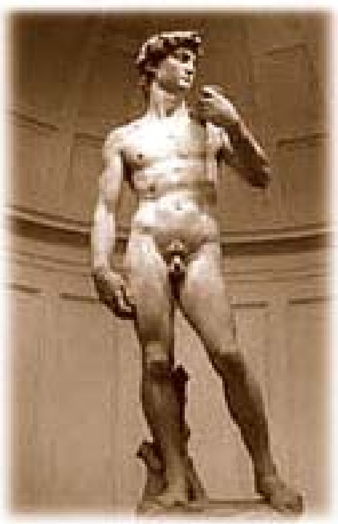
The urethra extends from the urinary bladder to the external urethral orifice at the tip of the penis. It is a passageway for sperm and fluids from the reproductive system and urine from the urinary system. While reproductive fluids are passing through the urethra, sphincters contract tightly to keep urine from entering the urethra.

The male urethra is divided into three regions. The prostatic urethra is the proximal portion that passes through the prostate gland. It receives the ejaculatory duct, which contains sperm and secretions from the seminal vesicles, and numerous ducts from the prostate glands. The next portion, the membranous urethra, is a short region that passes through the pelvic floor.

The longest portion is the penile urethra (also called spongy urethra or cavernous urethra), which extends the length of the penis and opens to the outside at the external urethral orifice. The ducts from the bulbourethral glands open into the penile urethra.

Accessory Glands

The accessory glands of the male reproductive system are the seminal vesicles, prostate gland, and the bulbourethral glands. These glands secrete fluids that enter the urethra.



Seminal Vesicles

The paired seminal vesicles are saccular glands posterior to the urinary bladder. Each gland has a short duct that joins with the ductus deferens at the ampulla to form an ejaculatory duct, which then empties into the urethra. The fluid from the seminal vesicles is viscous and contains fructose, which provides an energy source for the sperm; prostaglandins, which contribute to the mobility and viability of the sperm; and proteins that cause slight coagulation reactions in the semen after ejaculation.

Prostate

The prostate gland is a firm, dense structure that is located just inferior to the urinary bladder. It is about the size of a walnut and encircles the urethra as it leaves the urinary bladder. Numerous short ducts from the substance of the prostate gland empty into the prostatic urethra. The secretions of the prostate are thin, milky colored, and alkaline. They function to enhance the motility of the sperm.

Bulbourethral Glands

The paired bulbourethral (Cowper's) glands are small, about the size of a pea, and located near the base of the penis. A short duct from each gland enters the proximal end of the penile urethra. In response to sexual stimulation, the bulbourethral glands secrete an alkaline mucus-like fluid. This fluid neutralizes the acidity of the urine residue in the urethra, helps to neutralize the acidity of the vagina, and provides some lubrication for the tip of the penis during intercourse.

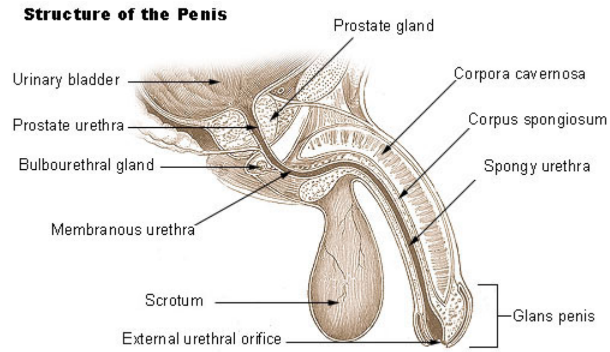
Seminal Fluid

Seminal fluid, or semen, is a slightly alkaline mixture of sperm cells and secretions from the accessory glands. Secretions from the seminal vesicles make up about 60 percent of the volume of the semen, with most of the remainder coming from the prostate gland. The sperm and secretions from the bulbourethral gland contribute only a small volume.

The volume of semen in a single ejaculation may vary from 1.5 to 6.0 ml. There are usually between 50 to 150 million sperm per milliliter of semen. Sperm counts below 10 to 20 million per milliliter usually present fertility problems. Although only one sperm actually penetrates and fertilizes the ovum, it takes several million sperm in an ejaculation to ensure that fertilization will take place.

Penis

The penis, the male copulatory organ, is a cylindrical pendant organ located anterior to the scrotum and functions to transfer sperm to the vagina. The penis consists of three columns of erectile tissue that are wrapped in connective tissue and covered with skin. The two dorsal columns are the corpora cavernosa. The single, midline ventral column surrounds the urethra and is called the corpus spongiosum.



The penis has a root, body (shaft), and glans penis. The root of the penis attaches it to the pubic arch and the body is the visible, pendant portion. The corpus spongiosum expands at the distal end to form the glans penis. The urethra, which extends throughout the length of the corpus spongiosum, opens through the external urethral orifice at the tip of the glans penis. A loose fold of skin, called the prepuce, or foreskin, covers the glans penis.

Male Sexual Response

The male sexual response includes erection and orgasm accompanied by ejaculation of semen. Orgasm is followed by a variable time period during which it is not possible to achieve another erection.

Three hormones are the principle regulators of the male reproductive system. Follicle-stimulating hormone (FSH) stimulates spermatogenesis; luteinizing hormone (LH) stimulates the production of testosterone; and testosterone stimulates the development of male secondary sex characteristics and spermatogenesis.

Female Reproductive System

The organs of the female reproductive system produce and sustain the female sex cells (egg cells or ova), transport these cells to a site where they may be fertilized by sperm, provide a favorable environment for the developing fetus, move the fetus to the outside at the end of the development period, and produce the female sex hormones. The female reproductive system includes the ovaries, Fallopian tubes, uterus, vagina, accessory glands, and external genital organs.

Ovaries

The primary female reproductive organs, or gonads, are the two ovaries. Each ovary is a solid, ovoid structure about the size and shape of an almond, about 3.5 cm in length, 2 cm wide, and 1 cm thick. The ovaries are located in shallow depressions, called ovarian fossae, one on each side of the uterus, in the lateral walls of the pelvic cavity. They are held loosely in place by peritoneal ligaments.

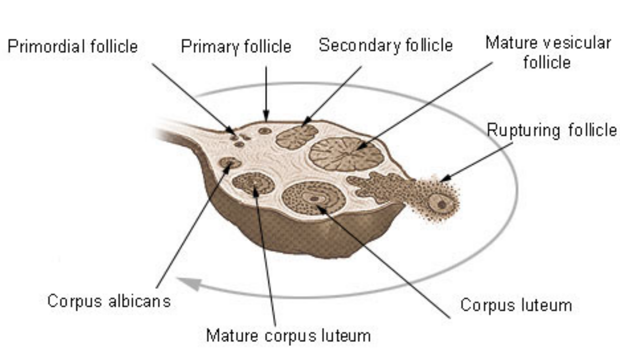
Structure

The ovaries are covered on the outside by a layer of simple cuboidal epithelium called germinal (ovarian) epithelium. This is actually the visceral peritoneum that envelops the ovaries. Underneath this layer there is a dense connective tissue capsule, the tunica albuginea. The substance of the ovaries is distinctly divided into an outer cortex and an inner medulla. The cortex appears more dense and granular due to the presence of numerous ovarian follicles in various stages of development. Each of the follicles contains an oocyte, a female germ cell. The medulla is loose connective tissue with abundant blood vessels, lymphatic vessels, and nerve fibers.

Oogenesis

Female sex cells, or gametes, develop in the ovaries by a form

Structure of an Ovary



of meiosis called oogenesis. The sequence of events in oogenesis is similar to the sequence in spermatogenesis, but the timing and final result are different. Early in fetal development, primitive germ cells in the ovaries differentiate into oogonia. These divide rapidly to form thousands of cells, still called oogonia, which have a full complement of 46 (23 pairs) chromosomes. Oogonia then enter a growth phase, enlarge, and become primary oocytes. The diploid (46 chromosomes) primary oocytes replicate their DNA and begin the first meiotic division, but the process stops in prophase and the cells remain in this suspended state until puberty. Many of the primary oocytes degenerate before birth, but even with this decline, the two ovaries together contain approximately 700,000 oocytes at birth. This is the lifetime supply, and no more will develop. This is quite different than the male in which spermatogonia and primary spermatocytes continue to be produced throughout the reproductive lifetime. By puberty the number of primary oocytes has further declined to about 400,000.

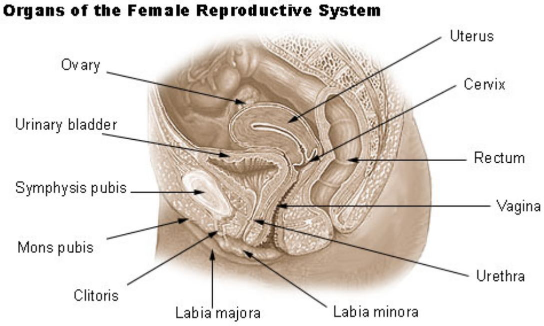
Beginning at puberty, under the influence of follicle-stimulating hormone, several primary oocytes start to grow again each month. One of the primary oocytes seems to outgrow the others and it resumes meiosis I. The other cells degenerate. The large cell undergoes an unequal division so that nearly all the cytoplasm, organelles, and half the chromosomes go to one cell, which becomes a secondary oocyte. The remaining half of the chromosomes go to a smaller cell called the first polar body. The secondary oocyte begins the second meiotic division, but the process stops in metaphase. At this point ovulation occurs. If fertilization occurs, meiosis II continues. Again this is an unequal division with all of the cytoplasm going to the ovum, which has 23 single-stranded chromosome. The smaller cell from this division is a second polar body. The first polar body also usually divides in meiosis I to produce two even smaller polar bodies. If fertilization does not occur, the second meiotic division is never completed and the secondary oocyte degenerates. Here again there are obvious differences between the male and female. In spermatogenesis, four functional sperm develop from each primary spermatocyte. In oogenesis, only one functional fertilizable cell develops from a primary oocyte. The other three cells are polar bodies and they degenerate.

Ovarian Follicle Development

An ovarian follicle consists of a developing oocyte surrounded by one or more layers of cells called follicular cells. At the same time that the oocyte is progressing through meiosis, corresponding changes are taking place in the follicular cells. Primordial follicles, which consist of a primary oocyte surrounded by a single layer of flattened cells, develop in the fetus and are the stage that is present in the ovaries at birth and throughout childhood.

Beginning at puberty follicle-stimulating hormone stimulates changes in the primordial follicles. The follicular cells become cuboidal, the primary oocyte enlarges, and it is now a primary follicle. The follicles continue to grow under the influence of follicle-stimulating hormone, and the follicular cells proliferate to form several layers of granulose cells around the primary oocyte. Most of these primary follicles degenerate along with the primary oocytes within them, but usually one continues to develop each month. The granulosa cells start secreting estrogen and a cavity, or antrum, forms within the follicle. When the antrum starts to develop, the follicle becomes a secondary follicle. The granulose cells also secrete a glycoprotein substance that forms a clear membrane, the zona pellucida, around the oocyte. After about 10 days of growth the follicle is a mature vesicular (graafian) follicle, which forms a "blister" on the surface of the ovary and contains a secondary oocyte ready for ovulation.

Organs of the Female Reproductive System



Ovulation

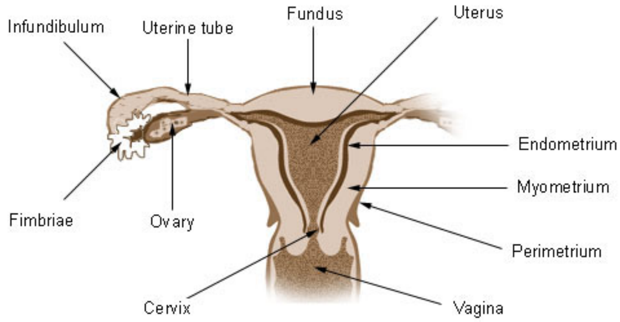
Ovulation, prompted by luteinizing hormone from the anterior pituitary, occurs when the mature follicle at the surface of the ovary ruptures and releases the secondary oocyte into the peritoneal cavity. The ovulated secondary oocyte, ready for fertilization is still surrounded by the zona pellucida and a few layers of cells called the corona radiata. If it is not fertilized, the secondary oocyte degenerates in a couple of days. If a sperm passes through the corona radiata and zona pellucida and enters the cytoplasm of the secondary oocyte, the second meiotic division resumes to form a polar body and a mature ovum

After ovulation and in response to luteinizing hormone, the portion of the follicle that remains in the ovary enlarges and is transformed into a corpus luteum. The corpus luteum is a glandular structure that secretes progesterone and some estrogens. Its fate depends on whether fertilization occurs. If fertilization does not take place, the corpus luteum remains functional for about 10 days then it begins to degenerate into a corpus albicans, which is primarily scar tissue, and its hormone output ceases. If fertilization occurs, the corpus luteum persists and continues its hormone functions until the placenta develops sufficiently to secrete the necessary hormones. Again, the corpus luteum ultimately degenerates into corpus albicans, but it remains functional for a longer period of time.

Fallopian Tubes
There are two uterine tubes, also called Fallopian tubes or oviducts. There is one tube associated with each ovary. The end of the tube near the ovary expands to form a funnel-shaped infundibulum, which is surrounded by fingerlike extensions called fimbriae. Because there is no direct connection between the infundibulum and the ovary, the oocyte enters the peritoneal cavity before it enters the Fallopian tube. At the time of ovulation, the fimbriae increase their activity and create currents in the peritoneal fluid that help propel the oocyte into the Fallopian tube. Once inside the Fallopian tube, the oocyte is moved along by the rhythmic beating of cilia on the epithelial lining and by peristaltic action of the smooth muscle in the wall of the tube. The journey through the Fallopian tube takes about 7 days. Because the oocyte is fertile for only 24 to 48 hours, fertilization usually occurs in the Fallopian tube.

Uterus

Uterus and Uterine tubes



The uterus is a muscular organ that receives the fertilized oocyte and provides an appropriate environment for the developing fetus. Before the first pregnancy, the uterus is about the size and shape of a pear, with the narrow portion directed inferiorly. After childbirth, the uterus is usually larger, then regresses after menopause.

The uterus is lined with the endometrium. The stratum functionale of the endometrium sloughs off during menstruation. The deeper stratum basale provides the foundation for rebuilding the stratum functionale.

Vagina
The vagina is a fibromuscular tube, about 10 cm long, that extends from the cervix of the uterus to the outside. It is located between the rectum and the urinary bladder. Because the vagina is tilted posteriorly as it ascends and the cervix is tilted anteriorly, the cervix projects into the vagina at nearly a right angle. The vagina serves as a passageway for menstrual flow, receives the erect penis during intercourse, and is the birth canal during childbirth.

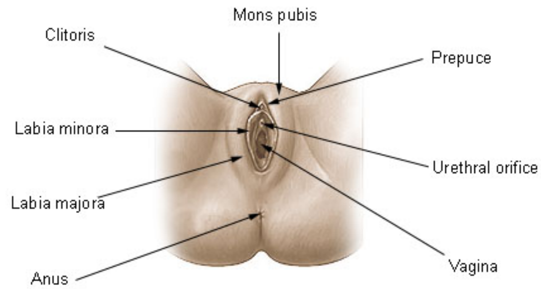
External Genitalia
The external genitalia are the accessory structures of the female reproductive system that are external to the vagina. They are also referred to as the vulva or pudendum. The external genitalia include the labia majora, mons pubis, labia minora, clitoris, and glands within the vestibule.

The clitoris is an erectile organ, similar to the male penis, that responds to sexual stimulation. Posterior to the clitoris, the urethra, vagina, paraurethral glands and greater vestibular glands open into the vestibule.

Female Sexual Response and Hormone Control
The female sexual response includes arousal and orgasm, but there is no ejaculation. A woman may become pregnant without having an orgasm.

Follicle-stimulating hormone, luteinizing hormone, estrogen, and progesterone have major roles in regulating the functions of the female reproductive system.

Female External Genitalia



At puberty, when the ovaries and uterus are mature enough to respond to hormonal stimulation, certain stimuli cause the hypothalamus to start secreting gonadotropin-releasing hormone. This hormone enters the blood and goes to the anterior pituitary gland where it stimulates the secretion of follicle-stimulating hormone and luteinizing hormone. These hormones, in turn, affect the ovaries and uterus and the monthly cycles begin. A woman's reproductive cycles last from menarche to menopause.

The monthly ovarian cycle begins with the follicle development during the follicular phase, continues with ovulation during the ovulatory phase, and concludes with the development and regression of the corpus luteum during the luteal phase.

The uterine cycle takes place simultaneously with the ovarian cycle. The uterine cycle begins with menstruation during the menstrual phase, continues with repair of the endometrium during the proliferative phase, and ends with the growth of glands and blood vessels during the secretory phase.

Menopause occurs when a woman's reproductive cycles stop. This period is marked by decreased levels of ovarian hormones and increased levels of pituitary follicle-stimulating hormone and luteinizing hormone. The changing hormone levels are responsible for the symptoms associated with menopause.

Mammary Glands
Functionally, the mammary glands produce milk; structurally, they are modified sweat glands. Mammary glands, which are located in the breast overlying the pectoralis major muscles, are present in both sexes, but usually are functional only in the female.

Externally, each breast has a raised nipple, which is surrounded by a circular pigmented area called the areola. The nipples are sensitive to touch, due to the fact that they contain smooth muscle that contracts and causes them to become erect in response to stimulation.

Internally, the adult female breast contains 15 to 20 lobes of glandular tissue that radiate around the nipple. The lobes are separated by connective tissue and adipose. The connective tissue helps support the breast. Some bands of connective tissue, called suspensory (Cooper's) ligaments extend through the breast from the skin to the underlying muscles. The amount and distribution of the adipose tissue determines the size and shape of the breast. Each lobe consists of lobules that contain the glandular units. A lactiferous duct collects the milk from the lobules within each lobe and carries it to the nipple. Just before the nipple the lactiferous duct enlarges to form a lactiferous sinus (ampulla), which serves as a reservoir for milk. After the sinus, the duct again narrows and each duct opens independently on the surface of the nipple.

Mammary gland function is regulated by hormones. At puberty, increasing levels of estrogen stimulate the development of glandular tissue in the female breast. Estrogen also causes the breast to increase in size through the accumulation of adipose tissue. Progesterone stimulates the development of the duct system. During pregnancy these hormones further enhance development of the mammary glands. Prolactin from the anterior pituitary stimulates the production of milk within the glandular tissue, and oxytocin causes the ejection of milk from the glands.

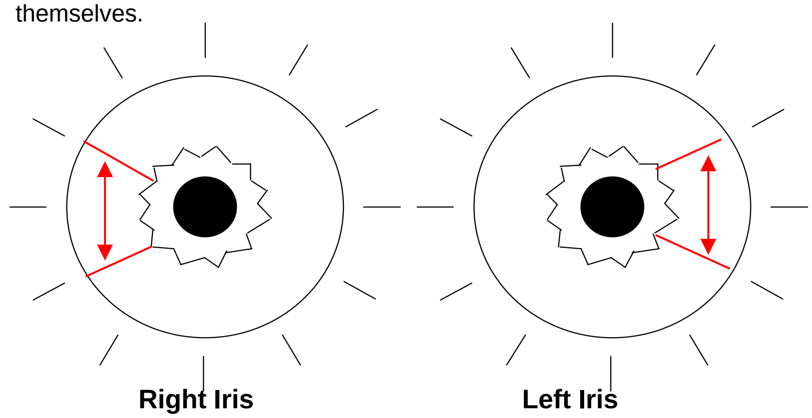
Please let us know if you are interested in our anatomy and physiology course. It costs $300 and can be taken online or on CD-ROM. Contact us with questions and/or to place an order.

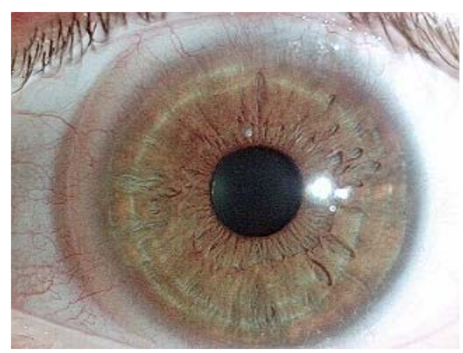
The Study of Iridology

We make it a point to put some type of iridology information in each of our newsletters. This month we are discussing the lungs and bronchials. Please let us know if you have any questions about these items.

Lungs (8:00-10:00 R, 2:00-4:00 L), Bronchioles (8:00-10:00 R, 2:00-4:00 L) Bronchus (2:00-3:30 R, 8:30-10:00 L)

This is one of the primary elimination systems in the body. The respiratory system via its exchange of gases oxygenates the blood, but also in the course of expiration removes potential acidic waste products in their gaseous form thus helping to maintain the body's acid/alkaline balance. When we do not get enough gas exchange due to poor lung development, mucous congestion or destruction of the lung tissues, we are forcing the other elimination systems to carry an additional burden. Whenever an elimination system fails to do its job efficiently, the whole body suffers. Toxic waste build-up in the tissues lowers vitality, diminishes resistance to disease, hastens the aging process and generally leaves the door open to many other problems. You can take care of the Lungs and Bronchioles by first avoiding the long-term use of over-the-counter drugs such as bronchial dilators, nasal sprays, decongestants and other drugs. These destroy the sensitive mucous tissues and are habit-forming substances and do nothing to correct the real problems, which still exist. You might think of helping yourself, if necessary, naturally in the following ways: Seek a climate, if possible, which is most helpful to these areas. Usually this is a dry climate with lower humidity and not too cold. Elevated altitude usually is helpful, 1,500 - 2,500 feet above sea level is best. Bowel care is almost always needed in cases where respiratory problems are involved. Of course, changes in the diet are essential especially eliminating all processed dairy products, whole wheat products and refined foods. Vitamins A, B, C and D are needed in adequate supply as are the minerals Calcium, Copper, Fluorine, Iron, Oxygen and Silicon. Helpful herbs are Comfrey, Lungwort, Angelica, Elecampane, Eucalyptus, Fenugreek, Licorice, Marshmallow, Mullein, Sage and Thyme. Of course there is exercise. Sniff breathing exercises and any work or play in the outdoors, which causes you to breathe deeper, would be beneficial. Try to stay away from heavy smog areas and drive with the car windows up to avoid breathing the exhaust. Don't suppress sneezes, or coughs, as these are your Bronchioles and Lungs cleansing themselves.





Right Iris (8:00-10:00)

Left Iris (2:00-4:00)

To find out more about iridology and/or to take our courses, please contact us. Courses are $200 each (beginning, intermediate, and advanced) or $450 if all 3 are ordered together.

Important Notice - The information contained in the Joyful Living Services' newsletter is for educational purposes only and should not be used to diagnose or treat diseases. If you have a disease, the author suggests that you contact a health practitioner, and do not treat the disease yourself.