Special article

THE BRAIN, THE INTRANUCLEAR CELLULAR RECEPTORS AND THE MODULATORY RESPONSE IN DETERMINING THE FORMS OF SEXUAL DYSFUNCTIONS, RESPECTIVELY SEXUAL DEVIATIONS

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In the human species, the development of the brain and its functions, especially of the cerebral cortex, transformed sexual intercourse, subordinated to a primary impulse, into a complex sexual act, from a neuropsychological point of view (1,2), with superior biological functionality determined by sexual dimorphism, sexual differentiation established up to the level of the last diploid cell in the body (3), in which neurohormones and neuromodulators play an essential role.

Sexual dimorphism is the result of a complex embryological process. As the anatomical structures appear from both morphologically close and distant areas, the rate of malformations of the genital tract is the highest in the human body (4), it directly affects sexual intercourse, through sexual dysfunctions, sexual deviations and intersexuality.

Nervous cells, through neurosecretion (neurohormones, neuromodulators, neurotransmitters) through chemical carriers transmit to specific receptors of other cells the information that determines the forms of sexual behavior (3).

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Neurosecretion acts directly on specific neurons, which it develops by activating intranuclear receptors along with neurosteroids, modulating the response of the brain loaded with specific hormones, which may be normal or abnormal, in our case by causing sexual dysfunction and sexual deviations, in some even using violence.

In this case, I would exemplify the absence of glycine, a neurotransmitter synthesized by the neurons of the septal nuclei, which, by destroying them and lacking glycine determine the aggressive and violent sexual behavior triggered by the amygdala, out of control of the brain (5).

The hypothesis presented by us is based on the experiment (6) which showed that if under normal conditions a rat coexists with a mouse in the same cage, and if the septal nuclei of the rat are stereotoxically destroyed, which through neurons synthesize and eliminate glycine, the animal becomes aggressive and violent because of the amygdala, thus killing the mouse. If the rat is injected with the neurotransmitter (glycine) in the amygdala body, it stops the attacks of violence and aggression on the mouse, restoring normal coexistence.

The blood-brain barrier protects brain neurons from the forceful intervention of peptide hormones, the brain producing the hormones it needs.

The blood-brain barrier itself, between blood and cerebral neurons, and the hematoliquid barrier, between blood and cerebrospinal fluid, prevents water-soluble substances from reaching neurons in the brain so that peptide hormones in the endocrine glands (7) and gastrointestinal tract no longer act or act poorly which will function through their own peptides (3) secreted by neurosecretion.

Basically, in order a hormone to act on a central nervous system neuron, it must cross the blood-brain barrier (lipid layer with special chemical and enzymatic structure) or it has to stimulate peripheral nerve terminations.

In fact, neuronal cells produce „chemeters", ie chemical carriers of nerve information that they transmit to the chemical receptors of other cells (3). Neurotransmitters released at the synapses ensure the transmission of nerve influx triggering the action potential. It acts on neurosecretory cells, and through a positive or negative feedback mechanism, controls its own neurosecretion through neuro-modulators, neuropeptides that determine intraneuronal, asynaptic communication and increase or decrease the amount of neurohormones (3,11).

Thus, the mentioned brain nuclei direct their activity towards normality or abnormality, with forms of normal or pathological sexual behavior. Functional disorders of the activity of the sexual organs affect both sexes, being more serious in men, the "essential" partner in performing the copulatory act.

Occurred sexual dysfunctions can be determined, for example, by „hypersexuality" with manifestations of aberrant behavior on women, children or structures in the environment in the association of a neuropsychological brain pathology with sexual deviations, sometimes with severe forms wearing forensic aspects, respectively legal (5).

The nervous connections of the hypothalamus with the limbic system determine a

direct cerebral effect of neuropeptides, the hypothalamus being involved in regulating the individual's behavior and sexual motivation (3).

After fertilization, specific chromosomal differentiation is the genetic sex determined by the nature of the two sex chromosomes „X" and „Y" and, very rarely, spontaneous or factor-induced genetic mutations, such as: drugs administered especially in the first 3 months of gestation, radiation or viruses that disrupt organogenesis. Sexual differentiation (sexual dimorphism) begins with the formation of the progonade, which can become the testicle or ovary, depending on the nature of the sex chromosomes. Progonade differentiation is controlled by a group of genes located on the short arms of the „Y" chromosome positioned on Yp11.23, constituting the Sexual Differentiation Factor (SDS), (1,2).

Under the influence of the chromosomal structure, sex-specific gonads will be formed from the ambiguous primordial gonad, constituting the gonadal sex.

At the gestational age of 6-8 weeks, under the influence of the „X" or „Y" chromosome, the sex differentiation of the embryo becomes clearer, and the constitution of the gonads and the finalization of the genital apparatus is done according to the genetic programming of the individual.

In this context, the genital glands go beyond the „indifferent period", following the stage of „differentiation" in which the gonads, by evolution, are constituted as the testicle or ovary, in which the testicle develops its structures and dimensions faster (1,2,4).

Free sex hormones cross the blood-brain barrier, participating in the determination of sexual brain differentiation, through irreversible structural changes, specific to men and women, especially in the first 3 months of gestation (embryogenesis period).

This explains the establishment of normal or abnormal structures that will determine sexual dysfunctions, respectively sexual deviations, sometimes major or intersex (1).

Obviously, the brain structural changes will also determine the normal or abnormal evolution of the evolutionary periods of the child, respectively the adult.

I mention that the production of neural receptors for enzymes and steroids is controlled by genetic factors.

Cerebral sexual dimorphism, caused by the morphological changes mentioned above, is the result of the complexity and density of synapses, dependent on sex hormone receptors, which depending on hormones favor the formation of axo-somatical (androgenic) and axo-dendritic (estrogen) synapses (3).

The cerebral cortex

The cerebral cortex, through the cells of the granular layer, is the center of analysis and control, and the Diencephalon (9) is the coordinating center of vegetative life and neuroendocrine regulation of human body functions. Both play a key role in sexuality (2).

The neocortex is characteristic to mammals, but humans have the most developed one. The six distinctive layers provide the individual with the ability to speak, think, memorize, create and select.

It is also the location of intelligence, playing an important role in shaping the structure of the individual and of the human

behavior, namely in the neuropsychological pathology. It is the centre of analysis and control.

The sensory afferent pathways arrive here, a spot from where the impulses that control the motor activity start, through direct and indirect links with the lower anatomical and functional levels of the central nervous system through connections with the diencephalon,(Fig.1) namely the hypophysis and gonads, all playing a vital role in the intercourse.

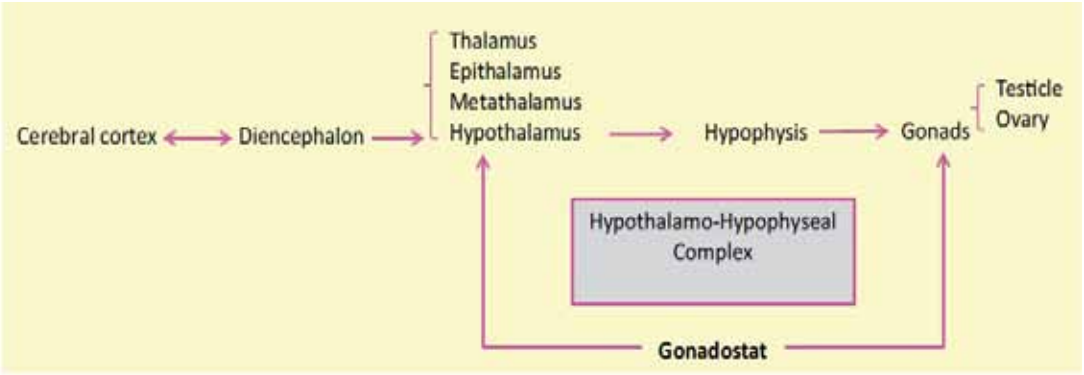

Fig. 1 The neurosecretion and neuromodulation of the gonads (image from the Treaty of Clinical Sexology)

In turn, the gonads perform the biosynthesis of specific sex hormones and their pulsatile discharge into the systemic circulation, with a varying duration, frequency and amplitude from one individual to another, depending on the person's sex and biological potential.

At first, the pulsatile discharges are prevalent at night (the first pollutions occur during sleep), except that the female's gonadotrophin secretion is influenced by her menstrual cycle.

Specific hormones have a different influence on the same brain segment of male and female, causing sexual dimorphism (also present in birds and animals), namely sex differentiation. In this context, there are changes in shape, size, structure and function, such as the thoracic segment development or the thoracic-brachial muscle of male, a wider pelvis and sharp waist because of the buttocks development in female, which becomes an aphrodisiac or arousal factor for some men (Brazilian women),(10).

All these constitute the gender identity, where the person perceives herself mentally as male or female, with behavior and sexual attraction to a person of the opposite sex.

The different behavior is the result of the neurotrophic action of sex hormones on specific neurons that they develop by activating intranuclear receptors, along with neurosteroids, modulating the brain's response to determine sexual dysfunction and sexual deviations (8,11).

The thalamus

Located on the side of ventricle III, the thalamus (Fig.2) consists of two ovoid masses of grey matter separated from the basal nuclei of the cerebral hemispheres by the internal white capsule.

Due to the groups of nuclei it contains, it is the intermediary centre (station) between the NS lower levels and the cerebral cortex (12), the subcortical sensory centre directly subordinated to the cerebral cortex, the centre of all sensitivity pathways before reaching the cerebral cortex (Fig.3), except for the olfactory pathways that go straight to the cortex.

The last neuron of the sensory ascending pathways coming from the analyzers and the receiving exogenous and endogenous impulses, through the ascending spinal bundles (lateral spinothalamic for the unconscious exteroceptive path, anterior spinothalamic for the exteroceptive tactile excitations and posterior spinothalamic) is situated in the thalamus.

The conscious proprioceptive, tactile, epicritic, taste and vestibular sensitivity are transmitted through the spinothalamic bundle, namely through the medial lemniscus (Reil's ribbon), all having an important role in the intercourse.

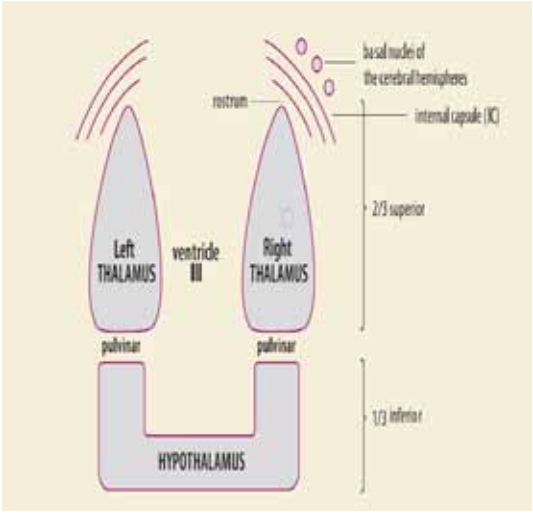

Fig. 2 The topography of the Thalamus (image from the Treaty of Clinical Sexology)

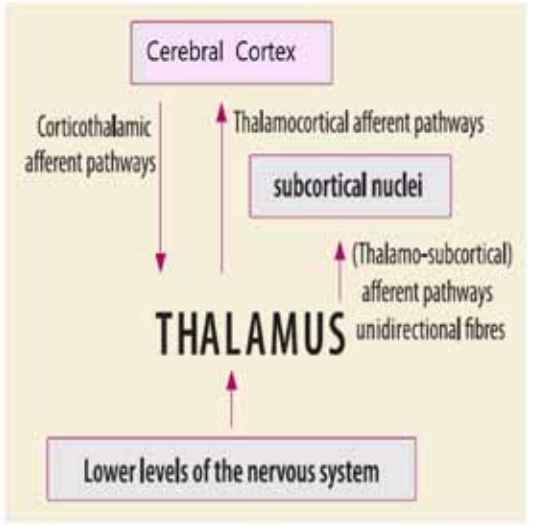

Fig. 3 Thalamus – intermediate station between the cerebral cortex and the lower levels of the Central Nervous System (image from the Treaty of Clinical Sexology)

In this context, the thalamic nuclei project themselves to the cortical fields, which will give a response, thus establishing functional units.

The exteroceptive sensitivity path brings tactile perceptions from Merkel, Meissner, Vater, Pacini, Krause, Ruffini corpuscles and intradermal endings through the posterolateral bundle (Lissauer's tract) that also leads painful proprioceptive impulses from the soft tissue (interoceptive sensitivity).

The epicritic conscious and tactile proprioceptive sensitivity path brings perceptions from the muscles, tendons, joints, through Goll and Burdach bundles to Goll and Burdach nuclei.

The axons forming the sensory decussation are located on the back of the pyramidal tracts, forming the medial lemniscus reaching the thalamus leave from the neurons of these nuclei. The bundles of the exteroceptive sensitivity (spinothalamic bundles) and the exteroceptive and proprioceptive bundles from the cranial nerves, such as olfactory, tactile and visual sensitivity pass through the medial lemniscus.

The visual sensitivity, through erotic images retained and stored in the brain, has a special role in determining the state of arousal and hyperexcitation (hypersexuality), sometimes difficult to control the brain, which can cause aggression during sexual intercourse, with serious consequences.

Also, the partner's selectivity is made without discernment, with deviant behavior (5), specific to people with neuropsychic diseases (see sexual deviations), schizophrenia, tabes, etc., with accentuated neuropsychic and vegetative lability.

The optic nerve (Fig.4) receives up to 90% of the total volume of information from the environment, and complex visual data are interpreted by one tenth of the cerebral cortex. The retina is derivative from the brain

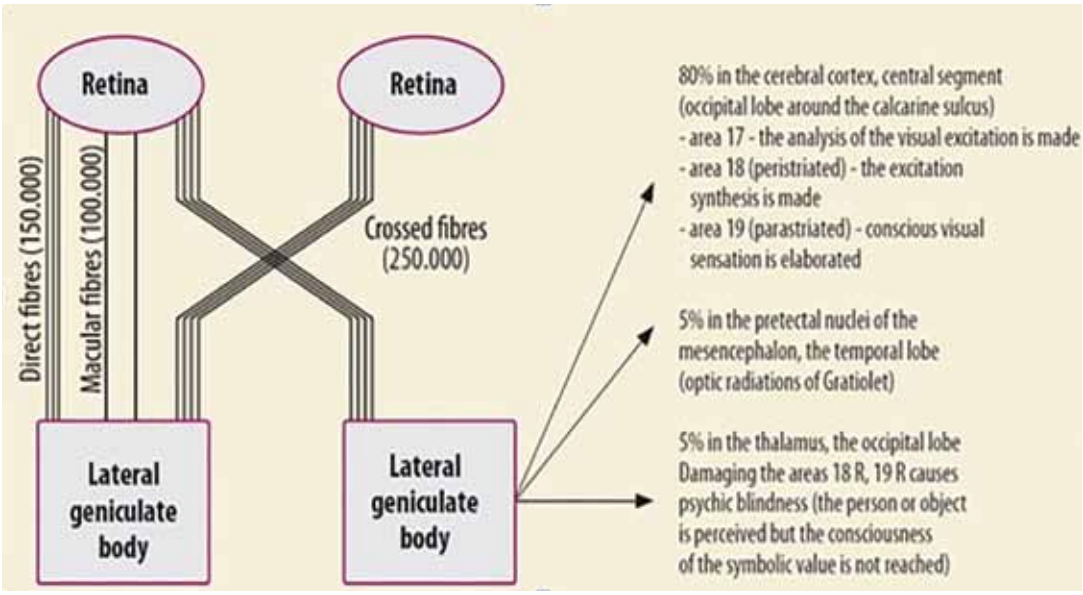

Fig.4 The optic nerve (image from the Treated Clinical Sexology)

and the optic nerve has over 500,000 fibers, compared to the acoustic (25,000) or vestibular (20,000) nerves.

Auditory sensitivity also participates in determining of the erotic state by collecting information related to sexual activity, which can induce this state, as well as olfactory sensitivity - through the receptors of the pituitary mucosa that line the *lamina cribosa* of the ethmoid bone.

In the Schultze olfactory receptors of the mucosa are found about 1 million chemical receptors, non-differential neurosensory cells of elongated or fusiform shape, which act not only as receptors for exciting volatiles (pheromones) that influence sexual behavior but also to transmit arousal through dendrites. olfactory cells in the olfactory bulbs, respectively in the cerebral cortex.

Tactile sensitivity - through the tactile receptors of the hair follicles and cutaneous ridges with unmyelinated nerve fibres (Merkel's Corpuscles) of the erogenous zones, have a special role because the tactile receptors engage outside the nervous system and digestive, respiratory, cardiovascular, directly intervening in the act sexual.

The most important role is played by the tactile stimulation of the vulvar receptors, especially the clitoris, respectively of the Hypereroticism Area - „H Area" (Fig.5a,b,c), (13).

The role of the taste analyzer in cunilingus or fellatio is also notorious, where the tongue, through the taste buds, especially the filiform papillae, fulfills the role of taste receptor (chemical contact analyzer) as well as the lips and walls of the oral cavity in oro-penile contact or oro- vulvar.

Fig.5a

Fig.5b

Fig.5a,b,c-a) Delimitation of the H Area, b) Specific tissue of H area, c) H Area
(images from the Treaty of Clinical Sexology)

All these pathways, as well as that of visceroceptive sensitivity, through the lateral spinothalamic bundle, bring sensations that play a decisive role in sexual behavior and intercourse.

From the thalamus, the bundles reach the cerebral cortex through the thalamocortical path.In this context, the information from the external environment shaped as nervous impulse reaches the cortex, where it is analysed and transformed into erotic sensations or feelings of inhibition, setting a specific sexual behavior of the individual.

The metathalamus

Located posterolateral to the third ventricle, the metathalamus (Fig.6) consists of lateral (external) geniculate bodies (ganglia) and medial geniculate bodies (internal). The medial geniculate bodies receive auditory fibres through the lower conjunctival arm, and the lateral geniculate body receives fibres through the optic tract with an undisputed value in sexuality.

The hypothalamus

Located below the thalamus, the hypothalamus (Fig.2) forms the floor of ventricle III. Tied to the

cerebral cortex, the brainstem and the spinal cord through tracts and fibres, it consists of the tuber cinereum, the rod of the neural hypophysis, and the mammillary bodies. The hypothalamus (14) is directly linked to the hypophysis, the CNS directly regulating its function.

The adjustment of the synthesis and of the adeno- and neural hypophysis(8) secretion is performed by the neurohormones and neuromodulators (9,15), the chemical messengers, produced by the neurons of brain nuclei. They modify the somatodendritic resting potential and influence the activity of the neighboring neurons and neurotransmitters, that acts on the neurosecretory cells by a negative feedback mechanism (16).

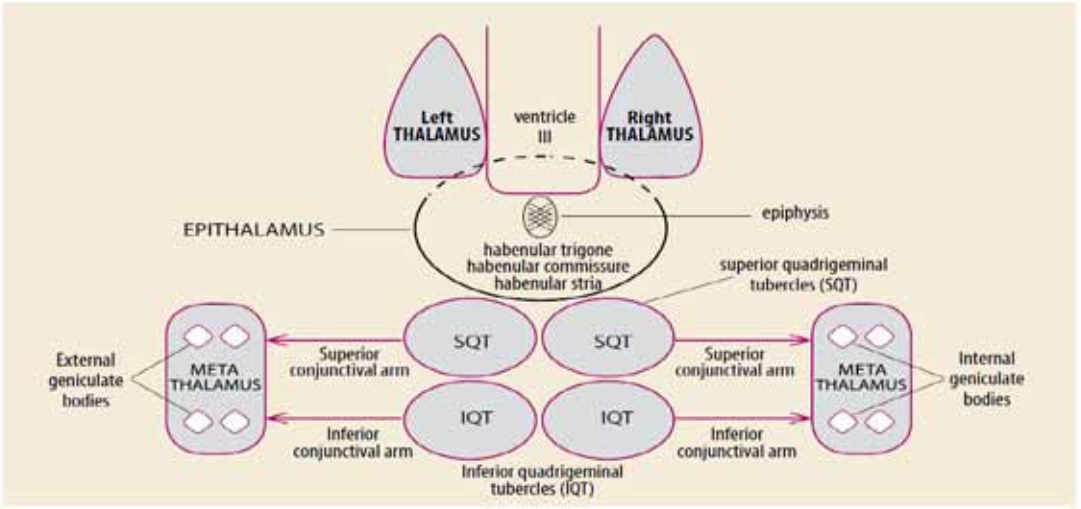

Fig.6 Epithalamus, metathalamus. Topography and connection pathways (image from the Treaty of Clinical Sexology)

Through neuromodulators that determine the non-synaptic communication between neurons released at the neuronal synapses and received by the receptors for the astrocytes neurotransmitters, the most numerous glial cells of the brain.

I mention that the astrocytes represent approximately 17% of the structure of the cerebral cortex, they are the largest and have many extensions.

Inside the grey matter we find the protoplasmic astrocytes, while the fibrous astrocytes are in the white matter.

Astrocytes provide neurons with energy and maintain homeostasis outside the cells and a particular pH and regulate the synapse formation (synaptogenesis). Astrocytes also play a role in the establishment of the chemical mediators.

I mention the fact that at the level of the neurohormones and neuromodulators, the biopotential action turns into information that reaches the cerebral cortex from the hypothalamus, thereby integrating the body's functionality as a whole.

The excitations of the hypothalamus determine the libido stimulation, and by the interest in the posterior part it stimulates in general sexual sensations.

Opioid peptides also lie in the hypothalamus, such as the enkephalins, the endorphins, and the dimorphines involved directly in the regulation of the neurosecretory system releasing neuromodulators such as the endogenous opioids, which reduce or remove the pain during sexual intercourse, favouring copulation and reaching orgasm more easily.

The hypothalamus has countless connections with parts of the brain that play a role in triggering an erection, mostly through the median preoptic nucleus which otherwise is more developed in male than in female (11.)

The influence of the hypothalamus (lateral mammillary nuclei, the medial preoptic area, the ventral medial nuclei, the infundibular area) on sexual behavior in rats was proven long time ago.

Thus, bilateral injuries of lateral mammillary nuclei of the mammillothalamic beam and the partial injuries of the fornix causes the disappearance of the female sexual behavior during estrum.

The injuries of the median hypothalamus and of the infundibular area causes the atrophy of the pituitary gonadotropic cells, then producing testicular injuries in the anatomical testicular structure, which affect the sexual behavior.

Moreover, the posterior hypothalamus injuries make the treatment with androgens or gonadotropin hormones unnecessary.

The connections of the hypothalamus are made through the afferent fibres that come from all cortical regions, especially from the cortex, through cortico hypothalamic fibres coming from the frontal lobe and the temporal premotor area, fields 6, 9, 11, and efferent fibres linking all floors of the central nervous system.

The cerebral cortex may bring an excitation or an inhibition action of the hypothalamus.

The hypothalamus has direct connections with the thalamus (anterior nuclei), through the retinohypothalamic fibres and, from here,

they reach the cerebral cortex through thalamic-cortical fibres.

The posterior hypothalamus is connected with the Sympathetic Autonomic System, and the anteriorlateral hypothalamus is connected with the parasympathetic system.

So, it controls the organovegetative reflexes, such as the blood circulation, the excretion, the digestion and the genital activity. It is linked by afferent pathways with the subcortical areas (the striatum, globus pallidus, the uncertain area, the nucleus of the amygdala through stria terminalis), the reticular substance and the spinal cord.

As noted, it has close functional and topographic links with the pituitary gland, which is located at the base of the diencephalon, the rod of the pituitary gland continuing with the infundibulum and the diencephalon tuberian region.

The direct nervous connection is via the supraoptic pituitary, paraventricular pituitary and tuberoinfundibular bundles etc., the pituitary neurosecretory being deposited in the posterior lobe.

This connection is done by the magnocellular extensions that allow the control of the posterior pituitary gland, and the anterior pituitary gland is controlled by the neurosecretory parvocellular extensions towards the median eminence.

This explains the hypothalamus action on the gonads (hormones, ovulation, and spermatogenesis) regarding the establishment of the pregnancy, the development of the product of conception, the onset of labor, sexual behavior, etc.

The hypothalamus is linked to the retina, a derivative of the brain, through the retinohypothalamic fibres of the optic chiasm, light pulses, which turn into nervous influx, directly influencing the autonomic system, and through the pituitary gland, explaining, for example, a specific sexual behavior manifested by the hyperexcitation of people exposing to the sun in warm areas.

The hypothalamus is linked to the limbic lobe and the midbrain, playing a role in regulating the sexual behavior (11,14).

Adenohypophysis

The adenohypophysis it is connected to the hypothalamus by the pituitary-port vascular system located in the pituitary stem (described by the Romanian Gr. T. Popa. in 1930).

The secreting cells produce 7 protein hormones, of which 3 with direct tissue action. Neurotransmitters such as the dopamine, essential in the sexual intercourse and produced by the neurons of the tuberoinfundibular system, the acetylcholine, the serotonin and the histamine, producing an inhibition or excitation effect, are stored in the adenohypophysis and the hypophyseal portal system.

Together with the neuropeptides they act on the neurosecretory cells of the astrocytes, which have specific receptors for the neurotransmitters that come in different anatomical pathways activated by different stimuli and, thus, explaining the feedback mechanism, which regulates the secretion thereof.

Relating to the morphophysiological condition of the individual, a neurotransmitter can be modified by another neurotransmitter.

A clear example is the circadian rhythm of the menstrual cycle, which determines a female's increased libido in some periods namely: the premenstrual, menstrual, postmenstrual periods. By the hypophyseal portal system, the hypothalamus through the gonadotropin-releasing hormone and partially the dopamine, synthesized particularly in the arcuate nucleus and the *substantia nigra* controls the gonadotropic function of theadenohypophysis, acting on specific receptors.

At the level of the pituitary gland they determine the synthesis and the release into circulation of the pituitary gonadotropins, which will act upon the gonads, inducing the synthesis and secretion of sex hormones, the hypothalamus being, thus, directly involved in the determinism of the sexual motivation.

Neurohypophysis

Derived from an expansion of the diencephalon, it is the place where certain neurohormones synthesized in the nuclei of neurons in the hypothalamus and secreted by supraoptic nuclei (vasopressin) and paraventricular (oxytocin) are deposited.

The neurohormones bind to specific polypeptides as the neurophysin 1 and 2 and are released in the circulatory system. Oxytocin, Vasopressin and Gonadotropin Releasing Hormone have a direct action on the gonads.

Thus, the oxytocin increases the libido, the volume of the seminal fluid, the process of spermatogenesis, and causes the uterine contractions in female acting on the receptors in the myometrium, maintaining an active labor on the pregnant uterus at the end of gestation and favours the milk ejection of the postpartum woman.

Gonadotropin Releasing Hormone (GnRH) is a hypothalamic neurohormone stimulating the pituitary gland. This decapeptide is secreted by the arcuate nucleus and the medial preoptic nucleus and is fixed to the cell receptors, and by mediating the cyclic monophosphoric acid it triggers the synthesis and release of FSH and LH, which act on the testicular tissue, hormones whose secretion is inhibited by the indolaminergic system.

The pituitary activity is neurogenic, controlled by the gonadotropin-releasing hormone, which has a pulsatile secretion (0.5-1 pulse/hour), from puberty to the end of the gonadal function and which by the neuromodulation effect stimulates the synthesis and release of the pituitary gonadotropins.

The gonadotropin-releasing hormone is secreted by a circadian rhythm modulated by serotonin, but also by the humoral path compared with the estradiol and testosterone blood levels, after their conversion to dihydrotestosterone and flavouring E2 in steroid sensitive brain cells that have the strongest inhibition of GnRH, statins blocking the synthesis and release of hormones or gonadotropins.

Chemical regulation is done through cells that have specialized receptors for steroid hormones and that undergo alkylating and fixing on small pericarions, the dopamine being the chemical mediator of these processes. This system is controlled by a long and short feedback mechanism.

There is a biorhythm control of the pulsatile secretion of LH and FSH with monthly and ultradian biorhythm in female and ultra-

dian biorhythm in male.

The LH-RF and RF-FSH secretion is given by the predominant action of one of the two hypothalamic centres, located in the medial dorsal nucleus, tonic centre and preoptic nucleus with a phasic centre.

Also, the secretion of these hormones acts on the two centres, by the short feedback mechanism, the phasic centre being the trigger centre. In turn, the gonadal hormones induce and develop the sexual motivation, the individual's potency, the libido and erection, the orgasm, and by the formation of gametes they intervene directly in the process of procreation. They induce the ovulation and stimulate spermatogenesis.

The dopamine, a monoamine hypothalamic neurohormone and independent neurotransmitter in the extrapyramidal system, namely the only one that does not have a peptide structure, reduces the release of prolactin (a polypeptide hormone, that inhibits the activity of the gonads directly and indirectly), thus stimulating the sexual activity.

The dopamine stimulates the adrenergic receptors, increases the blood pressure or the blood flow in coronary and renal vessels- increasing diuresis, and viscera vascularization, as net positive effects observed to the sexual intercourse. It also increases the sexual activity (libido, erection, potency, sexual behavior) by increasing the secretion of gonadotropin hormones.

The prolactin synthesized in the adenohypophysis controls the secretion of dopamine, having an inhibitory role.

I mention that hyperprolactinemia is stimulated by the primary hypothyroidism, where the TSH level is increased and the TRH level is low, by endogenous opioid endorphins, which support work in conditions of stress, thus explaining one of the causes of sexual dysfunction in male and female.

Neurosecretory cells also have a double coordination, through a direct mechanism, through the links that they have with the CNS (cerebral cortex, diencephalon, limbic system, the spinal cord) and indirectly through the mechanism of negative feedback when exceeding the normal constant values of the steroid hormones in the gonadostat by a superior command from the cerebral cortex, adapting to a proper sexual behavior.7

In practice, there is, as we can see, a direct neuroregulation of the sex hormones, through the CNS segments connections (cortex, limbic system, hypothalamus, midbrain, spinal cord) and an indirect neuroregulation, by neurohormones and neuromodulators, neuronal products of the brain by which they transmit information to the pituitary gland, which by the release of FSH and LH will control the gonads secretion.

The administration of medication influences the hypothalamic neurosecretion, the classic example being that of blocking the ovulation by oral contraceptives or atropine, as the administration of medication through the content of dopamine antagonistic substances with predominant peripheral effect of its receptors and the stimulation of the prolactin release.

In turn, the pulsatile pituitary secretion of gonadotropins is primarily dependent on the circulating values of the testosterone in male, and the estrogens in female, whose serum concentration depends on the periods of the menstrual cycle.

The brain commands the adenohypophysis regulation by the hypothalamus (the hypophysiotropic area between the optic chiasm and the mammillary bodies).

The medio-cyclical secretion of LH stimulates the hormone production of the yellow body and inhibits the production of estrogen hormones amid the menstrual cycle, triggering the ovulation controlled by the hypothalamus through the Release Regulating System, in a different way than in male, where the spermatozoa are released by the ejaculation during the fertilizing coitus.

By a reflex act, due to a strong excitation of the female during the sexual intercourse, the ovulation may occur exceptionally (reflex hyperovulation), thus explaining why the female can get pregnant outside the period of increased fertility.

There are cases cited in the literature when the female got pregnant right during the menstrual period, or within the same menstrual cycle, and two pregnancies resulted from different males (black and white).

In male, the LH intervenes directly in the testicular interstitial tissue stimulation, namely in the development of testosterone involved in the FSH induced spermatogenesis.

I mention the fact that androgen hormones, the testosterone in particular, influence the nervous and vascular activity, as a response to the erotic stimuli, the decrease of testosterone secretion also causing the decrease of the sexual appetite.

In addition to morphological testicular changes, the testosterone deficiency can also be determined by kidney diseases, diabetes, obesity, mental illness with depression and anxiety, tension in the couple, adrenal insufficiency, hypothyroidism or medication, drugs and smoking.

The testosterone is secreted by biorhythmic release, with variations within 24 hours, with elevated values in the early morning. The testosterone reaches the highest level between the ages of 25 to 30, and afterwards it gradually declines by 1%-2% per year, with a more pronounced decrease after the age of 50, and with more important decrease values after the age of 70.

FSH receptors are located in the ovarian follicle and the Sertoli cells of the seminiferous tubules.

The FSH stimulates the follicular development and estrogen production, namely the epithelium of the testicular seminiferous tubules required for spermatogenesis.

Regarding the relationship between FSH and LH, I recall the fact that it has been proven over 50 years ago that the LH is ineffective if it is not preceded by FSH.

In turn, the sex hormones, through their action on the cerebral cortex, influence the sexual behavior.

A favourable penile reaction was obtained by stimulating certain hypothalamic points, and damages to the hypothalamus caused an erectile dysfunction.

The Limbic Lobe (The Limbic System)

Due to its function, the limbic system (LS) causes normal sexual behavior, heterosexual, through the mechanism of selective inhibition of the endogenous factors, namely genetic and psychic factors, agitation,

aggression, shyness, emotion, etc.

It modulates the quality and quantity of the hypothalamus structures activity and establishes a sexual behavior according to the genetic sex and the endogenous, and exogenous particularities of the individual.

It controls the neurosecretion of the hypothalamus, modulating the LH and FSH secretion of the adenohypophysis.

According to F. Dock, the posteriomedial corticalamygdala plays a stimulating role, and the anteriormedial cortical-amygdala plays an inhibitory role, virtually controlling the secretion of pituitary gonadotropins. (17)

Temporal lobe damages cause major sexual deviations, aberrant sexuality with an uncontrolled hypersexuality (Klűver Bucy syndrome), necrophilia, homosexuality, bestiality, indecent sexual intercourse, namely in unacceptable places that determine public opprobrium etc.

The amygdala body is the location of violent behavior, with reactions of anger, aggression, fear and states of fear. It also plays an important role in the emotional regulation and the memorizing process of these moments.

I mention that any type of behavior may be accompanied by an emotional reaction, which is expressed somatically (motor), vegetatively and emotionally.

In this context, the emotional distress, well represented in the interpersonal sexual relationship, manifested by aggression, triggered by a specific situation, can cause injuries such as septal limbic injuries, injuries of the hypothalamus, the centres responsible for producing these states being in the grey midbrain matter and the perifornical hypothalamic nucleus.

The amygdaloid body is the richest in enkephalins, and also dopamine, glycine (synthesized in the septal nuclei), acetylcholine, serotonin, noradrenaline, which thereby removes the state of anger and aggressiveness triggered by the amygdala, establishing by the LS a balanced behavior.

The pyramidal neurons of the cerebral cortex, hippocampus, amygdala, are the largest neurons in the brain, with the diameter of 10-50 μm, but there are also some that are larger than 100 μm. Their larger area determines the ability to process and integrate more information.

At the level of these neurons, that use the glutamate as excitatory neurotransmitters and the amino butyric acid, as inhibiting neurotransmitters, the excitatory pathways end in the dendrites, and the inhibitory pathways end in the axon.

The septal nuclei, located at the base of the *septum pellucidum*, have a role in the sexual behavior, procreation and aggressive behavior because of external stimuli. The hippocampus is the centre of the defence behavior, the control of the emotional states and recent memory.

The damages of the limbic archicortex or subcortical nuclei break the hormonal balance, causing functional disturbances in the human behavior. It inhibits gonadotropin secretion.

Depression also plays an important role in sexual dysfunction, which produces structural disorders in the hippocampus, amygdala and frontal cortex.

According to some authors, in depression the number of glial cell is reduced.

Conclusions

Sexual dysfunctions in men and women can be temporary or permanent.

In relation to the received information, the nerve centers regulate, coordinate and adapt the body's functions as a whole, whereas complex activities such as language, thinking, writing, memory, creativity or performing a normal sexual relationship are based on biochemical, biophysical and cerebral functional changes.

Neurons, the fundamental units of the Central Nervous System (CNS), conduct the information that they will change into bioelectrical impulses after processing, in the brain, respectively in it's external granular layer and that of the pyramidal cells, transmitting information to the cortical and subcortical areas.

The bioelectrical impulse is received and transformed, along its path from axon to dendrite, through neurotransmitters, chemiters located in the receptors of astrocyte, cells that provide energy to neurons, thus regulating synaptogenesis.

The sex identity, according to sexual dimorphism, ensures attraction to the person of the opposite sex.

The structure and, consequently, the different behavior in men and women is the result of the neurotrophic action of sex hormones on specific neurons, which it develops by activating intranuclear receptors with neurosteroids, modulating the brain's response to the correct choice, essential for procreation and perpetuation of the human species.

Disruption of the processes of human sexual dimorphism (differences between men and women) causes the appearance of individuals with major sexual deviations or intersexuality, respectively of people with abnormal sexual behavior (5).

Conflict of interest

The authors have no conflict of interest to make the declaration, had full access to all the data in the study and take responsibility for the accuracy of the data analysis.

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