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Review Article

Neurological Correlates and the Mechanisms of Expanded Pleasures in Women: Novel Findings on ESR

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Abstract

"*Pleasure principal*" is one of the most important driving forces of the human psyche. Kinds of pleasure in human beings include various satisfactions, such as food intake for the survival, satisfaction of the ego and higher cortical cognitive functions, sexual satisfaction and orgasm, satisfaction of basic physiological needs and peak experiences, such as love, satori-like experiences, and some mystical-like experiences. Pleasure phenomenon has some neural correlates, circuitries and neurotransmitter systems involved. Some pleasure centers have been defined in both animals and humans, such as ventral tegmental area (VTA), nucleus accumbens (NA), prefrontal cortex, hypothalamus, cingulate cortex, insula, while amygdala, hippocampus and some structures of the temporal lobe may have an auxiliary role. Mainly neurotransmitters dopamine (DA) and oxytocin (OXT) are the mediators of pleasure experiences in humans. During love, sexual pleasure and orgasm, those hedonic hot spots are activated, as also shown by fMRI techniques. Recently it was proposed that sexual pleasure can be expanded and there were reports on expanded orgasms (EO or ESR). Also, some researchers have reported that there are erogenous zones other than clitoris, while some non-genital orgasms have also been reported. ***Pudental, pelvic, hypogastric nerves and vagus*** control the orgasmic reflex in females. OXT, which is also a pleasure molecule, just like DA, also has some separate pleasure pathways. The limits and extents of female pleasure and orgasms have not been investigated thoroughly until recently. One of the extremes of female pleasures, ESR, has some specific neurological mechanisms which can be explained by using current data on female sexuality. There are different types of female orgasms: clitoral, vaginal, blended orgasms, EO and status orgasmus, which are still debated in the academic circles. This review discusses the possible neurological and neuropharmacological mechanisms of EO and ESR, using the informatics theory, as well.

Keywords: *ESR; Expanded Sexual Response; Expanded Orgasm; Oxytocin, Dopamine; Clitoral Orgasm; Vaginal Orgasm; Blended Orgasm; Pleasure Center; Ventral Tegmental Area; Nucleus Accumbens; DVZ; Deep Vaginal Erogenous Zones; G-Spot; A-Spot; Status Orgasmus*

Abbreviations

ASC: Altered States of Consciousness; DA: Dopamine; DSM-5: APA's Classifications for Mental Disorders; DVZ: Deep Vaginal Erogenous Zones; EO: Expanded Orgasm; ESI: Erotic Sensual Information Input; ESR: Expanded Sexual Response; fMRI: Functional Magnetic Resonance Imaging; HDSI: Hypersexual Disorder Screening Inventory; NA: Nucleus Accumbens; NC: Nucleus Caudatus; Non-ESR (NESR): Not Being an ESR Woman; OFC: Olfactory Cortex; OXT: Oxytocin; PC-Muscle: Pubococygeus Muscles; PFM: Pelvic Floor Muscles; PET: Positron Emission Tomography; PVN: Paraventricular Nucleus (Hypothalamus); rCBF: Regional Cerebral Blood Flow; TENS: Transcutanous Electrical Nerve Stimulation; VTA: Ventral Tegmental Area

Introduction

Even in 21st century female sexual response and female pleasure is still a mystery after 60 years of research since Masters and Johnson [1]. Masters and Johnson were the first medical researchers who investigated "*Human Sexual Response*" under laboratory conditions using objective scientific methods.

The medical literature and sex therapy have mostly been interested in and focused on the pathologies of human sexual behavior. Not much research and investigation have ever been done on the limits and extents of human female's sexual potentials, such as ***Expanded Sexual Response (ESR)*** which is a recently defined phenomenon on female sexuality. Cultures of the Far East, and the Dionysus Cult members in ancient Greece had investigated mostly the "*pragmatic aspects*" of the female sexuality starting from 6th century B.C. [2-9].

Actually, the main goal of sexology and sex therapy should be investigating the physiology, limits, extents of sexual behavior and pleasure, not only focusing on the pathophysiology of the patients as "the subject". "***All human population should be the subject of modern sex therapy***", not only patients suffering from vaginismus, anorgasmia or lack of sexual desire in women and erectile dysfunction or premature ejaculation in men. Today, in the Western world the average coitus duration does not exceed 4 - 6 minutes [8-11]; is it acceptable to define normal coitus duration as 5 minutes? Tantric and Taoist love making techniques point out that, by training, this duration can be broadened and the pleasure from coitus, for both men and women, can be amplified. Today, some phosphodiesterase-5 inhibitors (such as sildenafil and tadalafil) can pharmacologically extend this duration, showing that this hypothesis may be possible by means of using these medications; however, in the Taoist and Tantric techniques, it is claimed that men can be trained to that extent without any pharmacological agents [6-10].

After the sexual revolution starting from 1950's, many reports have been published about the possible extreme limits of female orgasms. Some studies, publications and books in the West after 1990's point out that female sexual response can be enhanced and expanded to certain levels by knowledge and training [4,8,10-20]. Expanded pleasure and expanded orgasms (EO) were first defined by Patricia Taylor in 2000 [14,21]. In the latest (2018) You Tube British documentary, entitled as ***"Never Ending Orgasms"***, some subjects mention about 50 - 60 orgasms attained in an hour.

During our surveys since 1991 and concentrated study on EO between the years 2010 - 2019, we (our research group) have defined Expanded Sexual Response (ESR) in the human female. This article focuses on the possible neurological and neuropharmacological mechanisms of ESR.

Pleasure principle

Pleasure is a consciousness state that human beings experience as enjoyable, satisfying, giving joy or worth seeking. It may include other mind states such as happiness, entertainment, enjoyment, ecstasy, and euphoria. Some of the former schools described the concept of pleasure as the *"pleasure principle"*, which was regarded as innate and instinctive. Pleasure was described as a kind of feedback mechanism that leads the organism to seek the conditions it has just found pleasurable, and to avoid past circumstances that caused pain, anxiety, depression and sadness [22].

Pleasure is a very subjective experience such that different people respond to various stimuli differently. Many pleasurable experiences are associated with satisfying basic biological drives, such as eating, surviving, sleeping, and sexual pleasure and orgasm [23].

Based upon the *"incentive salience"* model of reward, an intrinsic reward has two components: a ***"wanting"*** or desire component that is reflected in approach behavior, and a ***"liking"*** or pleasure component that is reflected in consuming behavior [23,24]. Stimuli that are naturally pleasurable and attractive are known as ***intrinsic rewards***; whereas stimuli that are attractive and motivate approach behavior, but which are not recorded in the genes are coined as *extrinsic rewards*. *Extrinsic rewards* (e.g. money, fetish objects, and sexy objects, the opposite sex for heterosexuals, other sexual pleasure objects, variations etc.) are rewarding as a result of a learned association with an *intrinsic reward* [23-25].

Pleasure principal is innate and it cannot be deleted or postponed; somehow it should be satisfied. Psychoanalysis schools named this inner driving force as ID. Humans tend to follow what brings pleasure and satisfaction or contentment to them; sexual pleasure and orgasm are one of the most intriguing phenomena in human life.

G-spots or hot spots in the brain?

Some pleasure regions have been identified in the human brain, mostly depending on animal experiments. Human beings have similar pleasure centers as the experimental animals do. Until today, *lateral hypothalamus, nucleus accumbens (NA), ventral pallidum, parabrachial nucleus, orbitofrontal cortex (OFC), cingulate cortex and insular cortex* have been defined as pleasure centers or ***"hot spots"*** [23-25]. Ventral Tegmental Area (VTA) can also be accepted as a pleasure spot, because it contains nearly 5000 dopaminergic neurons that project into NA and some other cortical structures [26]. Microinjections of *opioids, endocannabinoids, amphetamines and orexin* are capable of enhancing liking effect in these hotspots [24-27].

Sexual motivation, desire, pleasure and orgasm also originate from the same limbic reward-pleasure circuitry. Love, sexual pleasure and orgasm in *H. sapiens* are far more complicated phenomena compared to the *"mating"* of the laboratory animals, although the same neurochemicals participate in the induction of sexual pleasure, such as dopamine (DA) and oxytocin (OXT), similar to animals [26,28].

Komisaruk., *et al.* reported, from some fMRI studies, that during the orgasms induced by vaginal-cervical stimulation or clitoral stimulation, *hypothalamic paraventricular nucleus (where oxytocin is initially released), amygdala, hippocampus, nucleus accumbens (NA), nucleus Caudatus (NC), insula, preoptic area (where oxytocin is released), some basal ganglions, cerebellum, anterior cingulate gyrus, insular-parietal and prefrontal cortices* were activated [29-33]. By means of sophisticated technology and imaging techniques, now, we are able to see how human data, fits with the findings emerging from animal experiments.

In some cerebral blood flow, PET studies Georgiadis., *et al.* have found that during arousal and orgasm, some parts of the brain shut down and are deactivated, while some parts are activated. During orgasm orbitofrontal cortex of prefrontal cortex was deactivated; during arousal left inferior parietal lobule and post central gyrus are activated; however right amygdala and left fusiform gyrus, right mid temporal gyrus, inferior temporal gyri were deactivated. During orgasm, *left cerebellar vermis* (frontal lobe) is activated in both men and women. In women, during orgasm, *right insula*, was activated more intense than men. In regional cerebral blood low studies (rCBF), Georgiadis., *et al.* have found that during clitoral stimulation, blood flow was increased *at the right somatosensorial cortex*; during clitoral orgasm, rCBF was decreased at the left *orbitofrontal cortex, inferior temporal gyrus and anterior temporal lobe*; an increase of rCBF, was detected at the *caudate nucleus* (NC) and *cerebellar nuclei* [34,35] (Figure 1).

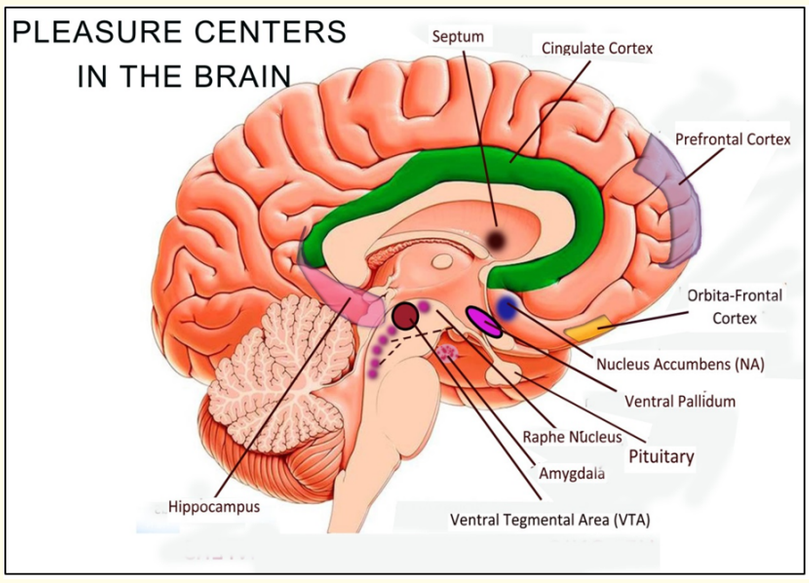

Figure 1: Pleasure Centers in the Brain. *Until now, the known pleasure centers have been identified as: VTA, NA, prefrontal cortex, lateral hypothalamus, septum, insula, ventral pallidum, orbitofrontal cortex, cingulate cortex, whereas hippocampus, amygdaloidal nuclei, dorsal raphe (and raphe nuclei), thalamus and hypothalamus are the auxiliary hedonic areas.*

The results coming from animal studies (mostly rats), have been tested in live human subjects by using very sophisticated imaging techniques, such as fMRI, show that, when there is pleasure the following areas of the brain may become activated [24-27,29,30-45] (Table 1).

• Thalamus and/or lateral hypothalamus • Nucleus accumbens (NA) • Ventral tegmental area (VTA) • Ventral pallidum • Insula	• Cingulate cortex • Prefrontal cortex • Orbitofrontal cortex • Septum
Auxiliary areas activating during sexual pleasure and orgasm	
• Hippocampus • Amygdala	• Anterior cingulate cortex • Dorsal raphe

Table 1: Pleasure areas of human brain activated during sexual pleasure.

Inside the brain at climax

Neuroimaging studies during sexual stimulation and orgasm

Komisaruk., *et al.* have done extensive research on the activation of brain regions, during stimulation of nipple, clitoris, vagina and cervix, arousal and orgasm by using fMRI technique [30-33,46]. By self-stimulation of clitoris, vagina and cervix, the corresponding of sensory cortex and cortex region overlapping with the innervation of ***pudental, pelvic and hypogastric nerves,*** were activated [30-33]. Prior to orgasm, they have found that *amygdala, hippocampus, nucleus accumbens, hypothalamus, septum, anterior cingulate, insula and VTA* were activated with also dorsal raphe [30-33].

Orgasm

At orgasm, *Nucleus Accumbens* (NA) and *VTA areas* were both activated. These regions play crucial roles in dopaminergic transmission, reward-pleasure reaction; dopaminergic neurons in VTA project into NA, where dopamine release onto D1-like receptors creates cascades of intracellular chemical reactions that may induce long term potentiation (LTP), learning, and may have influences on synaptic plasticity, memory and behavior. Dopaminergic agonists can promote sexual response, pleasure and orgasm; while dopaminergic antagonists attenuate sexual response and orgasm [30].

The *anterior cingulate and insula* are activated at orgasms. During orgasm, also, the amygdala, hippocampus and hypothalamus are activated in humans. Another region which is activated during, particularly, female orgasm is *the paraventricular nucleus of hypothalamus* (PVN). This is an area where ***oxytocin*** is produced. ***Oxytocin*** may be essential for the start of a female orgasm, because it starts orgasmic contractions in the uterus. PVN and *oxytocin* may also play roles in male erection and ejaculation, acting as sympathetic preganglionic excitatory neurotransmitter [33]. Thus, *oxytocin* plays important triggering roles in both male ejaculation and female orgasm (Table 2 and Figure 2).

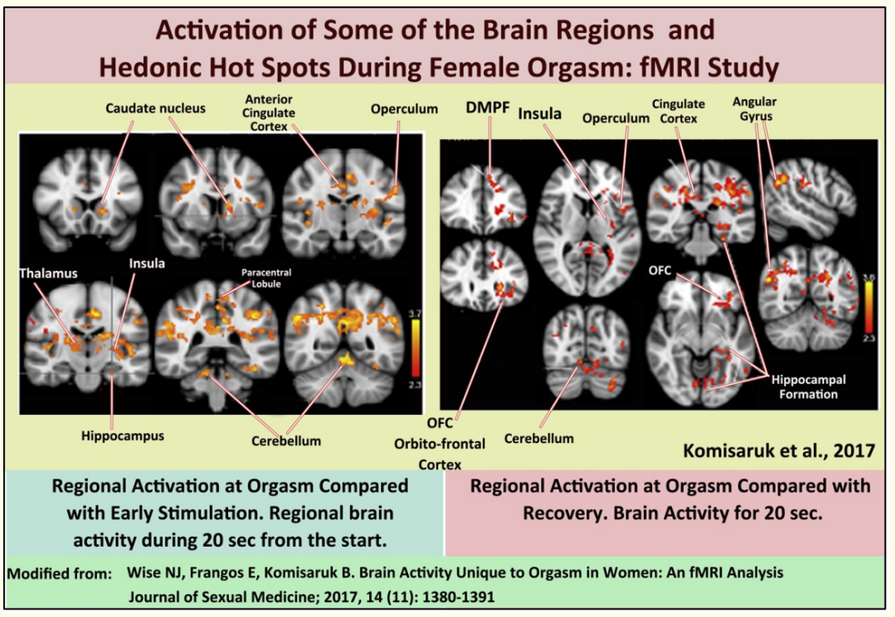

Figure 2: Left: Regional Activation at orgasm compared with early stimulation. *Regional brain activity during the 20 seconds at the initiation of stimulation. Right: Regional activation at orgasm compared with recovery. Brain activity during 20 seconds immediately after the button press, subtracted from 20 seconds of activity starting at the onset orgasm. Published with the permission of Prof. Barry Komisaruk [32,33].*

Areas activated during orgasm	Possible function of the brain regions
Ventral Tegmental Area	• Pleasure-Reward circuitry • Projections of many dopaminergic neurons to NA, prefrontal cortex, cingulate, ventral pallidum • Dopaminergic pleasure reaction • Love
Nucleus Accumbens	• Release of dopamine • Sexual conditioning and learning • Fantasy and variations • Remembering old events • Association • Imagination • Novel sexual pleasure objects • Pavlovian conditioning • Love
Anterior Cingulate	• Self-knowledge • Subjective feelings • Perception of the self • Perception of someone's own pleasure • Love
Insula	• Emotion • Romantic feelings • Romantic love • Anger • Empathy • Pleasure and happiness • Love
Amygdala	• Emotions • Sexual aggressiveness • Sympathetic physiological effects • Fantasy • Game-role play • Increases heart beat and blood pressure • Fear • Anxiety • Aggressive behavior • EQ • Love
Hippocampus	• 3-D imagination • Fantasy • Sexual game-role play • Memory • Learned sexual acts • Pavlovian conditioning Emotions • Love
Hypothalamus	• Increases heart beat and blood pressure • Sympathetic physiological effects
PVN-D4 receptors	• Release of oxytocin into pituitary and into the brain (CSF) • Oxytocin triggers both male ejaculation and female orgasm • Love

***Table 2**: The cortical and limbic brain structures that are activated during orgasm and their functions (human fMRI studies).*

Neurochemistry of pleasure

After years of research, we, now, know what neurochemicals are taking part in the induction of pleasure. Many neurotransmitters and hormones are working in similar ways in animals and humans, using the same receptor systems and similar cascades of molecular reactions. Sexual pleasure and orgasmic experience give euphoric, anti-depressant, anxiolytic, sedative and analgesic effects [8-12,12,47-49], mostly because of the rush of the following neurochemicals [7-11,45,50-56]:

- Dopamine
- Oxytocin
- Prolactin
- Epinephrine and norepinephrine
- Endorphins.

The effects of some neurotransmitters and hormones on sexual desire, arousal, libido and orgasm are summarized in the below tables (Table 3 and 4) and figures 3 and 4.

Males	Change in Sexual Function		Females	Change in Sexual Function	
Dopamine	↑↑↑	↓↓↓	**Dopamine**	↑↑↑	↓↓↓
Sexual Desire	↑↑	↓	Sexual Desire	↑↑↑	↓
Sexual Arousal	↑	↓	Sexual Arousal	↑↑	↓
Orgasm	↑↑	↓	Orgasm	↑↑↑	↓↓
Norepinephrine	↑↑↑	↓↓↓	**Norepinephrine**	↑↑↑	↓↓↓
Sexual Desire	↑	↓	Sexual Desire	↑	↓
Sexual Arousal	↑	↓	Sexual Arousal	↑	↓
Orgasm	↑	↓	Orgasm	↑	↓
Serotonin	↑↑↑	↓↓↓	**Serotonin**	↑↑↑	↓↓↓
Sexual Desire	↓	**?**	Sexual Desire	↓	↑
Sexual Arousal	↓	**?**	Sexual Arousal	↓	↑
Orgasm	delayed		Orgasm	**↓↓ - Ø**	↑↑
Acetylcholine	↑↑↑	↓↓↓	**Acetylcholine**	↑↑↑	↓↓↓
Sexual Desire	↓	↑	Sexual Desire	↓	↑
Sexual Arousal	↓	↑	Sexual Arousal	**?**	**?**
Orgasm	↓	↑	Orgasm	↓↑	**?**
Oxytocin	↑↑↑	↓↓↓	**Oxytocin**	↑↑↑	↓↓↓
Sexual Desire	↑	↓	Sexual Desire	↑	↓
Sexual Arousal	↑	↓	Sexual Arousal	↑	↓
Orgasm	↑	↓	Orgasm	↑↑↑	↓
Histamine	↑↑↑	↓↓↓	**Histamine**	↑↑↑	↓↓↓
Sexual Desire	↑	↓	Sexual Desire	**?**	↓
Adrenaline	↑↑↑	↓↓↓	**Adrenaline**	↑↑↑	↓↓↓
Sexual Desire	↓	**?**	Sexual Desire	↑	↓
Sexual Arousal	↓	**?**	Sexual Arousal	↑	↓
Orgasm	Premature	↑	Orgasm	↑↑	**↑↑?**
Opioids	↑↑↑	↓↓↓	**Opioids**	↑↑↑	↓↓↓
Desire-Arousal	↓	↑?	Desire-Arousal	↓	↑?
Orgasm	↓↑	↑?	Orgasm	↓↑	↑?

Table 3: Correlation of neurotransmitters and sexual behavior; desire, arousal, orgasm. *Arrows pointing up depict the increase; arrows pointing down depict decrease. Here in males and females, during the increased or decreased status of the neurotransmitter, what happens to sexual desire, arousal and orgasms are evaluated [7,8,11,17,26,28,30,45,47,92].*

Males	Change in Sexual Function		Females	Change in Sexual Function	
Testosterone	↑↑↑	↓↓↓	**Testosterone**	↑↑↑	↓↓↓
Sexual Desire	↑	↓	Sexual Desire	↑	↓
Sexual Arousal	↑	↓	Sexual Arousal	↑↑↑	↓
Orgasm	↑	↓	Orgasm	↑↑	↓
Estrogen	↑↑↑	↓↓↓	**Estrogen**	↑↑↑	↓↓↓
Sexual Desire	**?**	**?**	Sexual Desire	↑**?**	↓
Sexual Arousal	↑	**?**	Sexual Arousal	**?**	↓
Orgasm	**?**	**?**	Orgasm	↓↑**?**	**?**
Progesterone	↑↑↑	↓↓↓	**Progesterone**	↑↑↑	↓↓↓
Sexual Desire	↓	**?**	Sexual Desire	↓	↑
Sexual Arousal	↓	**?**	Sexual Arousal	↓	↑
Orgasm	**?**	**?**	Orgasm	↓	↑
Prolactin	↑↑↑	↓↓↓	**Prolactin**	↑↑↑	↓↓↓
Sexual Desire	↓	↑	Sexual Desire	↓	↑
Sexual Arousal	↓	↑	Sexual Arousal	**?**	**?**
Orgasm	**?**	↑	Orgasm	↑	↓
Oxytocin	↑↑↑	↓↓↓	**Oxytocin**	↑↑↑	↓↓↓
Sexual Desire	↑	↓	Sexual Desire	↑	↓
Sexual Arousal	↑	↓	Sexual Arousal	↑↑	↓
Orgasm	↑	↓	Orgasm	↑↑↑	↓
Pheromones	↑↑↑	↓↓↓	**Pheromones**	↑↑↑	↓↓↓
Sexual Attractiveness	↑	↓**?**	Sexual Attractiveness	↑**?**	**?**
SHBG	↑↑↑	↓↓↓	**SHBG**	↑↑↑	↓↓↓
Sexual Desire	↓	↑	Sexual Desire	↓	↑
Sexual Arousal	↓	↑	Sexual Arousal	↓	↑
Orgasm	↓	↑	Orgasm	↓	↑
Cortisol	↑↑↑	↓↓↓	**Cortisol**	↑↑↑	↓↓↓
Sexual Desire	↓	↑	Sexual Desire	↓	↑
Sexual Arousal	↓	↑	Sexual Arousal	↓	↑

Table 4: Correlation of hormones and sexual behavior; desire, arousal, orgasm. *Arrows pointing up depict the increase; arrows pointing down depict decrease. Here in males and females, During the increased or decreased status of the hormones, what happens to sexual desire, arousal and orgasms are evaluated [7,8,11,17,26,28,30,45,47,92].*

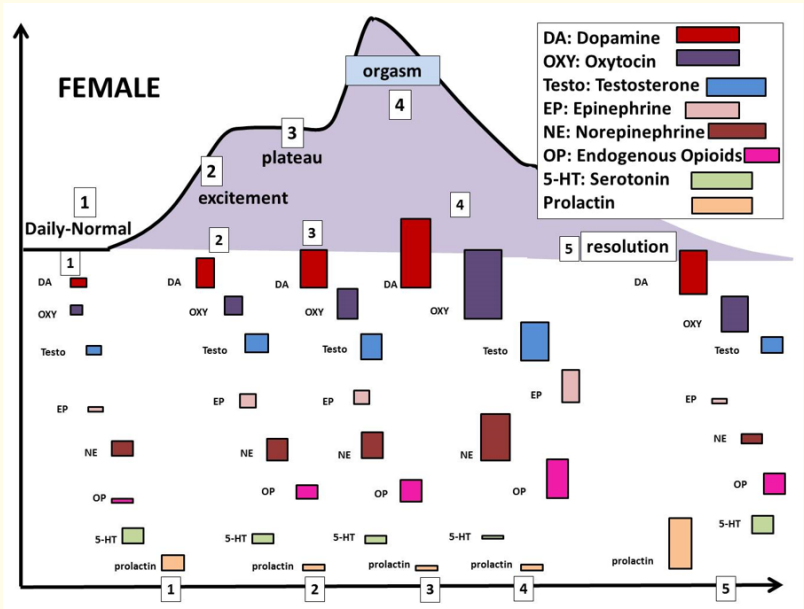

Figure 3: The release of various neurotransmitters during the phases of male and female sexual response cycle; control, excitement, plateau, orgasm. *The height of the rectangle depicts the concentration levels of various neuro transmitters in the brain and CSF. DA: Dopamine; OXY: Oxytocin; Testo: Testosterone, EP: Epinephrine; NE: Norepinephrine, OP: Opioids; 5-HT: Serotonin; Prolactin are shown. The data shown in the graph is not taken from an actual experiment, however, out of the data from the literature an approximate extrapolation and graphic depiction is made. The rectangles are the possible approximate concentrations of the neurotransmitters; they are merely assumptions to visualize the alterations of neurotransmitters during the sexual response cycle.*

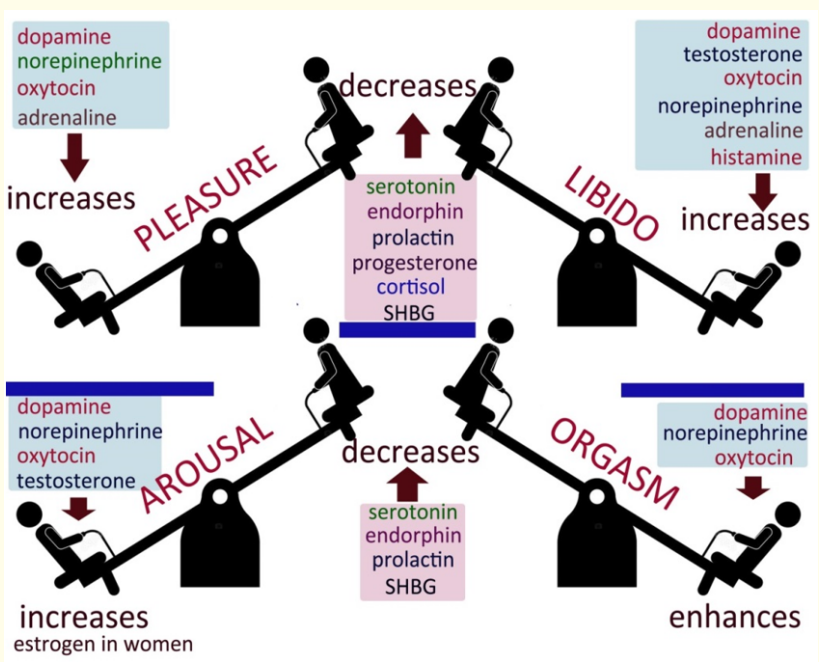

Figure 4: The balance between neurotransmitters and how they influence pleasure, libido, arousal and orgasm. *Down arrows show increase and a heavier effect in a seesaw, upward arrows show the decrease and a lighter effect in a seesaw. For instance at top left, dopamine, oxytocin, adrenaline increase the pleasure, compared to serotonin, endorphin, prolactin, progesterone, cortisol and SHBG that decrease the pleasure. At bottom right, serotonin, endorphin, prolactin, SHBG decreases the pleasure and intensity during orgasm; while dopamine, norepinephrine and oxytocin increase the pleasure and intensity during orgasm [26,28].*

Novel findings on female anatomy

The arguments and discussions about G-spot

Many reports, surveys and laboratory observations revealed that 40% to 60% of the subjects reported a sensitive and pleasurable area around 11:00-1:00 (clockwise) position of the anterior wall of vagina at the mid-length of urethra (See figure 5) [7-11,30,47-50,57-60].

Recently, an internet survey among 5000 women in England (2011), showed that nearly 72% of the correspondents admitted to have G-Spots; however, 50% of these women were able to describe the exact coordinates of G-Spot, while 35% described it deep inside, 15% located it elsewhere (http://www.orgasmsurvey.co.uk/pressrelease.htm). This study also confirms our hypothesis on DVZ, since 35% of the 72% of the study group (1260 women out of 5000 women), revealed that they have sensitive zones deep inside the vagina, assuming that DVZ was G-Spot, since they did not have any idea about the definition and sensitivity of A-Spot, O-Spot, Cervix and PFM.

Today there are still arguments about whether the G-Spot exists or not, however, many studies and surveys showed that, although the frequency alters, from 35 - 40% to 50 - 60% of the female population confirm to have G-Spots and accept the contributions of the stimulation of G-Spot to the development of female orgasm, particularly during vaginal orgasms.

Deep vaginal erogenous zones (DVZ)

Recently, other erogenous zones in the deep structures of pelvic area and vagina have been described [7-11,47-51,61-63] We have also investigated the possible existence of such areas in our surveys and other research projects; we have come across the description of such sensitive areas that may contribute to the development of female orgasm in some women [10,11]. The descriptions of DVZs were as follows (Table 5 and Figure 5).

G-SPOT (Grafenberg's Spot): The localization of G-spot is at the anterior vaginal wall, 2.5 - 4 cm inside, under the mid ureteral length.
A-SPOT: A-Spot is at the anterior wall of vagina, 2 - 3.5 cm below anterior fornix, under the bladder.
O-SPOT: O-Spot is between the posterior vaginal wall and the rec-tum, 2 - 4 cm below posterior fornix
Cervix: Cervix is the collum (neck) of uterus.
Pelvic Floor Muscles (PFM-PC-Muscles): PFM are the muscle net-work between pubis and coccyx.

Table 5: The descriptions of the locations of deep vaginal erogenous zones (DVZ) by women, other researchers or literature.

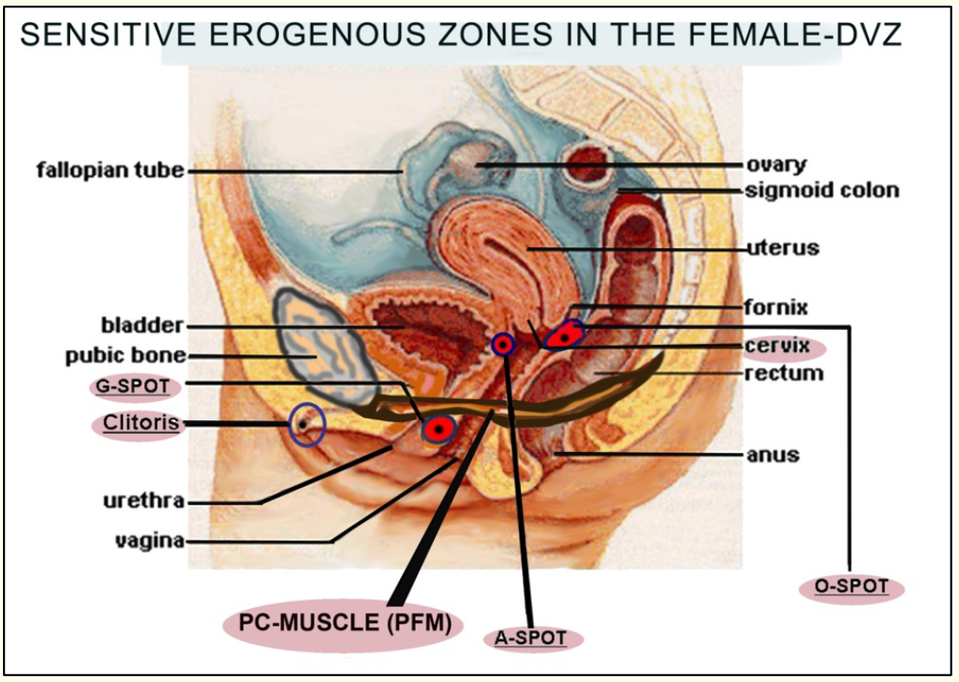

Figure 5: Deep Vaginal Erogenous Zones (DVZs)*. DVZ include: G-spot, PC muscle, inner clitoris, cervix, A-Spot, O-Spot. Those areas are depicted with red circles or ovals at different parts of female genitalia.*

Non-genital orgasms

Recently female orgasms of non-genital origin have also been defined [64-67]. Whipple and Komisaruk., *et al.* also defined imagery orgasms, in which they documented cases of women who claim they can experience orgasms just by imagery - without any physical stimulation. Their bodily reactions of doubling of heart rate, blood pressure, pupil diameter and pain threshold, responses that were comparable in magnitude to when the same women induced orgasms by genital self-stimulation [67-69].

Otto and Paget defined zone orgasms, while they claimed that *"zone orgasm occurred when a sensitive spot or zone on the body of a person not usually used for erotic stimulation is stimulated to a peak"* [70,71]; they published the results of 216 people who filled out a questionnaire containing the zone orgasm item, 31 women and 8 men stated that they had experienced a zone orgasm, for instance experiencing an orgasm from having their neck licked, their fingers sucked or their thigh/groin area stroked [70]. Otto, Paget and Whipple and Komisaruk defined various different kinds of orgasms, such as mouth orgasms; hand and shoulder orgasms; breast and nipple orgasms; anal orgasms; birth orgasms; sleep and dream orgasms; phantom orgasms; hemiplegic orgasms in women; paraplegic orgasms in women; epileptic orgasms during seizures [67,70,71]. In most these orgasms, the undiscovered neurological connections, spino-thalamic pathways, innervation by nerves other than **pudental nerve**, such as **hypogastric n. and vagus**, were questioned.

Expanded pleasures and ESR

Patricia Taylor, who defined expanded orgasms (EO) first time, reported that the EO or ESR (expanded sexual response) orgasm duration was 0.2 to 60 minutes in 22 female subjects [14,21]. In our studies and surveys between 2010 and 2019, we have come across many cases of EO; more than 120 cases filled our ESR scale as being ESR women [10,11,72]. The women who experienced ESR orgasms claimed that during a *status orgasmus* or prolonged ESR orgasm, which lasted from a couple of minutes to 10 - 15 minutes or more, they had had 20 to 30 minor orgasms in a train of multiple orgasms [8-11,47-51]. These figures were beyond the known and the published limits and the normal recorded physiology of the female orgasms.

According to *'Cosmo Report'* among 10,000 American women, 14.8% of women could attain only one orgasm, 65.9% could have 2 to 5 orgasms, 13.4% could reach to 6 to 10 orgasms, while only 5.9% could attain 11 or more orgasms during one love making session [73]. Our surveys point out that 6.1% (Kadınca Report, 1993; N = 1534), 7.7% (Hülya Report, 2003; N = 706) and 4.3% (Istanbul Report, 2013 - 2017, continuing; N= 949) of Turkish women can attain more than 11 orgasms during a love making session [17-20]. Thus, in different cultures we have substantial data which confirms the existence of a group of nearly 4 - 7% of women who can attain more than 11 (up to 20 or more) orgasms in a couple of hours during one love making session. Depending on the data from many other worldwide surveys and our surveys directed us to have an estimate of developing ESR, ***"to be at the ranges of 10 to 15% in the women population"*** after a creating a mathematical model and various calculations of probability [10,11]. Besides, in many of the ESR cases, we have come to the conclusion that ESR orgasms can be learned and women can be trained to achieve prolonged ESR orgasms.

Expanded sexual response (ESR): Definitions

We have recently defined Expanded Sexual Response (ESR) in various scientific meetings and papers after an international ongoing survey, which is still continuing [17-20].

ESR has been defined as: *"being able to attain long lasting and/or prolonged and/or multiple and/or sustained orgasms and/or status orgasmus that lasted longer and more intense than the classical orgasm patterns defined in the literature".* In the Eastern, Chinese, Indian and Tantric literature similar enhanced orgasmic experiences of females have been reported as well as some Western reports of the last decades (See table 6).

• The ESR women experienced vaginal, clitoral and blended orgasms, as described by Ladas., *et al*.	• ESR women described a phenomenon called G-Spot orgasms.
• The ESR women experienced multiple orgasms in most of their sexual activities.	• ESR women described sensitive erogenous zones in their genitalia other than clitoris.
• The ESR women were able to attain long lasting and/or prolonged and/or multiple and/or sustained orgasms and/or status orgasmus that lasted longer than the classical single orgasm and/or multiple orgasm patterns defined in the literature.	• The ESR women were measured to have to have strong pelvic floor muscles (PFM) compared to NESR women; Kegel Perineometer measurement showed that their PC muscle strength was > 20 milibars.
• ESR women admitted to have a form of altered states of consciousness (ASC) during some of their prolonged orgasms and/or status orgasmus.	• ESR women masturbated more frequently compared to NESR women.
• The libido of ESR women was very high compared to NESR women.	• ESR women had erotic fantasies more frequently than the NESR women.

Table 6: The main characteristics of women with ESR and expanded orgasm experience.

Other definitions we have presented include as follows (Figure 6):

- **Single Female Orgasm:** Clitoral or vaginal orgasms. Clitoral orgasm is mediated by pudental nerve; vaginal orgasm is mediated by pelvic nerve. It has long been debated that some vaginal orgasms are triggered by Grafenberg's Spot (G-Spot) [58]. Clitoral orgasm is generally perceived in a local genital area, as bursting; 80 to 90% of women have experienced it. Vaginal orgasms are said to be more satisfactory and more radiating occurring in 30 to 35% of the female population according to Hite and Cosmo Reports [73,74].
- **Multiple Orgasms:** Multiple orgasms can be either clitoral or vaginal or induced by both. There is a successive train of orgasms, generally increasing in amplitude and intensity gradually.
- **Blended Orgasms:** Blended orgasms can be mediated by the orgasm triggering mechanism of both clitoris and spots of vaginal origin (DVZ: such as G-Spot, A-Spot, O-Spot, PFM or Cervix). A blended orgasm is much more intense than a clitoral or vaginal orgasm alone. Both pudental and pelvic nerves mediate the triggering of blended orgasm. Blended orgasms are much more satisfactory and they are multiple orgasms [30,58].

Definition of status orgasmus

Status orgasmus is the continuous form of blended orgasms and/or clitoral/vaginal orgasms that last for starting from 1 minute to 10 - 15 minutes (or more). During status orgasmus a continuous orgasmic state is experienced and very few women are believed to achieve status orgasmus state. *Status orgasmus* can be seen in vaginal and clitoral orgasms, however mostly it is seen as an expanded/extended form of blended orgasms, in which both clitoral and vaginal orgasm reflexes are triggered at the same time. Similar orgasmic states and full body orgasms are also defined in Tantric literature. The duration may change from woman to woman. *Status orgasmus* was first defined by Masters and Johnson as lasting for 43 seconds in a woman in 1966. Today it is estimated that *status orgasmus* continues for 1 to 2 minutes, while it may last for 10 to 15 minutes, a prolonged and extended orgasmic state which ends by a giant orgasm (Big-O) that gives a big relief and satisfaction at the end. In most of the *status orgasmus* experiences there is usually a refractory period of 10 to 15 minutes. The number of minor orgasms in a *status orgasmus* may exceed from 5 - 10 to 20-30 (some women claim that this quantity goes up to around 50). In *status orgasmus* it is thought that pudental, pelvic, hypogastric and vagal nerves mediate the triggering mechanism at the same time (Figure 6).

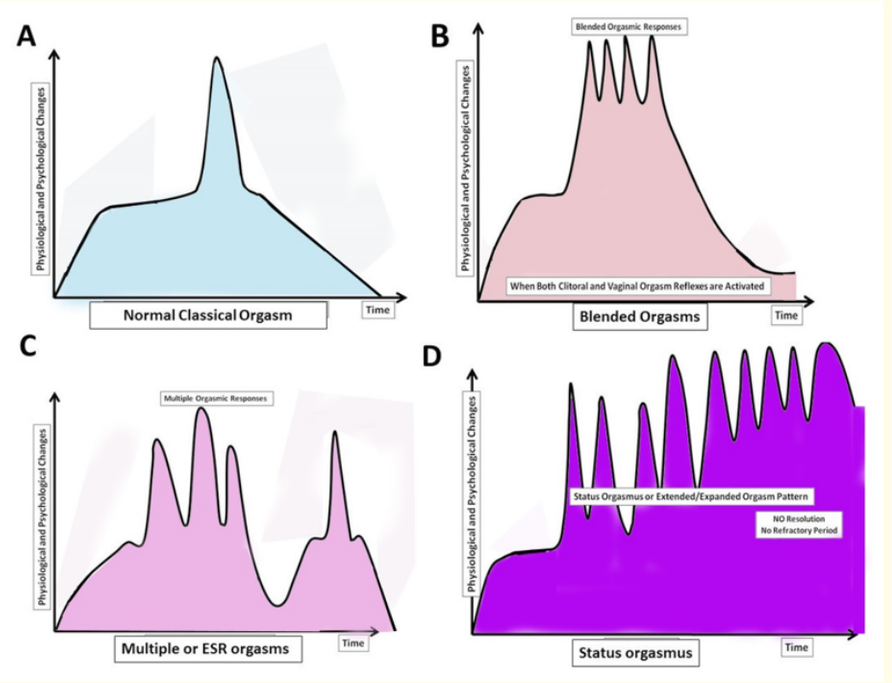

Figure 6: *A) Classical female orgasm pattern, defined in the classical medical literature B) Multiple female orgasm pattern C) Blended female orgasm pattern D) Prolonged expanded orgasm or status orgasmus. In the figure, X axis is time; Y axis depicts the classical patterns of physiological changes and pleasure as drawn in the classical sex therapy books. In blended orgasms there are many orgasm contractions coming from either clitoral or vaginal erogenous zones, which form separate peaks. Pleasure in blended and multiple ESR orgasms are more intense than that of one single orgasm. During status orgasmus, there is a non-stop continuous orgasming pattern, lasting for minutes or tens of minutes, while the woman attains a train of orgasms as long as she is stimulated.*

Expanded Sexual Pleasure: The Insatiable ID Inside?

Today's Western society, even after a 50 years of sexual revolution, regards "*sex*" as a filthy, dirty and an unethical issue, while women with hyper active sexual life styles are not respected and are mentioned to be hysterical or mentally ill. One century ago, female orgasm was named as "*hysterical paroxysm"* (or a hysterical fit), as a pathology (see the film "*Hysteria*"), by medical doctors and psychiatrists. This concepts and trend, descending from the middle ages, still prevails the ethical systems and norms of the societies in many countries; that was, probably, one of the reasons why some American psychiatrists tried to propose a "*Hypersexual disorder*" and its criteria as "HDSI" into DSM-5 in 2013. However, we do not yet know the physiology and extents of female sexuality which has been started to be investigated for the last five decades [75]. It is a general belief that a woman can attain one orgasm, as much as a man and that is fine and good enough; however, the recent data, being collected from various regions of the globe, does *not* confirm this hypothesis. On the contrary, it seems that the women and men are not alike, when we consider the structure, mechanism, female nerve innervation, duration, intensity and number of orgasms. Actually as objective scientists, we have to investigate the female sexual physiology more profoundly, before branding the women, who have hyper active sexual life styles, with the titles of "*insatiable*" or "*nymphomaniac*". After the year 2000, we have come across many reports claiming that some women can attain "*limitless orgasms*"; one of the results we have cited were 134 and 200 orgasms per hour and none of them were "*persistent genital arousal disorder*" (PGAD) or bipolar [7, 8].

Peak Experience or Getting Addicted to Dopamine and Oxytocin?

Both male and female orgasms can be accepted as peak experiences. Figures (3 and 4) depict the neurochemical changes during female orgasm, most cited references in this article, have a consensus about the major role of ***dopamine*** and meso-limbic-cortical dopaminergic projections, which, lately, also became very important to explain the mechanisms of drug addiction, or any other addiction of habituation, such as gambling and over-eating. When pleasure principal is in action, people unconsciously try to increase their ***dopamine*** levels in the brain by means of, eating excessive food or chocolate; by running; by gambling; by listening to music; by using drugs which increase

dopamine, such as amphetamines, cocaine etc.; by excessive sex and sexual pleasure. So the question often asked is: *"If addiction and pleasure have the similar neural mechanisms and they are using the same neurochemicals, does a woman get addicted to sex?"* and *"Is it bad for health?"* If pleasure and "*getting high on dopamine*" is addiction; all women are already addicted, because this function is innate, built-in and inevitable; it is the nature's trap to convey human beings to reproduce. There is nothing wrong with this, how can it be pathological?

Let's ask the question the other way: "*Yes, sexual pleasure and orgasms make women become addicted to that "**crummy**" deed; is it detrimental and wicked for the female psychology and personality*?" Of course, the answer is "NO"! For women, **oxytocin** and **dopamine** rush for a healthy life may become very important, because orgasm induces, euphoria, sedation, satisfaction, joy, self-fulfillment while it diminishes pain, anxiety, and depression. It is proven that sexual pleasure and climaxes are anti-depressant, anxiolytic, sedative, analgesic, and stimulating the immune system (and thus they have anti-cancer effects!). Even in ESR and prolonged orgasms, neurochemical changes are so sharp that orgasms may become mild hallucinogenic! Besides, most importantly, it is a natural means to become happy! Then what is wrong with those puritan ***male*** doctors who continue to oppose many of the hypotheses articulated in this review?

… Or should we punish the hyper-orgasmic women by dumping their brains with *serotonin*, by means of prescribing SSRI anti-depressants, which abate libido, block orgasms and decrease pleasure? This would ***not*** be a purely, objective scientific attitude, but it would be a wild capitalistic approach! Human health is more important than the ***"das capital***"!

Tantric Experiences and the Limits of Women

The medical literature has mostly been interested in and focused on the pathologies of human sexual behavior. Not much research and investigation have ever been done on the limits and extremes of human female's sexual potentials, such as ESR, non-genital orgasms or brain orgasms without any genital stimulation.

Ancient Eastern literature is full of incidences and descriptions of elevated and enhanced levels of orgasmic response and sexual pleasure of women, such as "*Tantrist and Taoist Love Making"* in India and China [2-5; 76]. Recent publications and books in the West after 1990's point out that female sexual response can be enhanced and expanded to certain levels [7-20; 47-52] Such results have also been reported by Masters & Johnson (1966) and Hartman & Fithian (1972). William Masters and Virginia Johnson reported a female's sustained and long orgasms lasting for 43 seconds, coining the episode as *status orgasmus* in their famous book "*Human Sexual Response*" [1]. William Hartman and Marilyn Fithian also reported the highest recorded orgasm number in the human female as 134 orgasms per hour [16, 17].

In 1991 Brauers designed a method named as "*ESO Ecstasy Program*" by which prolonged, sustained and long lasting orgasms could be attained by women, such as orgasms lasting for more than an hour [12]. In 2000, Patricia Taylor reported expanded orgasm patterns of 22 women in her PhD thesis and defined the term as "*Expanded Orgasm*" (EO) in the human female [14, 21]. Recently in a British documentary such "***Super-Orgasms***" were also confirmed by scientists in 2018 (see the You Tube documentary video: "Never Ending Orgasms"; https://www.youtube.com/watch?v=fwDbxyppfEg&t=721s)

Neurological Mechanisms of Coital-Vaginal Orgasms

Vaginal orgasm has been regarded as a myth, particularly by feminists. However, Shere Hite, *as a hot feminist*, even reported that 30 % of women were experiencing vaginal-coital orgasms in her feminist report, although it contained lots of scientific flaws [74].

Clitoral vs. Vaginal Orgasms

Clitoral stimulation is the main source of sensory input for triggering a female orgasm; *glans clitoris*, which contains nearly 8000 nerve endings, can trigger an orgasm when stimulated manually by pressure, friction, vibration, cunnilingus, or indirect penile trust stimulation in most of the women [1, 77, 78]. The surface of *glans clitoris* is nearly 0, 4 cm^2 at the tip, so for each millimeter square, there are 200 nerve endings, which makes the *glans clitoris* a very powerful sensory organ. There are different kind of receptors at the tip of the clitoris such as, *Paccini corpuscles.* Orgasms attained through clitoral stimulation have been reported to be more localized, sharp, bursting, short lasting, superficial, confined only to the pubic area; while '***coital vaginal orgasms'*** have been described as more diffuse, "*whole body*", radiating, psychologically more satisfying, lasting longer, having more tendency to turn into multiple orgasms [8-11; 16, 30, 73, 74, 77-81].

Singer gives another typology of female orgasm [82]:

1. *Vulva orgasm*: identified by orgasmic platform contractions and induced by coital or non-coital activity.

2. *Uterine orgasm*: identified by some physiological parameters such as apnea and lack of orgasmic-platform contractions and induced by cervical stimulation from deep coital trusting.

3. *Blended*: Having the elements of both, unified.

Ladas *et al.* also mentioned about *blended type* of orgasms [58]. Ladas *et al.* hypothesized that G-Spot was responsible for the triggering mechanisms of vaginal orgasms, while vaginal orgasms were mediated through a reflex arch through *sacral plexus* via *pelvic nerve*; clitoral orgasms were also mediated through a similar pathway via *pudental nerve*. According to the hypothesis defended in the book "G-Spot", blended orgasms were the unifying of two types of orgasms, vulva-uterine orgasms, which were mediated through *pudental, pelvic and hypogastric* nerves [58].

Our extensive survey results on female sexuality (Kadınca Report-1993; Hülya Report-2003; İstanbul Report-2013-2018, which is still continuing) among nearly 2500 women since 1991, have pointed out that, "***clitoral orgasms and vaginal orgasms are definitely two distinct phenomena"*** [8, 10, 17, 72, 83].

Masters & Johnson argue about the possibility of indirect clitoral stimulation during coitus, thus according to them, the hood of clitoris inducing a friction to the glans builds up an indirect clitoral orgasm. The literature and our studies have collected enough data to ***dispute*** such a phenomenon. Let's clear out the existence of a separate "*vaginal orgasm*":

1. The clitoral hood cannot move directly enough to stimulate the glans during coitus. If some deep erectile structures of clitoris, such as bulbus or crus, are stimulated as well, this sensory input will not be carried by pudental nerve, because most of the deep structures of clitoral complex are innervated by pelvic nerve, which may cause another type of "***clitoris-pelvic orgasm***", which is not exactly the same as "***glans-pudental nerve orgasm***".

2. Most of the descriptions of each type of orgasms in the literature are very different in terms of their physiological, neuropharmacological and psychological effects [7-11; 14, 20, 21, 30, 50, 58, 74, 79, 80, 85]. For instance, orgasms triggered by coitus induce 4 times fold prolactin release in the female brain compared to manual clitoral orgasms, which is proposed to be a measure of sexual satiety [86].

3. It has been reported that the women who are aware of their G-Spots and who have responding-pleasurable G-Spots, are more likely to attain '***coital vaginal orgasms'*** [8, 10, 50, 58, 87].

4. There appears to be other deep vaginal erogenous zones (DVZs) in some sexually hyper active and responsive women, other than clitoris and G-Spot, as reported recently (see figure-5 and below); [8, 10, 60]. Those zones are more prominent in the women with ESR and high sexual responsiveness, compared to none-ESR (NESR) women or average women. Nearly 99 % of ESR women were able to attain vaginal-coital orgasms [7-11; 18, 19]. Those areas are innervated by pelvic nerve and partially by hypogastric nerve, similar to G-Spot, which induce a separate orgasm reflex arch pathway; thus a very different physiological orgasmic response builds up.

5. Our and Komisaruk *et al.*'s preliminary studies by means of the electrical and vibration stimulation of DVZ seem to trigger orgasm patterns alone, without the stimulation of *glans clitoris* [8]. Similar supporting data comes from the research group of Komisaruk; stimulation of cervix alone induced orgasmic behavior in women who were hemiplegic, having no connection of nervous input from glans via *pudental nerve* and from vagina via *pelvic nerve* [30]; this is also a proof that orgasm reflexes can be triggered from the brain without the existence of input through *glans clitoris*. It was proven and concluded that these hemiplegic orgasms were mediated by *vagus nerve*.

6. In women, undergone clitoridectomy, *coital orgasms* have been reported [8, 61, 62, 80, 88, 90], which shows that without the existence of *glans clitoris*, orgasms may build up by some other mechanisms, while inner clitoral complex may have some contributions to those kind of orgasms, however they are unlikely to trigger an orgasm by the stimulation of bulbus or crus

of clitoris alone; there should be other triggering neural pathways and mechanisms that play major roles in the development of "*orgasms without clitoris*". In a study among 137 women, who had undergone female genital mutilation, 69% reported that they were still attaining orgasms during intercourse [89]. Other studies also confirm that after the resection of clitoris, female orgasms are ***not*** totally absent [90].

7. After the definition of novel "*four nerve and six pathway hypothesis of female orgasm"* (see below), it was realized that at least six different pathway-mediated orgasm reflex arches, some of which may contribute to build up "*vaginal orgasms*" originating from direct stimulation of DVZs, may exist! [8, 11, 30, 91, 92].
8. Our preliminary research and other accumulating data also showed that some specifically designed electronic dildo shaped vibrators that have a rotational and vibrating property at the tip may induce "*powerful vaginal orgasms*" (unpublished data), which may also show that stimulation of PC muscles, O-Spot, A-Spot and Cervix may trigger vaginal orgasms in some women. Near to these findings, electrical stimulation of cervix and DVZs by a TENS unit (trans-cutaneous-electrical-nerve-stimulation unit) may induce similar *vaginal orgasms* (unpublished data).
9. A recent survey in United Kingdom among 5000 women also showed that 74 % of women reported the existence of erogenous zones, which contributed in the development of orgasms, in their vaginal canal and cervix, however they named them as G-Spot, since they were not aware of DVZ. (http://www.orgasmsurvey.co.uk/pressrelease.htm)
10. Recently, ***"Brain Orgasms"*** without the stimulation of any genital erogenous zones have been reported [8, 10, 29, 30, 51]. If brain orgasms can exist, then we should investigate many other pathway systems and mechanisms, such as the "*oxytocin pathway*", other than focusing only on the '*glans clitoris*'! [93]

Neurological Mechanisms of ESR

Mechanisms of Single Vaginal and Clitoral Orgasms, Multiple Orgasms and ESR Orgasms

To explain the enhanced and expanded forms of female orgasmic consciousness, we had hypothesized the "*Four Nerve and Six Pathway Hypothesis of Female Orgasm*" in our former publications [8-10]. There is a lot of data which confirms that four separate nerves carry sensory inputs from the "*erogenous zones*" of female genitalia or body; these are ***pudental, pelvic, hypogastric and vagus nerves*** [8-11; 30, 58]. The following are the possible pathways (below Table-7) that carry erotic sensory-information input (ESI) to somato-sensory, frontal and prefrontal cortices and the limbic system, and contribute to the formation of an "*orgasm reflex*" (Figure-7 and 8); some of those loci directly trigger a female orgasm, some of them may have contributions in terms of erotic sensory information input (ESI) [11,50,92, 93]. Also, there are two other oxytocinergic pathways which contribute to the formation of an orgasm of any kind (Fig-9) [8-10].

If a single "orgasm reflex pathway", while some other pathways having some involvement, as well, are activated during the development of an orgasm; a single clitoral, vaginal or brain orgasm may occur. If many (more than one) "*orgasm reflex pathways*" and a combination of the following pathways (Table-7) are involved in the erotic formation system of an orgasm, then big-O, prolonged orgasms, EO or "ESR orgasms" may develop and orgasms may become more intense, multiple and prolonged because of the summation effect of accumulated ESI (just like it is in the summation or interference of wave patterns).

ESI values and maps or curves are different for every woman. This whole process is a learned and maturing phenomenon, which can be developed and improved by training and education, as many ancient Tantrists had done centuries ago [5-11].

Also there are threshold levels of ESI for clitoral orgasms or vaginal-coital orgasms or EOs. If the total ESI or the summation ESI entering the consciousness are enough and overpass the threshold (-for that specific kind of orgasms-, *e.g. blended orgasm*), different kind of orgasms may occur in the human female (See Fig-7, 8). If there are 6 orgasmic pathways, the subsets of the combinations of the information routes for building an orgasm up in the brain, would be 2^n-1= 63 different types orgasms can be defined for a woman. Every orgasm is different in every woman; there are, actually orgasm types as many as the population of women in the world.

In vaginal orgasms, there may be more components to trigger an orgasm, such as, DVZ areas or other psychological input from the brain itself. Experiencing the coitus and *being filled with the male phallus,* itself, is an erotic factor for most of the women. In average women (Non-ESR-women), such extra informational input can be supplied from many other pathways cited in this article, particularly orgasmic *four nerve-six pathway system* (Fig-8). This concept may explain the variety of orgasms in different women, such as clitoral, vaginal, multiple, blended, or long lasting *etc*.

In **ESR women**, all the components in four nerve-six pathway system are enhanced and carry more sensory sexual (*or erotic*) information input (ESI), and probably the number of sexual and erotic components are increased too, which is observed in our surveys such as that the fantasy, masturbation, sexual image, and all ESI patterns are enhanced and expanded in ESR women, including the libido, sexual mind, arousability, etc.

• Glans clitoris → Pudental N. → Sacral plexus → BRAIN → Clitoral orgasm • Parts of clitoral complex (crus, body, bulbus etc.) → Pudental N. → Sacral plexus → BRAIN → Clitoral orgasm or Vaginal orgasm, or contributes • Parts of clitoral complex (crus, body, bulbus etc.) Pelvic N. → Sacral plexus → BRAIN → Vaginal orgasm, or contributes • G-Spot → Pelvic N. → Sacral plexus → BRAIN → Vaginal orgasm; and ejaculation in some women • Various vaginal stimulation during coitus → Pelvic N. → Sacral plexus → BRAIN → Vaginal orgasm • A-Spot → Pelvic N. (possibly partially hypogastric N.) → Sacral plexus (+ partially Pelvic plexus) → BRAIN → Vaginal orgasm, or contributes to Vaginal orgasm • O-Spot → Pelvic N. (possibly partially hypogastric N.) Sacral plexus (+ partially Pelvic plexus) → BRAIN → contributes to Vaginal orgasm, Anal orgasm • PFM (PC-Muscle) → Pelvic N. (possibly partially hypogastric N.) Sacral plexus (+ partially Pelvic plexus)→ BRAIN → Vaginal orgasm, or contributes to Vaginal orgasm	• Cervix → Partially Pelvic N. + Mostly Hypogastric N. → Pelvic Plexus (+ partially sacral plexus)→ BRAIN → Vaginal orgasm, or contributes to Vaginal orgasm • Cervix → Vagus N. → BRAIN → Vaginal orgasm, or contributes to Vaginal orgasm, • Uterus → Hypogastric N. + Vagus N. → Pelvic Plexus + BRAIN → contributes to Vaginal orgasm • Anus + Rectum → Infra Anal N. + Pudental N. + Pelvic N. + Anal sphincter nerves → Sacral Plexus → (BRAIN) → Anal orgasm (O-Spot stimulation contributes to anal orgasms) • Nipples → Intercostal N. → Pituitary → Oxytocin Pathway → BRAIN→Nipple orgasm; or contributes to Clitoral orgasm, Vaginal orgasm • BRAIN-imagination-fantasy-sexual images → Pituitary → Oxytocin Pathway → BRAIN→ Brain orgasm or contributes to all kind of orgasms

Table 7: Four nerves and many different pathways control female orgasm and ESR orgasms.

Thus, ESR women have learned to activate more orgasm inducing pathways along with more enhanced ESI to be sufficient to trigger an orgasm alone. Hence, ESR orgasms are enhanced and prolonged, since they carry more sexual erotic information input (ESI) from more than one orgasm *inducing-contributing* pathway into *"a more sexually excitable-arousable brain and psychological system"*. However, in NESR women only one, systematic orgasmic pathway works, and that is, most of the time, the clitoral orgasm pathway via *pudental nerve*. The other orgasm inducing pathways in NESR women only function as complementary, and supply additional sensual information (ESI) to facilitate the building up of an orgasm through one pathway, *e.g. clitoral-pudental-sacral plexus* orgasm pathway (Figure-7).

The brain and the body of ESR women function in a more *sophisticated* and *evolved* fashion, while many novel components to the four nerve-six pathway system may be added (e.g. fantasies, variations, novelties, enhanced stimulation from DVZ etc.). In ESR women, the learned orgasmic reflex pathways are enhanced and increased; *e.g.* ESR women can attain orgasms by means of the stimulation of *glans clitoris*, coitus, *or* sole stimulation of DVZs (manual, pressure or using a vibe) or by contracting PFM (PC-Muscles) *etc*., just like in the *non-genital orgasms*.

In the below figure (Figure-7) different possible components of ESI are depicted. A female orgasm is the combination and summation of these nine (or more) components. An anorgasmic woman cannot use those components intense enough to pass the threshold (in the brain) of triggering an orgasm; or her mind has so many blockades or inhibitions and taboos that, her consciousness cannot perceive them as erotic stimuli. In the bottom (B) plot C and D, the sample subject has many components which may convey different kinds of erotic information as ESI to the brain. Orgasm reflex is triggered when the ESI passes the threshold and in every woman, all these components have different amplitudes to build up an orgasm; also the thresholds and amplitudes of ESI may change from woman to woman. The ESI thresholds for various orgasms are different for every woman (Figure-7).

So four nerve-six pathway hypothesis is more likely to explain neural correlates of EO and ESR phenomenon. In ESR women the following pathways may induce orgasms separately, while they may only play as a contributing and complementary role in NESR women to build up an orgasm. (Figure 8 & 9)

Dopaminergic, oxytocinergic, serotoninergic, glutamatergic, endogenous opioid systems also play an auxiliary role in the development of orgasms through these pathways (Figure-8):

1. *Glans clitoris-Pudental nerve*-sacral plexus
2. Coitus-DVZs-*Pelvic nerve*-sacral plexus

3. Coitus-DVZs-cervix-*Hypogastric nerve*-pelvic plexus
4. Coitus-DVZs-uterus-cervix-*Vagus nerve*-brain
5. Nipples-intercostal nerves (particularly T-4) -pituitary-*oxytocin pathway* (oxytocin as a hormone)
6. Brain-fantasies-sexual images -sexual psychology- frontal, somatosensory, prefrontal cortices-limbic system- hypothalamus-pituitary-*oxytocin pathway* (oxytocin as a neurotransmitter).

"Four nerve and six pathway hypothesis of female orgasm" seems to explain some of the characteristics of ESR. ESR is a novel phenomenon to be investigated by neuroscience in 21st century, since many women can have a better quality of sex life, pleasure and orgasms, after certain training, if the basic mechanisms of ESR are discovered (Figures 8 & 9).

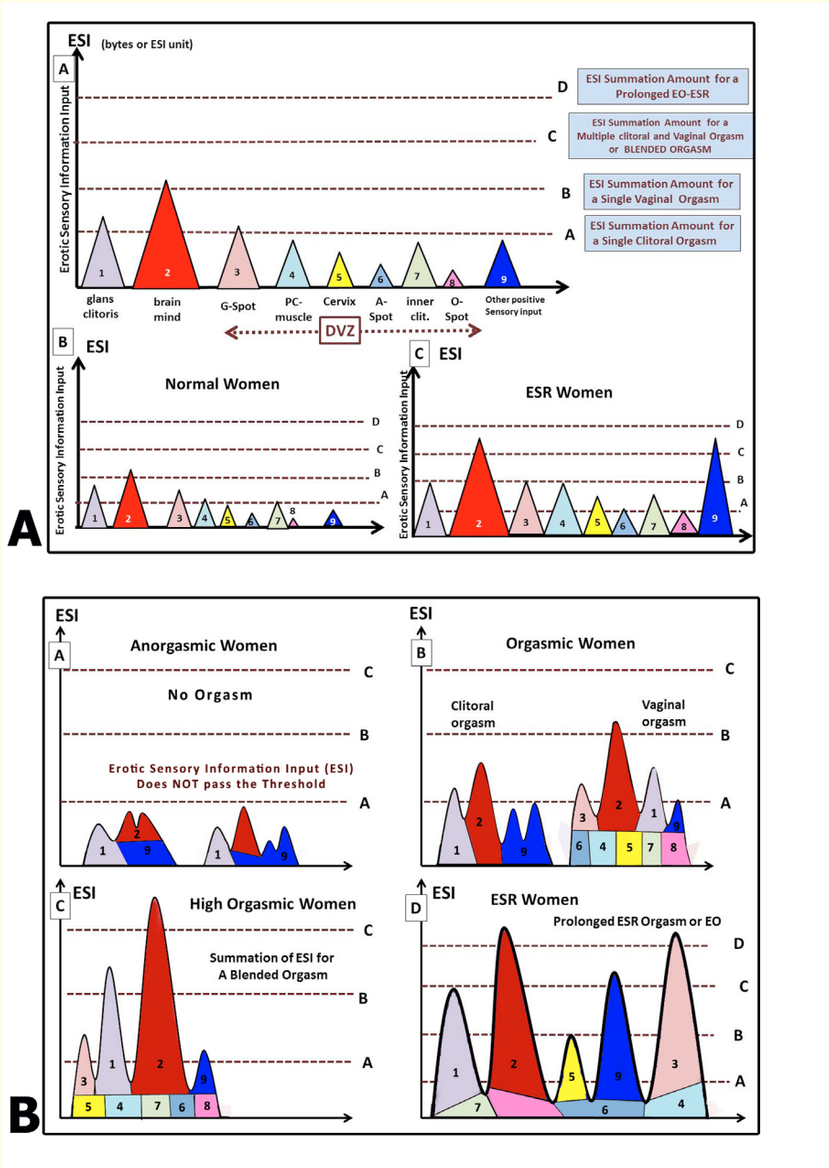

Figure 7: Informatics Theory of Female Orgasm: The arousal zones in female genitals which may contribute to the building up of a clitoral, vaginal, blended or ESR orgasm. *For every woman the amplitude of ESI (Erotic sensual information input) and the arousability of these components are different; so the heights of colored triangles will be different, so will be the summation of these ESI factors. In ESR women ESI amplitude summation is the greatest. Those curves can be plotted for every woman by means of quantifying ESI using objective scientific criteria and parameters such as, action potential number or bursts, evoked potentials, receptor arousability, fMRI activation in the brain etc. Here only some assumptions and extrapolations are made and a simple approach is shown to depict the components that induce a vaginal, blended or ESR prolonged orgasm. Top figure (A) shows possible and crude ESI distributions in NESR and ESR women. Bottom figure (B) shows the summation of ESI originating from different DVZ or locations. See the vector summation of ESI (similar to the summation of waves in physics and optics) is much greater in ESR women overpassing the thresholds of clitoral, vaginal and blended orgasms. Notice that brain factor (red) is the greatest of all. All the ESI factors can be quantified in fact and be used in an informatics model of orgasm; like the total number of pleasure information in bytes. For details of pleasure information bytes see: [26,28,47,50,92] All different kind of sensual information is depicted with different color (e.g. red: brain; lilac: glans clitoris; pink: G-spot etc.).*

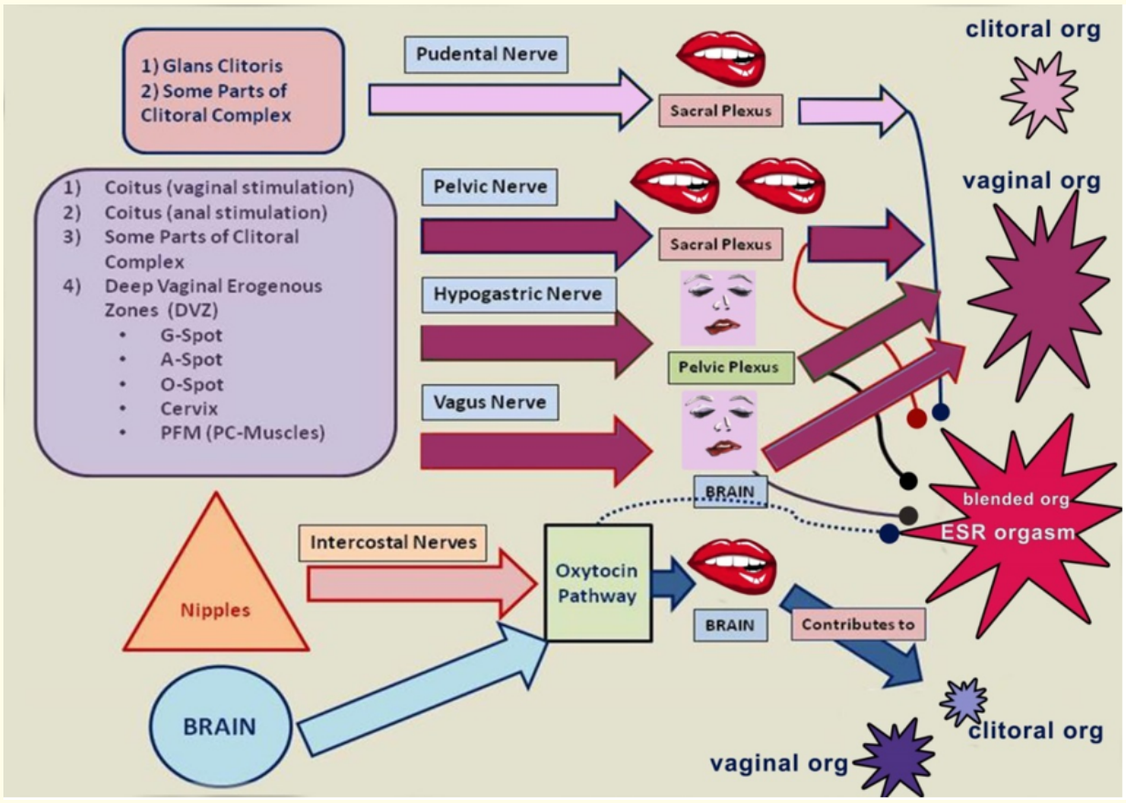

Figure 8: Four Nerve Six Pathway Hypothesis of Female Orgasm. *At least six pathway-orgasmic reflex arch systems work during the development of female orgasms. Pudental, Pelvic, Hypogastric, intercostal and Vagus nerves constitute the main nerve network system. Also there are at least two Oxytocin pathway systems, whereas Oxytocin works as a neurotransmitter and as a hormone, separately. During expanded orgasms and ESR orgasms, more than one 'orgasm reflex arch pathway' is activated and trigger an expanded orgasm, while many others contribute to the formation of an EO or ESR orgasms.*

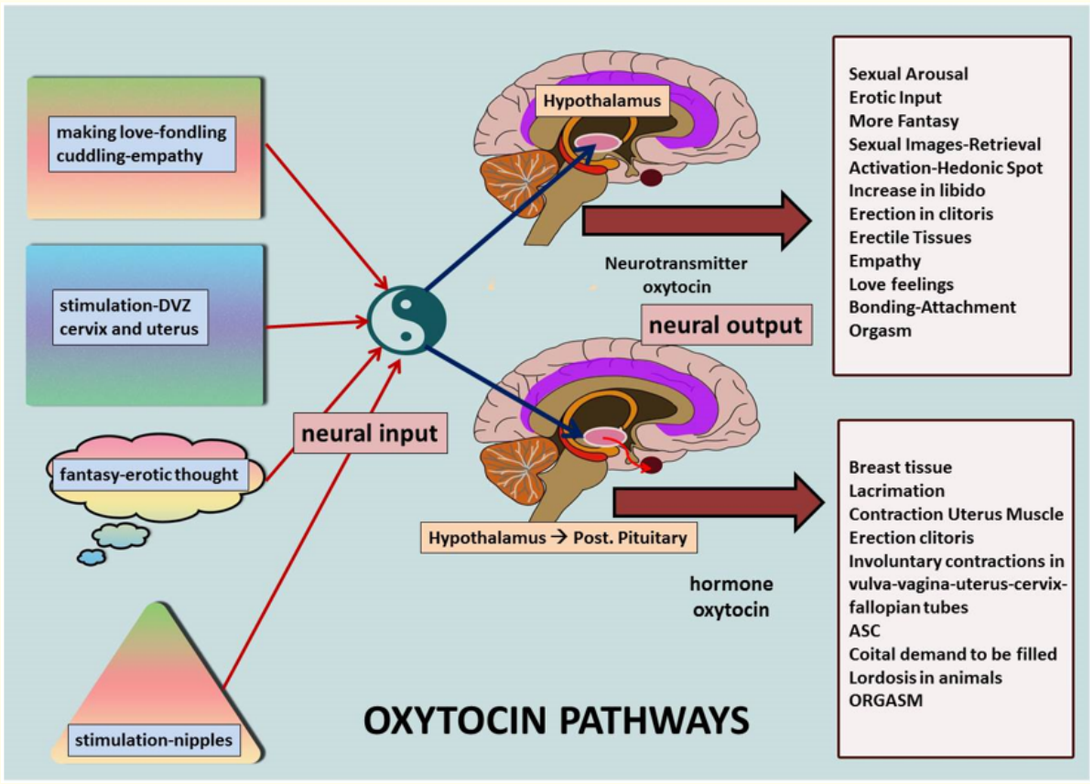

Figure 9: Oxytocin pathways as a neurotransmitter and a hormone. *The factors which induce the secretion of oxytocin and the effects of oxytocin at the target organs are summarized.*

Choosing the Right Partner

In most of the cases of the sexual dysfunction of females, in our workshops, education programmes (see: www.cinselegitim.org and www.ciseated.org) or private sessions, the real problem was the "*partner problem*". Many men do not try to understand and solve their own problems, but accuse the spouse or the women instead. In many cases of anorgasmia, lack of sexual desire or vaginismus, we have come to the conclusion that ***the males should be educated or trained first***. In many cases of sexual dissatisfaction and dysfunction, the problem focuses on the male partner.

Firstly, males do not spend much time and energy to give pleasure to women. Secondly, they never accept that the problem is their attitude and illiteracy on sexuality. Sexual behavior and sexuality is a learned phenomenon, only the *libido* is built in. In this regard, for women, finding and choosing the right partner for themselves becomes a crucial issue for a better satisfaction.

However, learning more about female physiology will empower us to treat or to help many men and women. As a consequence of the four nerve-six pathway hypothesis we designed a method to stimulate most of the pathways which contribute in the formation of an orgasm. This method does not only help women to attain an orgasm, but also develops expanded orgasms in time [6-11].

Expanded ESR Orgasms in Women: Four Spot Method

Stimulation of G-spot (coitus, manual, electrical or vibe), Deep Vaginal Erogenous Zones (DVZ) (coitus, vibe , electrical [TENS-device], or manual), *glans clitoris* (cunnilingus, manual, vibe, or electrical), clitoral complex (coitus, vibe, electrical, or manual), anus (coitus, vibe, or manual), nipples (mostly manual, sucking, or vibe) and the BRAIN (fantasies, learned sexual behavior patterns) ***at the same time***, may start to induce blended orgasms in a minority of women after certain numbers of trials, by means of triggering more than one orgasm reflex pathway. The vibration frequency of effective vibes differs from spot to spot (60-100 Hz); also, vibe frequency may be variable in different women. For coitus, a male partner should be maintaining intercourse for more than 30 minutes. For oral sex, a continuous stimulation more than 20-30 minutes should be maintained [8-10].

In ***Four Spot Method***, male partner uses his left hand's second and third fingers to stimulate the G-Spot upward (in the lying position), fourth finger of the left hand is used to stimulate anus. The head is in between the legs of the woman to perform cunnilingus, which should be continued for at least 30 to 40 minutes, with up and down continuous movements of the tongue (1-3 Hz). The right hand should be stimulating the left nipple (or sometimes right) of the women. Thus anus, G-Spot, *glans clitoris*, nipples are stimulated at the same time until she reaches a series of orgasms, which may last for more than for a couple of minutes. In between these stimulations, rotating probe and vibrating vibes can be used to stimulate the deep vaginal erogenous zones (DVZ) [8-11].

Future Perspectives for Women and Conclusion

As a conclusion, we must assert that, the female physiology is not, yet, discovered thoroughly. The works and publications of Komisaruk *et al.* and Whipple *et al.* were *great mile stones* on sexual physiology, after Masters & Johnson; we, now, know much more than we used to 3 decades ago about the neuroscience of female orgasm. All kind of research on male and female sexuality should be encouraged and funded [see: 93].

ESR is a novel phenomenon to be investigated by neuroscience in 21st Century, since many women can have a better quality of sex life, pleasure and orgasms, after certain training, if the basic mechanisms of ESR are discovered. More detailed research should be carried for the investigation of ESR, EO and female orgasm, as well as the neurophysiology and neuroanatomy of female sexual response to confer a healthy and pleasurable life to both women and men.

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Bibliography

1. Masters W and Johnson V. "Human Sexual Response". Boston: Little Brown Company (1966).

2. Chang J. "The Tao of Love and Sex: The Ancient Chinese Way to Ecstasy". New York: Dutton (1977).

3. Chang J. "The Tao of the Loving Couple: True Liberation Through the Tao". New York: Dutton (1983).

4. Schwartz L and Schwartz B. "The One Hour Orgasm". New York: St. Martin's Griffin (1999).

5. Mumford J. "Ecstasy through Tantra". Minnesota: Llewellyn Pub, 3rd edition (2005).

6. Sayin HÜ. "Resimli 100 Soruda Neo-Tantra: Tantrik Cinselliğin Sırları, (Illustrated Neo-Tantra in 100 Questions: Secrets of Tantric Sexuality)". İstanbul: Tantra Akademi/Onur Publications (2013).

7. Sayin HÜ. "Cinsellikte Farklı Boyutlar (Derin Sex) (Different Dimensions of Sexuality: Deep Sex)". second expanded edition, two volumes) Second expanded-extended updated edition, 2 volumes. İstanbul: Tantra Akademi/Onur Publications (2014).

8. Sayin HÜ. "Kadın ve Orgazm: Orgazm Yöntemleri ve Yeni Cinsel Terapi Teorileri (Women and Orgasm: Orgasm Methods and Novel Sex Therapy Theories)". İstanbul: Tantra Akademi/Onur Publications (2017).

9. Sayin HÜ. "Tantra, ESR and the Limits of Female Potentials" (Review). *SexuS Journal* 2.3 (2017): 055-074.

10. Sayin HÜ. "Artırılmış Cinsel Doyum: ESR; Kadınlarda Ultra Orgazm (Expanded Sexual Response: ESR; Ultra Orgasm in Women)". İstanbul: Tantra Akademi/Onur Publications (2012).

11. Sayin HÜ. "Doors of female orgasmic consciousness: New theories on the peak experience and mechanisms of female orgasm and expanded sexual response". (Research and Review) *NeuroQuantology* 10.4 (2012): 692-714.

12. Rhodes R., *et al*. "ESO Ecstasy Program: Better, Safer Sexual Intimacy". New York: Grand Central Publishing (1991).

13. Bodansky S and Bodansky V. "Extended Massive Orgasm". California: Hunter House Pub (2000).

14. Taylor P. "Expanded Orgasm, Soar to Ecstasy at your Lover's Every Touch". New York: Sourcebooks (2002).

15. Zdrok V. "Anatomy of Pleasure". Philadelphia: Infinity Publishing Co (2004).

16. Sayin HÜ. "Other Dimensions of Sexuality (Cinselliğin Farklı Boyutları)". İstanbul: YOL Publications (1993).

17. Sayin HÜ. "Deep Sex: Different Dimensions and Openings of Sexuality (Derin Seks: Cinsellikte Farklı Boyutlar, Yeni Açılımlar)". İstanbul: Klan Publications (2010).

18. Sayin HÜ., *et al.* "Expanded Desire: The Main Parameters and New Definitions of Enhanced and Expanded Sexual Response (ESR"). The 33rd NACS Conference 2011, Oslo, Norway. Abstract Book, 33 (2011): 2.

19. Sayin HÜ., *et al.* "Pelvic Floor Muscle Strength is Correlated with Attaining Vaginal Orgasms in Human Female as Measured by Kegel Perineometer". The 33rd NACS Conference 2011, Oslo, Norway. Abstract Book, Abstract Book 2011; 33 (2011): 22.

20. Sayin HÜ. "Altered states of consciousness occurring during expanded sexual response in the human female: preliminary definitions". *Neuroquantology* 9.4 (2011): 882-891.

21. Taylor P. "An Observational and Comparative Study of Practitioners of Expanded Orgasm: An Investigation of an Effective and Accessible Path to Transcendent States of Consciousness". Submitted in Partial Fulfillment of the Requirements for the Degree of Philosophy in Transpersonal Psychology, International University of Professional Studies, Maui, Hawaii (2000).

22. Freud S. "Beyond the pleasure principle". New York: Bantam (1950).

23. Schultz W. "Neuronal reward and decision signals: from theories to data". *Physiological Reviews* 95.3 (2015): 853-951.

24. Berridge KC., *et al*. "Dissecting components of reward: 'liking', 'wanting', and learning". *Current Opinion in Pharmacology* 9.1 (2009): 65-73.

25. Berridge KC and Kringelbach ML "Pleasure systems in the brain". Neuron 86.3 (2015): 646-664.

26. Sayin HÜ. "Getting high on dopamine: Neuroscientific aspects of pleasure: Part-1" SexuS Journal 4.11 (2019): 883-906.

27. Berridge KC and Morten L. Kringelbach, "Affective neuroscience of pleasure: reward in humans and animals". *Psychopharmacology* 199.3 (2008): 457-480.

28. Sayin HÜ and Schenck CH. "Neuroanatomy and neurochemistry of sexual desire, pleasure, Love and orgasm, Part-2". SexuS Journal 4.11 (2019): 907-946.

29. Komisaruk BR and Beverly W. "Functional MRI of the brain during orgasm in women". *Annual Review of Sex Research* 16 (2005): 62-86.

30. Komisaruk BR., *et al*. "The Science of Orgasm". Baltimore: John Hopkins University Press (2006).

31. Komisaruk BR, *et al.* "Women's clitoris, vagina, and cervix mapped on the sensory cortex: fMRI evidence". *Journal of Sexual Medicine* 8.10 (2011): 2822-2830.

32. Wise NJ., *et al.* "Brain activity Unique to Orgasm in Women: An fMRI Analysis". *Journal of Sexual Medicine* 14.11 (2017): 1380-1391.

33. Jannini EA., *et al*. "Peripheral and Central Neural Bases of Orgasm". In Texbook of Sexual Function and Dysfunction: Diagnosis and Treatment. First Edition, Edited by Sue W. Goldstein, Noel N. Kim, Anita H. Clayton. New York: John Wiley & Sons Ltd, 2018. Chapter 13 (2018): 179-195.

34. Georgiadis RJ *et al*. "Regional cerebral blood flow changes associated with clitorally induced orgasm in healthy women". *European Journal of Neuroscience* 24.11 (2006): 3305-3316.

35. Georgiadis RJ. "Men versus women on Sexual Brain Function: Prominent differences during tactile genital stimulation, but not orgasm". *Hum Brain Map* 30.10 (2009): 3089-3101.

36. Berridge KC. "The Debate over Dopamine's Role in Reward: The Case for Incentive Salience". *Psychopharmacology* 191.3 (2007): 391-431.

37. Berridge KC and Aldridge JW. "Decision utility, incentive salience, and cue-triggered 'wanting'". In: Bargh J, Morsella E (eds) "The psychology of action". Oxford University Press, New York (2008).

38. Richard JM., *et al*. "Mapping brain circuits of reward and motivation: in the footsteps of Ann Kelley". *Neuroscience and Biobehavioral Reviews* 37.9 (2013): 1919-1931.

39. Castro DC and Berridge KC. "Opioid and orexin hedonic hotspots in rat orbitofrontal cortex and insula". *Proceedings of the National Academy of Sciences of the United States of America* 114.43 (2017): E9125-E9134.

40. Kringelbach ML and Berridge KC. "The Joyful Mind". *Scientific American* 307.2 (2012): 44-45.

41. Ortigue S., *et al.* "The neural basis of love as a subliminal prime: An event-related functional magnetic resonance imaging study". *Journal of Cognitive Neuroscience* 19 (2007): 1218-1230.

42. Ortigue S., *et al.* "Neuroimaging of love: fMRI meta-analysis evidence toward new perspectives in sexual medicine". *Journal of Sexual Medicine* 7.11 (2010): 3541-3552.

43. Aron A *et al*. "Reward motivation and emotion systems associated with early-stage intense romantic love". *Journal of Neurophysiology* 94.1 (2005): 327-337.

44. Maravilla KR and Yang CC. "Sex and the brain: The role of fMRI for assessment of sexual function and response". *International Journal of Impotence Research* 19.1 (2007): 25-29.

45. Meston C and Frohlich P. "The Neurobiology of Sexual Function". *Arch Gen Psychiatry* 57 (2000): 1012-1030.

46. Komisaruk BR and Sansone G. "Neural pathways mediating vaginal function: The vagus nerves and spinal cord oxytocin". *Scandinavian Journal of Psychology* 44.3 (2003): 241-250.

47. Sayin HÜ. "Cinsel Beyin (Sexual Brain-Sexual Mind)". İstanbul: Tantra Akademi/Onur Publications (2018): 384.

48. Sayin HÜ. "A Comparative Review of Psychopharmacology of Hallucinogen-Induced Altered States of Consciousness: Relation to Sexuality (Review)". *SexuS Journal* 3.7 (2018): 413-450.

49. Sayin HÜ and Kocatürk A. "Expanded Sexual Response in the Human Female: The Mechanisms of Expanded Orgasms in Women". *SexuS Journal* 3.8 (2018): 533-548.

50. Sayin HÜ. "Kadınlarda Orgazmın Psikolojisi (Psychology of Orgasm in Women)". İstanbul: T*antra Akademi/Onur Publications* (2015).

51. Sayin HÜ. "Altered States of Consciousness Occurring During Expanded Sexual Response (ESR) in the Human Female: Preliminary Definitions (Review)". SexuS Journal 1.1 (2015): 077-088.

52. Sayın H Ümit and Emel Yetkin Yücesoy. "Mechanisms of Multiple Vaginal Orgasms with ESR Cases". 39th NACS International Scientific Meeting, Trondheim-Norway" (2017).

53. Kuchinska S. "The Chemistry of Connection: How the Oxytocin Response Can Help You Find Trust, Intimacy and Love". New York: New Harbinger Publications (2009).

54. Carter CS. "Oxytocin and sexual behavior". *Neuroscience & Biobehavioral Reviews* 16.2 (1992): 131-144.

55. Lee HJ., *et al.* "Oxytocin: The Great Facilitator of Life". *Progress in Neurobiology* 88.2 (2009): 127-151.

56. Magon N and Kalra S. "The orgasmic history of oxytocin: Love, lust, and labor". *Indian Journal of Endocrinology and Metabolism* 15 (2011): 156-161.

57. Perry JD and Whipple B. "Pelvic muscle strength of female ejaculators: evidence in support of a new theory of orgasm". *Journal of Sex Research* 17.1 (1981): 22-39.

58. Ladas AK., *et al*. "The G-Spot and other Discoveries About Human Sexuality". New York: Henry Holtand Company (first publication 1982) (2005).

59. Weijmar Schultz WC., *et al.* "Vaginal sensitivity to electric stimuli: theoretical and practical implications". Archives of Sexual Behavior 18.2 (1989): 87-95.

60. Morris D. "The Naked Woman: A Study of the Female Body". London: St. Martin's Griffin (2004).

61. Levin RJ. "The breast/nipple/areola complex and human Sexuality". Sexual and Relationship Therapy 21 (2006): 237-49.

62. Levin RJ. "The pharmacology of the human female orgasm - Its biological and physiological backgrounds". *Pharmacology Biochemistry and Behavior* 121 (2014): 62-70.

63. Chua Chee Ann. "A proposal for a radical new sex therapy technique for the management of vasocongestion and orgasmic dysfunction in women: the AFE zone stimulation technique". *Journal of Sex and Marital Therapy* 12 (1997): 357-370.

64. Komisaruk BR and Beverly W. "The suppression of pain by genital stimulation in females". *Annual Review of Sex Research* 6 (1995): 151 -186.

65. Komisaruk BR and Beverly W. "Love as a sensory stimulation: Physiological Consequences of its deprivation and expression". *Psychoneuroendocrinology* 23.8 (1998): 927-944.

66. Komisaruk BR., *et al.* "Brain activation during vagino-cervical self-stimulation and orgasm in women with complete spinal cord injury: fMRI evidence of mediation by vagus nerves". *Brain Research* 1024.1-2 (2004): 77-88.

67. Komisaruk BR and Whipple B. "Non-genital Orgasms". *Sexual and Relationship Therapy* 26.4 (2012): 356-372.

68. Whipple B and Komisaruk BR. "Analgesia produced in women by genital self-stimulation". *Journal of Sex Research* 24.1 (1988): 130-140.

69. Whipple B., *et al*. "Physiological correlates of imagery induced orgasm in Women". *Archives of Sexual Behavior* 21.2 (1992): 121-133.

70. Otto HA. "Liberated orgasm: The orgasmic revolution". Silverato, CA: Liberating Creations (1999).

71. Paget L. "The big O. Orgasms: How to have them, give them and keep them coming". New York: Broadway Books (2001).

72. Armagan N., *et al. "*Can Sexual Response be Enhanced and Expanded in the Human Female: Preliminary Findings and a Proposed Psychometric Scale for Expanded Sexual Response (ESR)". 38th Annual Meeting of IASR (International Academy of Sex Research), Lisbon-Portual, Abstract Book, 38 (2012): 9.

73. Wolfe L. "The Cosmo Report". London: Corgi Books (1982).

74. Hite S. "The Hite Report: A National Study of Female Sexuality". New York: Dell Publishing (1976).

75. Sayin HÜ and Kocatürk A. "APA's DSM-5 HDSI proposal re-assessed: Female Perspectives". SexuS Journal 4.11 (2019).

76. Chia M. "Healing Love through the Tao: Cultivating Female Sexual Energy". New York: Destiny Books (2005).

77. Kline-Graber G and Graber B. "A guide to sexual satisfaction: woman's orgasm". New York: Fawcett Popular Library (1975).

78. Kaplan HS. "The New Sex Therapy". New York: Penguin Books (1981).

79. Fisher S. "Female Orgasm". New York: Basic Books (1972).

80. Fisher S. "Understanding the Female Orgasm". London: Penguin Books (1973).

81. Mah K and Binik YM. "The nature of orgasm: A critical review of major trends". *Clinical Psychology Review* 21.6 (2001): 823-856.

82. Singer I. "The goals of human sexuality". New York: W.W. Norton (1973).

83. Kocatürk A., *et al*. "Comparison of the Sexual Behavior of 939 Female Students in İstanbul Universities (2012) to the Survey Results of Kadınca Report (1993): Decline in Sexual Knowledge and Education in Turkish Universities?" 38th Annual Meeting of IASR (International Academy of Sex Research), Lisbon-Portugal, Abstract Book 38 (2012): 82.

84. Campbell B and Petersen WE. "Milk ''let-down'' and the orgasm in the human female." *Human Biology* 25.3 (1953): 165-168.

85. King R*., et al*. "Are there different types of female orgasms?" *Archives of Sexual Behavior* 40.5 (2010): 865-875.

86. Brody S and Krüger TH. "The post-orgasmic prolactin increase following intercourse is greater than following masturbation and suggests greater satiety". *Biological Psychology* 71.3 (2006): 312-315.

87. Hooper R. "New Scientist" 2644 (2008): 6-7.

88. Escapa R. "Bizzare Sex". London: Grafton Books (1989).

89. Catania L., *et al.* "Pleasure and orgasm in women with Female Genital Mutilation/Cutting (FGM/C)". *Journal of Sexual Medicine* 4.6 (2007): 1666-1678.

90. Cortés-González JR., *et al.* "Does circumcision has an effect on female's perception of sexual satisfaction?" *Rev Invest Clin* 60.3 (2008): 227-230.

91. Carellas B. "Urban Tantra". New York: Celestial Arts (2007).

92. Sayin HÜ. "Neural Correlates of the "ID"". EC Neurology 11.4 (2019): 256-273.

93. Also please see: the You Tube video: "Never Ending Orgasms".

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