



ΠΑΝΕΠΙΣΤΗΜΙΟ
ΠΑΤΡΩΝ
UNIVERSITY OF PATRAS

ΑΝΟΙΚΤΑ ακαδημαϊκά
μαθήματα ΠΠ

Female Sexual Dysfunction

Ενότητα 1: Κεντρικό νευρικό σύστημα

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Σχολή Επιστημών Υγείας

Τμήμα Ιατρικής

Σκοποί ενότητας

- Αλληλεπίδραση ορμονών και νευρωνικών κυκλωμάτων.
- Συσχέτιση ορμονικών παραγόντων με αναπαραγωγικούς και συμπεριφορικούς φαινότυπους.

Περιεχόμενα ενότητας

- Φύλο και εγκέφαλος
- Λειτουργική υποθαλαμική αμηνόρροια
- Διαφυλικοί
- Η ψυχική συνιστώσα της ανθρώπινης σεξουαλικότητας
- Female sexual dysfunction

Historical Context of Female Sexuality

- Pre-Historic
- Victorianism
 - Hysteria
 - Nymphomania
- Freud
- The 'sexual revolution'
- Orgasm, masturbation, dysfunction

Female Orgasm

- Long ago, in the 4th century B.C., the great Hippocrates believed that the fetus was a result of female pleasure. Therefore, in order to procreate a woman must always be kept sexually satisfied.
- In the same century however, the nemesis of the female orgasm, Aristotle, disagreed with Hippocrates. He suggested that only the man's semen was fertile, and that a woman had no role in the procreative process. So, female sexual pleasure was quickly looked down upon.

Historical Notes

- This mentality continued well into the Middle Ages. Throughout these centuries the Church advocated the repression of female sexuality. It promoted chastity, abstinence, and female isolation.
- By the 18th century the female condition was no better, but it was believed that the female orgasm was necessary for reproduction. Yet, women were still encouraged to repress their sexual desires, and simply fulfill the needs of their husbands.

Storer 1856

- "Mrs. B.," age twenty-four and married to a much older man, sought the help of Dr. Horatio Storer, a gynaecologist and the future president of the American Medical Association, because of lascivious dreams.
- He reported that she "can hardly meet or converse with a gentleman but that the next night she fancies she has intercourse with him, ...though thinks she would at once repel an improper advance on the part of any man" (Storer 1856, 384). In fact, she "enjoys intercourse greatly" (with her husband) and has had sex with him nightly for the seven years of their marriage. The husband "has of late complained that he found physical obstruction to intercourse on her part, though she thinks it rather an increasing failure by him in erection" (Storer 1856,384). In this "Case of Nymphomania," Storer directed Mrs. B. to separate temporarily from her husband as well as to restrict her intake of meat and abstain from brandy and all stimulants to lessen her sexual desire, to replace the feather mattress and pillows with ones made of hair to limit the sensual quality of her sleep, and to take cold enemias and sponge baths and swab her vagina with borax solution to cool her passions. "If she continued in her present habits of indulgence," Storer argued, "it would probably become necessary to send her to an asylum" (Storer 1856, 385).

Freud's Contribution

- Penis Envy
 - According to Freud, this occurs when a girl realizes that she has no penis. "Girls hold their mother responsible for their lack of a penis and do not forgive her for their being thus put at a disadvantage"
- Hysteria
 - Freud suggested that the causes of hysteria were rooted in childhood sexual abuse. He later abandoned this theory and instead emphasized the role of sexual fantasies in the development of a variety of neuroses and illnesses in women.

Freud (cont)

- Clitoral orgasm
 - Less mature, associated with masturbation
- Vaginal orgasm
 - More mature, associated with intercourse

Masters & Johnson, 1960's

- "vaginal orgasm was caused by stimulation of the clitoris during intercourse"

Do women have a “lower” sex drive than men?

- Pop psychology suggests that....
 - Frequency of fantasy, masturbation and sexual activity lower in women
 - Within long term relationship, women lose interest in sex before men
 - “If I don’t love cake as much as you.....”

Baumeister, Cataneese, & Vohs (2001)

- Men have more frequent and intense sexual desire than women, as reflected in
 - spontaneous thoughts about sex
 - frequency and variety of sexual fantasies
 - desired frequency of intercourse
 - desired number of partners
 - masturbation
 - liking for various sexual practices,
 - willingness to forego sex
 - initiating versus refusing sex
 - making sacrifices for sex

Masturbation

- Kinsey (1950's)
 - 92% of men and 62% of women have masturbated during their lifespan
- 2007
 - 95% of men and 71% of women masturbated at some point in their lives.
 - 73% of men and 37% of women reported masturbating in the four weeks before their interview
 - 53% of men and 18% of women reported masturbating in the previous

Decker & Schmidt (2002)

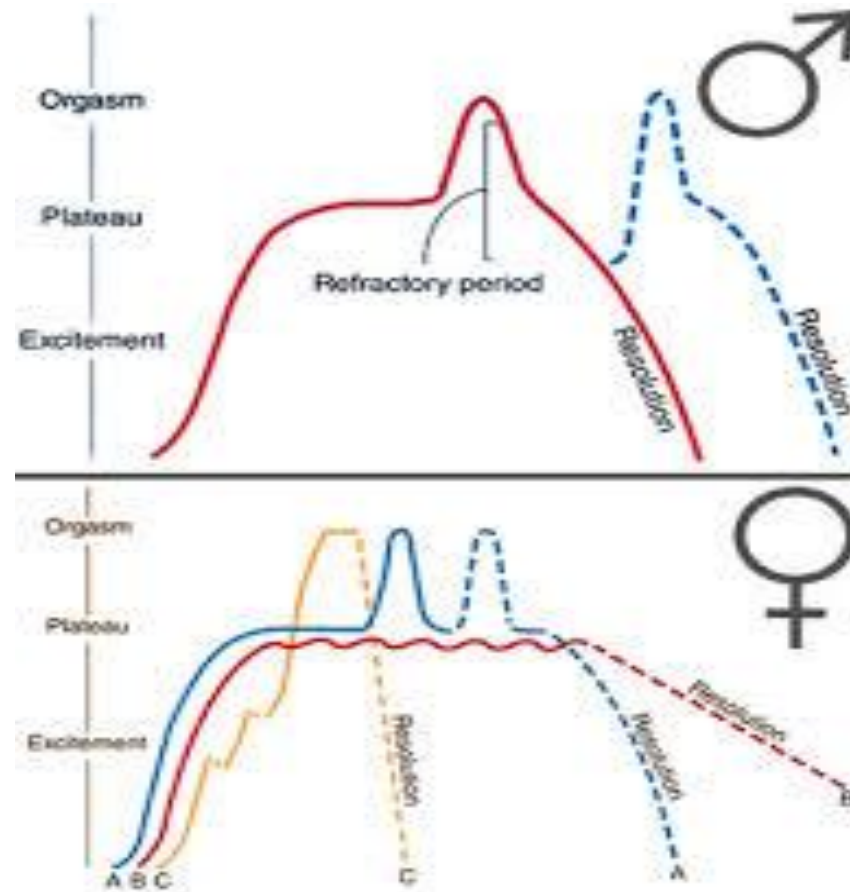
- Decker & Schmidt (2002) “Shifts in masturbatory behavior 1966-1981-1996”
 - men and especially women begin to masturbate (MA) considerably earlier than used to be in the 80s, not to mention in the 60s. As a consequence, most young women nowadays have already experienced MA when having their 1st heterosexual intercourse-thus following a pattern of sexual socialization that traditionally was typical for boys
 - adults now MA almost irrespective of whether they have intercourse often whether they are singles or live in a steady relationship or whether they are satisfied with their current relationship.
 - MA coexists with **sex** between partners and a loving relationship more often than it did in 1981 and 1960

The global study of sexual attitude and behaviors

- Brock et al., J Urol 2003
- Behavior, attitudes, beliefs, and satisfaction regarding sex, intimacy, and relationships among men and women
- 40-80 years old
- Women: 98% sexual concern
 - 87% hypoactive sexual desire
 - 83% orgasmic disorders
 - 72% dyspareunia sexual pain disorders
 - 34% decreased sexual interest
 - 19% sexual intercourse is not pleasurable
 - 23% decreased lubrication

PHYSIOLOGY

Normal female sexual response cycle



<http://commons.wikimedia.org/wiki/File:Sexual-response-cycle.png>

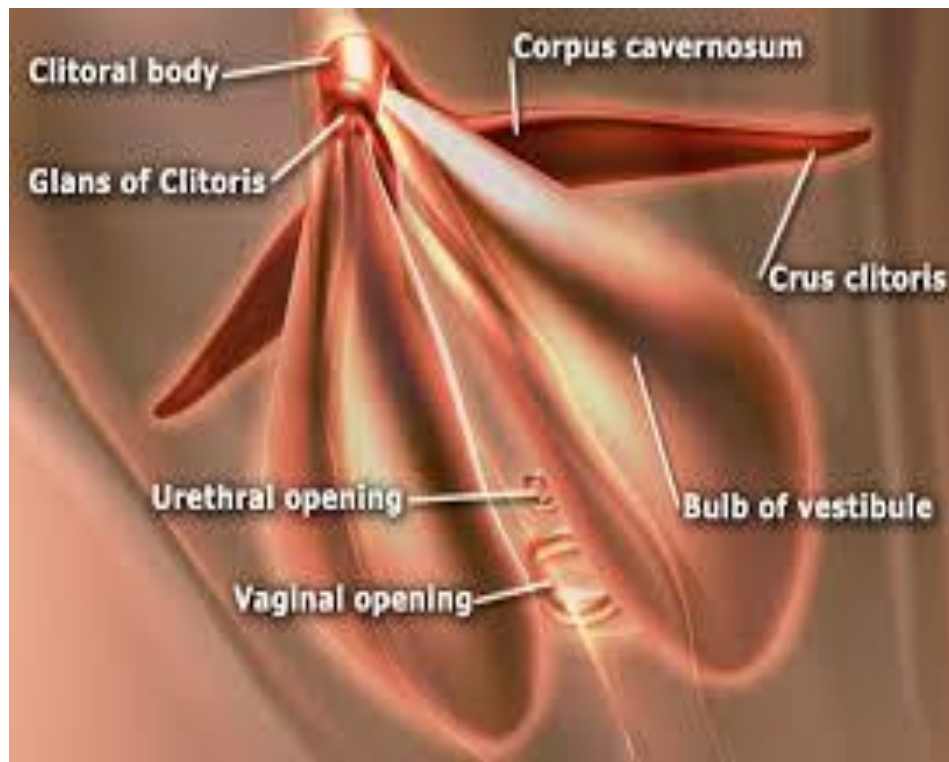
Masters & Johnson, 1966

Orgasm

- “The entire anterior vaginal wall, rather than one specific spot (G spot), were found to be erotically sensitive in most of the women examined. All other parts of the vagina had poor erotic sensitivity.

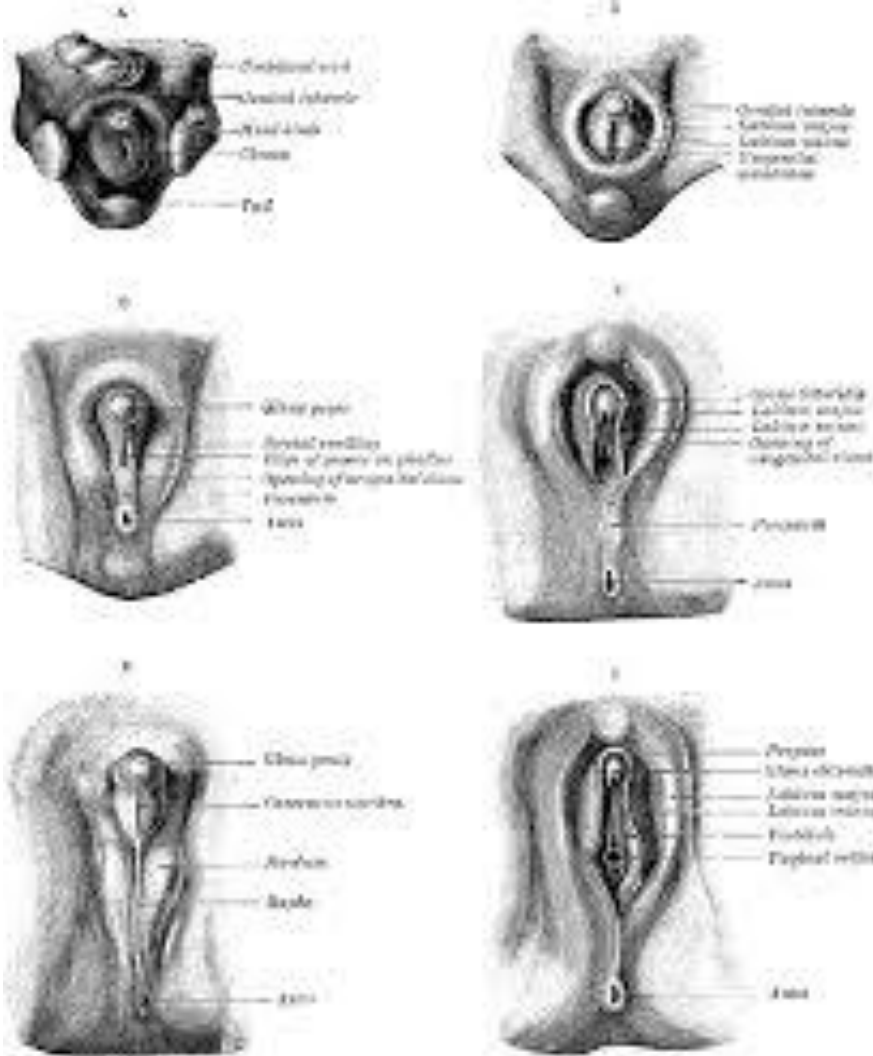
- This supports the conceptualization of a 'clitoral/vaginal sensory arm of orgasmic reflex' including the clitoris, the entire anterior vaginal wall as well as the deeper situated tissues.
Hoch Z. Acta Obstet Gynecol Scand 1986;65:767

Clitoris: physiology



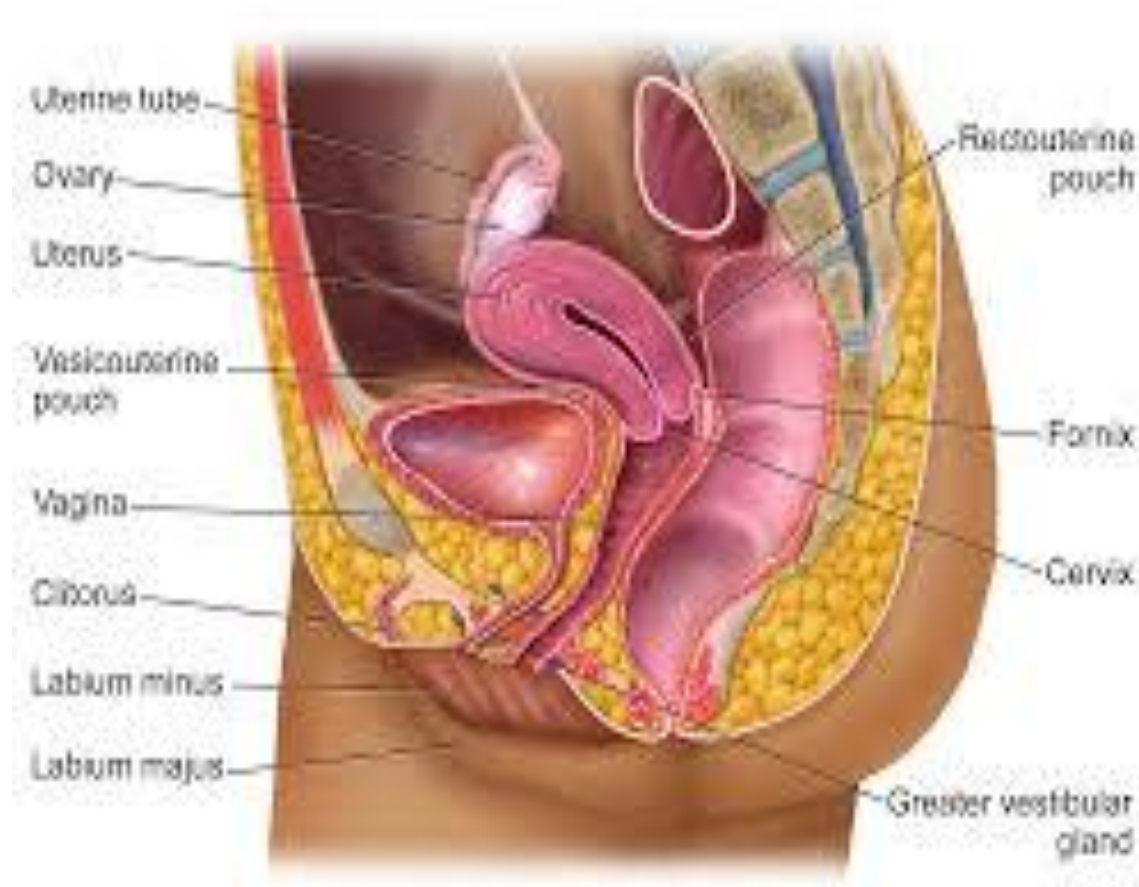
http://en.wikipedia.org/wiki/File:EdSim_Clitoris_anatomy.jpg

Embryological Development of Male and Female Genitalia



- Testosterone levels during the early postnatal period affects penile and clitoral development. Brown GR, et al. Int J Androl 1999;22:119-28
- X autosome translocations is associated with hypoplastic external genitalia with absent clitoris and labia minora, but normal internal genitalia. Omar HA, et al. J Pediatr Adolesc Gynecol 1999;12:161
- Fgf10 genes are regulating the development of the glans penis and the glans clitoris. Haraguchi R et al. Development 2000;127:2471

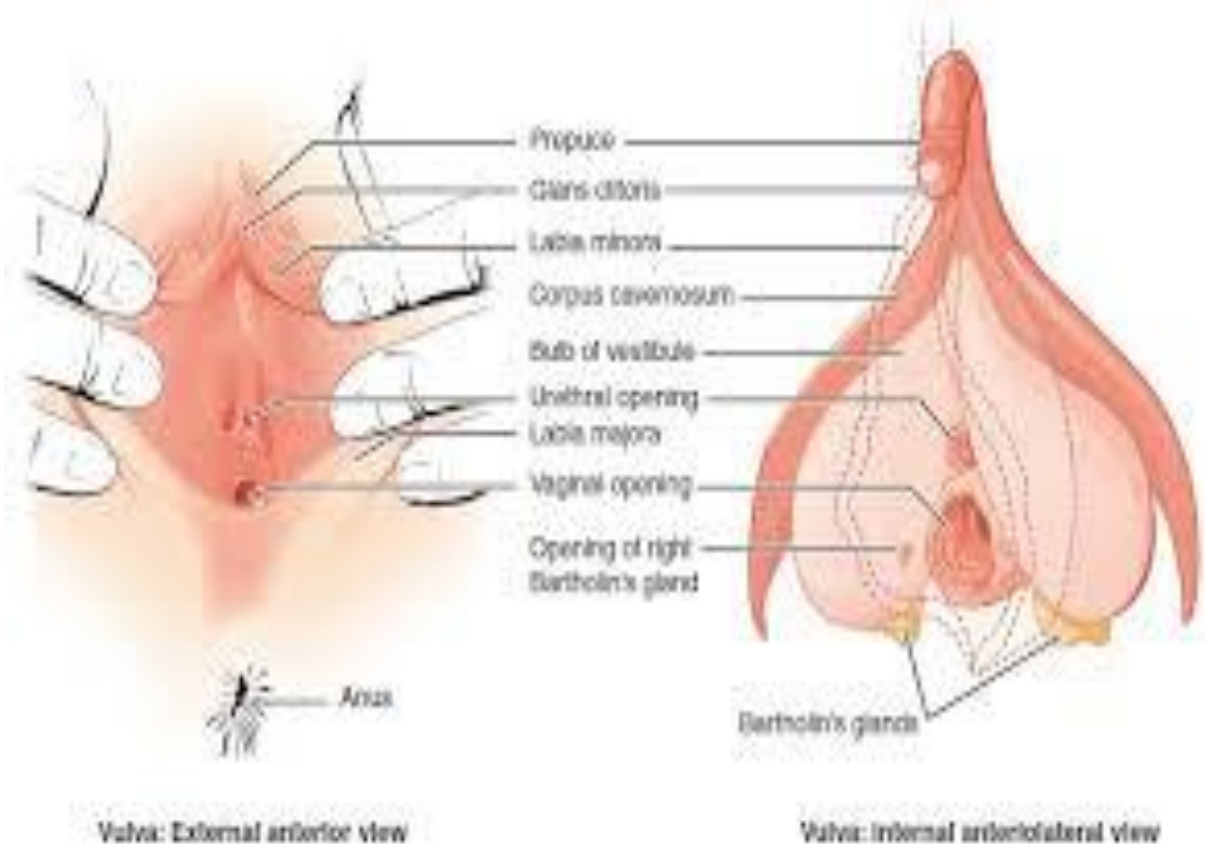
Clitoris: anatomy



The Female Reproductive System

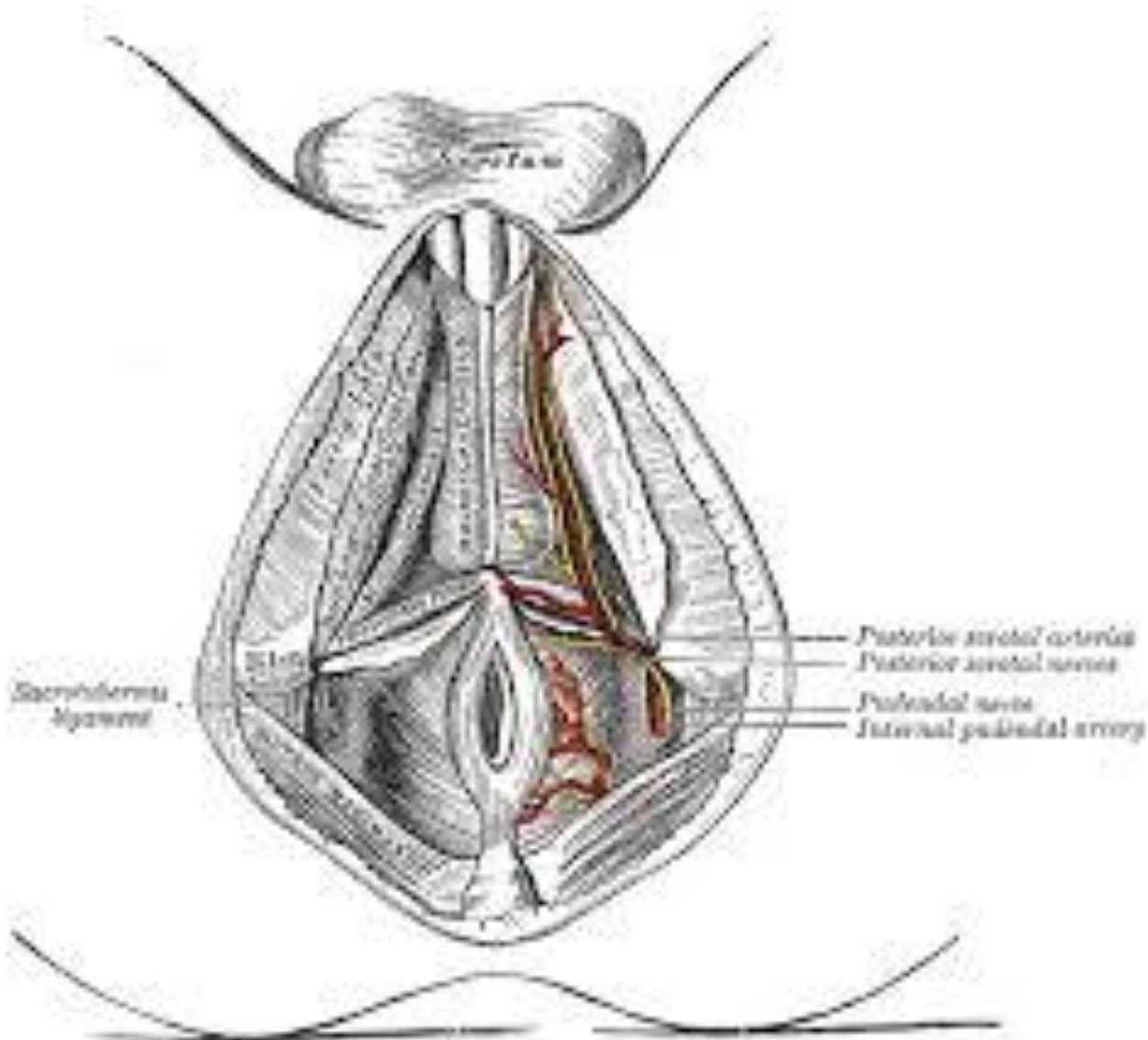
http://en.wikipedia.org/wiki/Female_reproductive_system#/media/File:Blausen_0400_FemaleReproSystem_02.png

Anatomical considerations



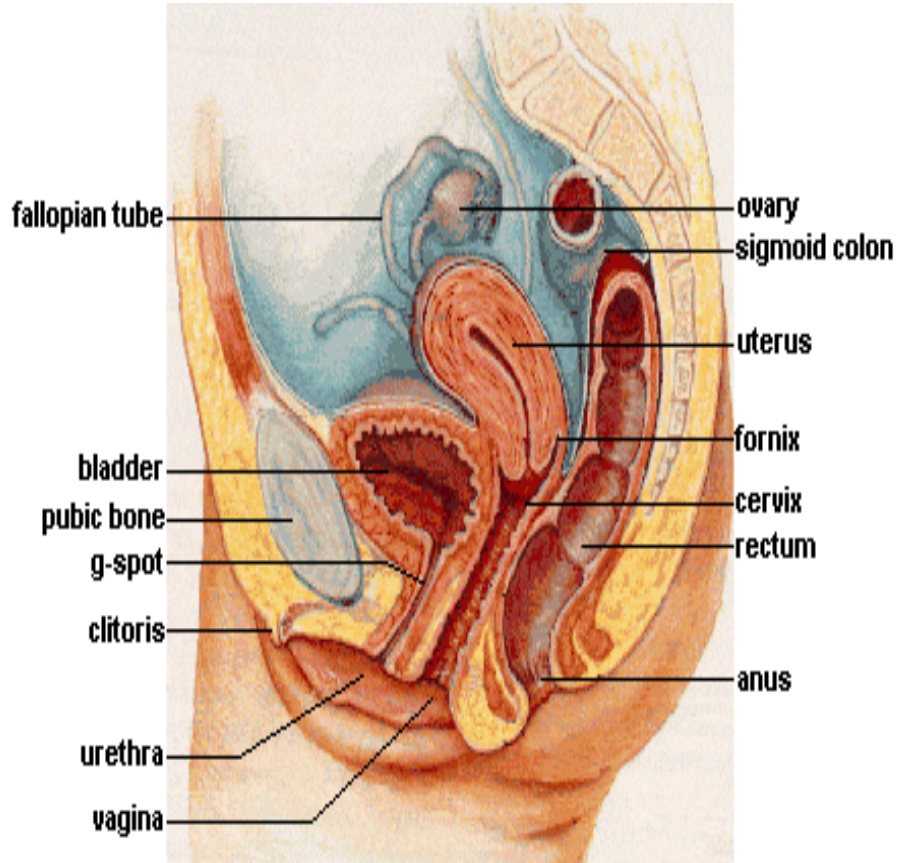
http://en.wikipedia.org/wiki/Clitoris#/media/File:Figure_28_02_02.jpg

Arteries



- Dorsal artery of the clitoris
- Posterior labial artery
- Common clitoral artery
- Perineal artery
- Internal pudendal artery

Aroused state



Vagina

- Increased length and width
- Increased blood flow
- Increased lubrication

Clitoris

- Increased blood flow
- Engorgement

Labia Minora

- Increased blood flow
- Engorgement

http://en.wikipedia.org/wiki/Human_sexuality#/media/File:Female_reproductive_system_lateral.png

Mechanisms of clitoral engorgement

Flaccid state: smooth muscles are tonically contracted (sympathetic)
Sexual stimulation: release of neurotransmitters/relaxation of smooth muscles

Dilation of arterioles: increased blood flow

Trapping of blood by the expanding sinusoids

Compression of venular plexuses reduce the venous outflow

Increase in intracavernous pressure (100 mmHg)

Further pressure increase with contraction of ischiocavernosus muscles

Mechanism of detumescence

- Transient intracorporeal pressure increase
- Smooth muscle contraction against a closed venous system
- Slow pressure decrease (reopening of veins)
- Fast pressure decrease (venous capacity is restored)

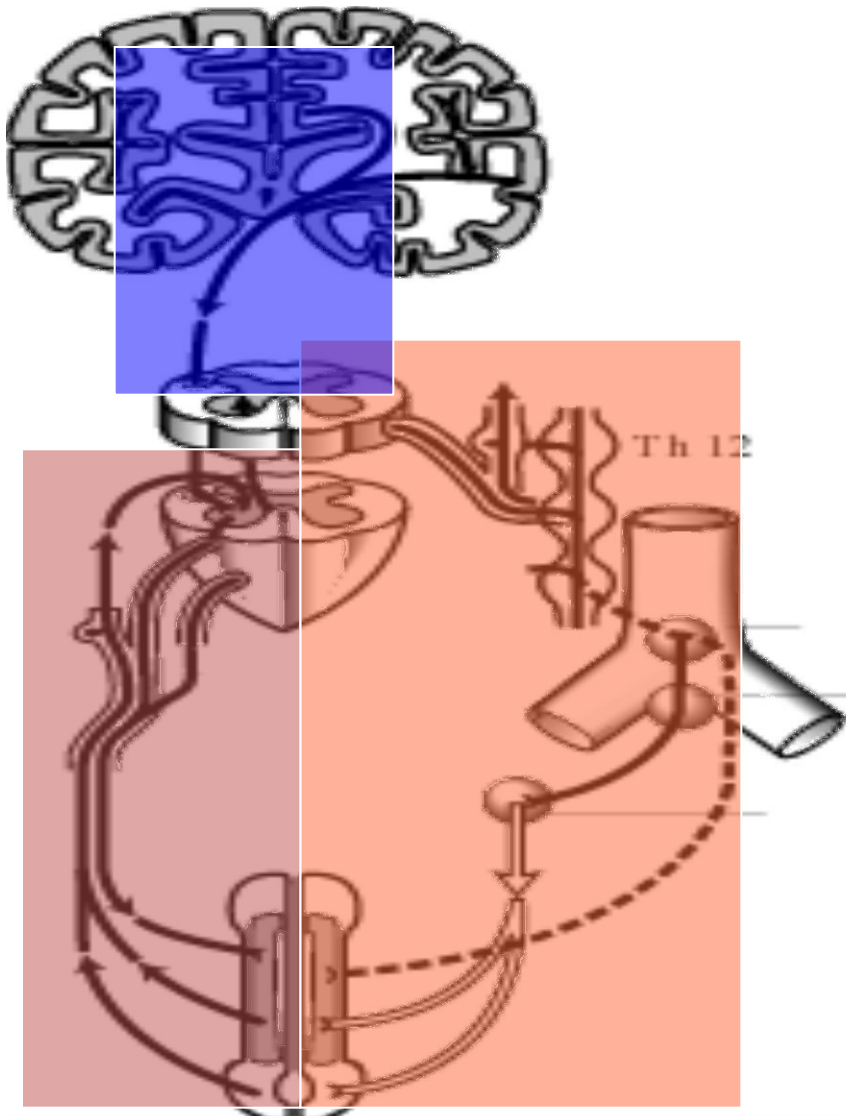
Engorgement

- Neurally initiated
- Smooth muscle activated
- Haemodynamically rigidified
- Sympathetically terminated

Full engorgement

- CNS Activation
- Neural Stimulation
- Clitoral Arterial Vasodilation
- Cavernous Relaxation
- Increased Inflow of Blood
- Expanded Sinusoids – Venous Occlusion

Neural processes of erectile response



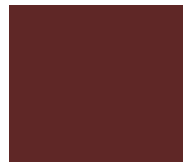
Central – hypothalamus:
PVN, MPOA



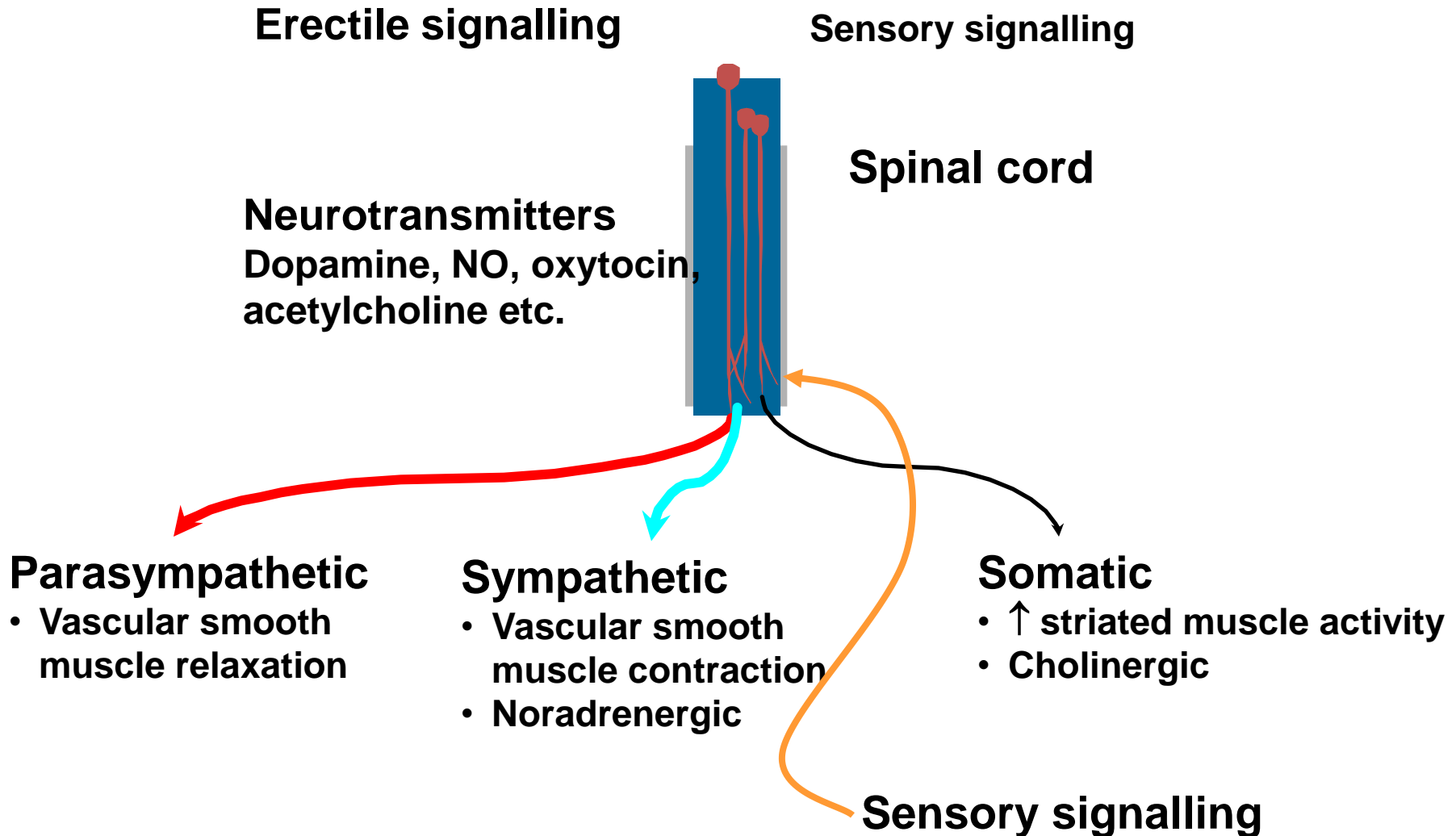
Spinal – sympathetic:
Thoracolumbar T11–L2



Spinal – parasympathetic:
Sacral S2–S4



Spinal processes



Neurotransmitters

Peripheral

- Norepinephrine
- Endothelin
- Thromboxane A2
- Prostaglandin F2a
- Prostaglandin E
- Acetylcholine
- NO
- VIP

Central

- Dopamine
- Oxytocin
- Serotonine (5-HT)
- Noradrenaline
- Prolactin
- Opioids

Role of NO in the physiology of clitoral engorgement

- Ach stimulates the release of NO from endothelial cells
- NO released from NANC neurons
- Synthesized from L-arginine by NO-synthase

- Increase the production of cGMP
- Relaxation of the cavernous smooth muscle (maintaining a very low intracellular Ca;
- Activation of cGMP-specific protein kinase-
- Inactivation of myosin light chain kinase

Clitoris: the role of NO

- nNOS immunoreactivity in nerve bundles and fibers within the glans and CC of the clitoris. eNOS immunoreactivity in vascular and sinusoidal endothelium with a predominance in the glans clitoris.

Burnett AL, et al. J Urol 1997;158:75

- Human clitoral CCSM tone is regulated by the synthesis and release of NO. Sildenafil inhibited cGMP hydrolysis.

Park K, et al. Biochem Biophys Res Commun 1998; 28;249:612

- EFS induces NANC relaxation responses in the clitoral CC of the rabbit.

Cellek S, Moncada S. Br J Pharmacol 1998;125:1627

- Sildenafil enhances EFS clitoral relaxation by a NO-cGMP dependent pathway.

Vemulapalli S, Kurowski S. Life Sci 2000; 26;67:23

- Clitoral CC pretreatment with NOS inhibitor accentuated ANGII contractions.

Park JK, et al. J Urol 2000;164:556

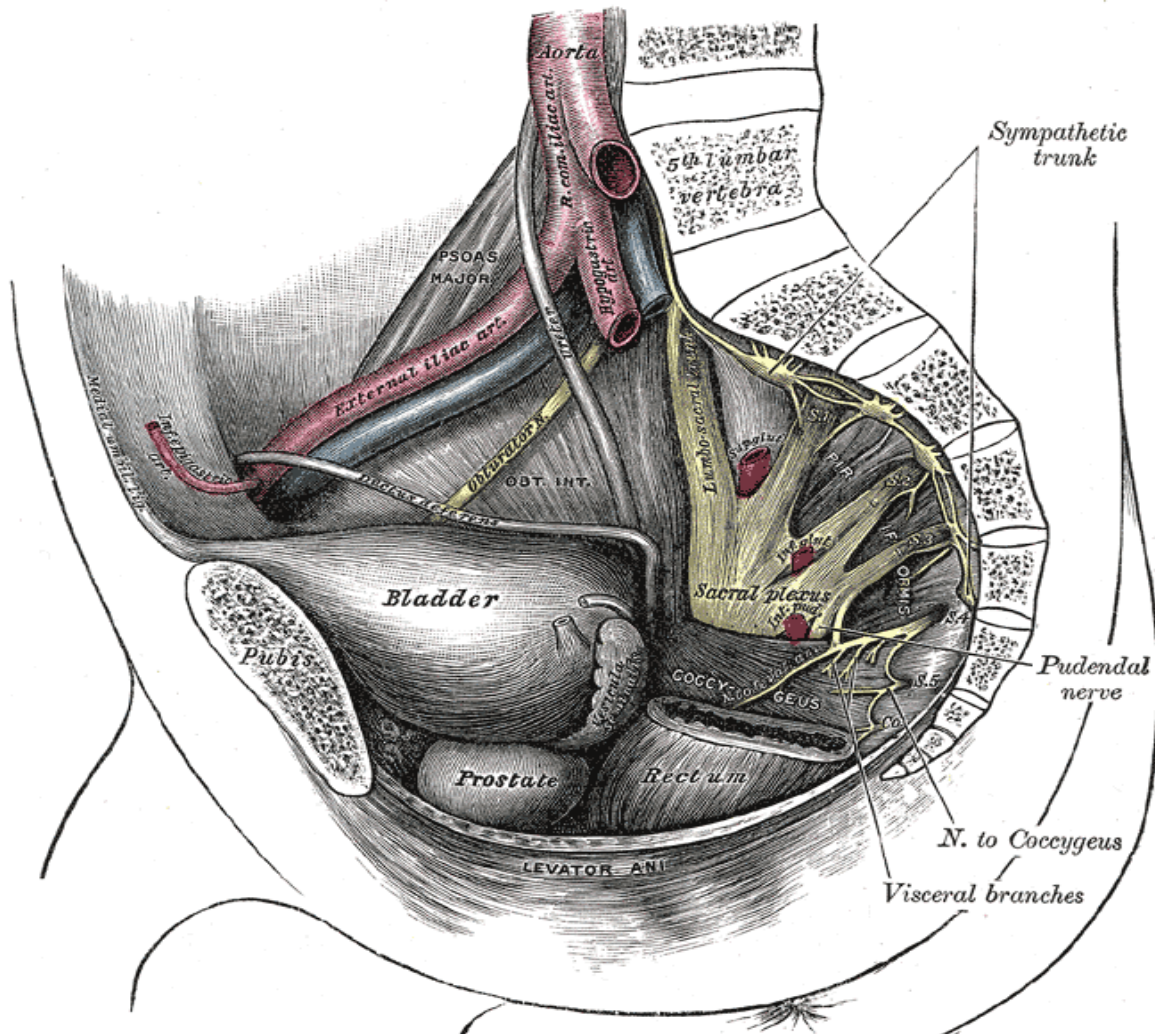
Vaginal engorgement and clitoral erectile insufficiency syndromes

“The first phase of the female sexual response, associated with neurotransmitter-mediated vascular smooth muscle relaxation, results in increased vaginal lubrication, wall engorgement and luminal diameter as well as increased clitoral length and diameter. Specific physiologic impairments of vasculogenic female sexual dysfunction include **vaginal engorgement and clitoral erectile insufficiency syndromes**.

These syndromes exist when during sexual stimulation abnormal arterial circulation into the vagina or clitoris, usually from atherosclerotic vascular disease, interferes with normal vascular physiologic processes. Clinical symptoms may include delayed vaginal engorgement, diminished vaginal lubrication, pain or discomfort with intercourse, diminished vaginal sensation, diminished vaginal orgasm, diminished clitoral sensation or diminished clitoral orgasm. “

Goldstein I, Berman JR. : Int J Impot Res 1998;10-S2:S84

Nerves



- Clitoral nerve
- Dorsal nerve of the clitoris
- Posterior labial branch
- Superficial branch of perineal nerve
- Deep branch of perineal nerve
- Pudendal nerve

Nerve fibers subtypes

Thermal sensation

Warm sensation- unmyelinated C fibers

Cold sensation- small myelinated A delta fibers

Vibratory sensation

Large myelinated A fibers

Female sexual response

- The two cavernosus muscles contracted on vaginal distension; The amplitude of contraction increased with the increase of volume of vaginal inflation.

Shafik A. Gynecol Obstet Invest 1993;35:114

- Electrical stimulation of the dorsal nerve of clitoris induced cortical somatosensory evoked potentials and bulbocavernosus reflex responses in women.

Vodusek DB. Electroencephalogr Clin Neurophysiol 1990;77:134

- Electrosensitivity of the dorsal nerve of the clitoris is diminished in incontinent women.

Varma JS, et al. Br J Obstet Gynaecol 1988;95:705.

Virus-labeled neurons after pseudorabies virus injection into the rat clitoris

Spinal cord:

- L5-S1
- T12-L4 and
- S2-S4.

Brain:

- nucleus
paragigantocellularis,
- raphe pallidus,
- raphe magnus,
- Barrington's nucleus,
- ventrolateral central gray,
- hypothalamus
- medial pre-optic region.

Female sexual dysfunction

Definition

A common problem

Detrimental effects on woman's quality of life

Dysfunction:

cause distress as opposed to a normal

physiologic response due to difficult circumstances

Epidemiology

- Man: 31%
Woman: 43%

Lauman et al., JAMA, 1999

- General population 60% of women <60 y. have some degree of SD.

Frank et al., N Eng J Med, 1978

- Associated with psycho-demographic characteristics: age, education, poor physical and emotional health, sexual abuse or coercion

Classification (DSM-IV)

1. Sexual desire/interest disorder
2. Sexual arousal disorders (genital, subjective, combined)
3. Orgasmic disorders
4. Dyspareunia and vaginismus
5. Persistent sexual arousal disorder

Disorders 1

- **Sexual interest/desire disorder**

Absent/diminished feelings of sexual interest or desire, absent sexual thoughts or fantasies, lack of responsive desire. Independent from duration, quality of relationship.

- **Arousal disorder**

Subjective: Absence of sexual arousal from any type of sexual stimulation. Lubrication occurs.

Combined: Absence of vulval swelling, lubrication.

Genital: Reduced sexual sensation from any type of stimulation. Excitement occurs from non-genital stimuli.

Disorders 2

- Orgasmic disorder

Despite of self-report of high sexual arousal, there is either lack of orgasm, marked diminished intensity of orgasmic sensations or marked delay of orgasm of any kind of stimulation

- Sexual pain disorder

Dyspareunia: Recurrent/persistent pain with attempted or completed vaginal entry.

Vaginismus: Difficulties to allow vaginal entry of any object despite the woman's expressed wish to do so. Involuntary pelvic muscle contraction.
Phobia

- Persistent sexual arousal disorder

Spontaneous intrusive/unwanted genital arousal in the absence of sexual interest and desire. Orgasm is possible, the feeling of arousal persists for hours/days.

Etiology

- Normative changes related to age menopause, pregnancy, parturition and breast feeding.
- Sexual activity remain constant (reasons to engage in sex other than desire)
- Even years after menopause, an increase in desire and interest with a new relationship
- Dyspareunia after operated vaginal delivery (14%) vs. CS and intact perineum (3.4%)

Psychological interpersonal factors

- Sexual and non-sexual distractions (insufficiently aroused, reaching orgasm, delayed ejaculation, fear of pregnancy or STD, lack of privacy)
- Mental well being 59% less distress. Correlation of desire complaints in women with low-self image, mood instability, tendency to worry/anxiety, loss of control
- Socioeconomic factors (poor educational background or low class)
- Memories of past negative sexual experiences

Hormonal, anatomical, vascular, neural

- Diabetes with peripheral neuropathy, angiopathy
- Vascular compromise decreased lubrication
- Pelvic surgery innervation, interruption of vascular supply
- Spinal cord injuries damage to sympathetic nervous system, orgasmic disorders
- Chronic kidney disease, cancer, lupus, rheumatic diseases, Parkinson's disease, fibromyalgia and chronic pain

Etiology of FSD

- Genital tract atrophy
- Genital surgery
- Neurological disease (stroke, spinal cord injuries, Parkinson)
- Endocrinopathies (Diabetes, Hyperprolactinemia, Hypogonadism, hypo-hyper thyreodism, liver and adrenal failure)
- Sexual abuse
- Peripheral vascular disease
- Psychological factors, life stressors
- Interpersonal, relationship disorders
- Medications

Drugs causing FSD 1

- Alkylating agents (cyclophosphamide)
- Antiandrogens (simecridine, spironolactone)
- Anticonvulsants
- Anticholinergics
- Antiestrogens (tamoxifen, raloxifen, GnRH-a)
- Antihistamines
- Antihypertensive (diuretics, β -blockers, Ca channel blockers)
- Drugs of abuse (Alcohol, sedatives, hypnotics)
- Metoclopramide
- Metronidazole
- Oral contraceptives
- Sympathomimetic amines

Drugs causing FSD 2

- NO, VIPs, estradiol maintain integrity of vaginal mucosal epithelium, promote lubrication
- Estrogens at baseline level required to make VIP and NO effective
- Estrogen (HRT) increase VIP and NO
- NO major neurotransmitter allowing the congestion of clitoris
- VIP increase blood flow through the vagina

Testosterone

- Decrease T: decrease libido, arousal, sexual response, sensation, and orgasm
- T affects CNS and sexual behavior
- T improves sexual desire after surgical menopause
- Lack of data for T supplementation in premenopausal women

Suggested hormonal investigations for FSD

- Estradiol or FSH if deficiency symptoms
- Serum testosterone
- DHEAS
- Free testosterone
- Prolactin

Clinical evaluation

- Are you currently in a sexual relationship
- Do you have any problem with desire arousal or orgasm
- If you are not sexual active, are there any particular problems contributing to you lack of sexual activity
- Do you have any concerns or questions about your sex life
- Please feel free to ask in future

Common symptoms/history

- Pelvic pain, distress about menses, general dissatisfaction with a contraceptive precaution, expression of distaste for the genital area or dissociation at the time of genital examination
- Sexual history: medical, reproductive, surgical, psychiatric, social, sexual information

Questions for assessment of FSD

- How does the patient describes the problem
- How long has the problem been present
- Was the onset sudden or gradual
- Is the problem specific to a situation/partner or is it generalized
- Were there likely precipitating events
- Are there problem in the woman's primary sexual relationship
- Are there life stressors that contributing to the sexual problem
- Is there guilt, depression, anger
- Are there physical problems (pain)
- Are there problems in desire, arousal, orgasm
- Is there a history of physical, emotional, sexual abuse
- Does the partner have any sexual problems

Main characteristic of sexual function

MALE

- Penile rigidity

FEMALE

- Genital sensation

Sexual function in the sexes

MALE

- Obvious
- Easy to characterize
- Measurable
- Cannot hide the problem from partner

FEMALE

- Occult
- Difficult to demonstrate
- Difficult to measure
- Can easily hide the problem from partner

Female Genital Sensory Testing

- Vaginal Thermode
- Vaginal Vibratory Probe on stand
- Clitoral Thermode
- Clitoral Vibratory Probe on stand

The most sensitive parameters

Site and Modality	Sensitivity	Specificity	Fisher exact Test p
Clitoral Vibratory	69%	83%	0.009
Clitoral Warm	65%	83%	0.02
Vaginal Warm	42%	93%	0.05

Vibratory Normal Sensory Thresholds

Site	Ascending	Descending
Vagina	4.3 mm (1-25)	3.57 mm (0.7-12)
Clitoris	1.6 mm (0.5- 15.4)	2 mm (0.3- 12.4)

Thermal Normal Sensory Thresholds

Site	Warm	Cold
Vagina	39.6 C ⁰ (37.8-48.3)	32.3 C ⁰ (16.8-35.8)
Clitoris	37.9 C ⁰ (37.2-39.0)	34.8 C ⁰ (29.2-36.2)

Y. Vardi et al: Urology, in press

Management 1

- Educate patient and the partner about normal physiologic response and anatomy
- Physiological changes with age
- Correlation with general health
- Cessation of smoking, alcohol consumption

Management 2

- Disorders of desire difficult to treat
- Psychotherapy/sex therapy
- Hormones (HRT, tibolone, T)
- Centrally acting agents (inhibition of serotonin, facilitating dopaminergic activity, or binding to melanocyte RCPs)
- Testosterone patch in post-menopausal women

No pharmacologic treatments are approved

Management 3

- SILDENAFIL unlicensed
- MASTER & JOHNSON: masturbation training to attend adequately sexual sensations
- ESTROGEN for arousal disorders
- Vaginal moisturizers

Management 4

- **ORGASM DISORDERS**

Women can achieve orgasm with some specific forms of stimulation but not with intercourse

Cognitive-behavioral approach

Comfortable with her body and sexuality

Alters negative attitudes and decreasing anxiety

Behavioral treatments

Directed masturbation

Sensate focus exercises

Systematic desensitization

Privacy

Management 5

- ***DYSPAREUNIA***

Ddx: vaginismus, atrophy, inadequate lubrication, vulvodynia.

Urethral disorders, cystitis, interstitial cystitis

Adhesions, infection, endometriosis, pelvic congestion

Touch the vagina with cotton or finger insertion: if pain vaginismus

Cognitive and behavioral psychotherapeutic approaches to decrease panic

Control vaginal muscles without automatic contraction

Vaginal dilators of increasing diameter

Botox injection into puborectalis

Management 6

- **PERSISTENT SEXUAL AROUSAL DISORDER**

Anti-depressant usage

Patient feel more comfortable when clinician knows her problem

Sex therapist

Psychosexual counseling (comprehensive interview, religion, the art of giving and receiving pleasure in a healthy relationship)

See the partner

Βιβλιογραφία

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Σημείωμα Αναφοράς

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- το Σημείωμα Αναφοράς
- το Σημείωμα Αδειοδότησης
- τη δήλωση Διατήρησης Σημειωμάτων
- το Σημείωμα Χρήσης Έργων Τρίτων (εφόσον υπάρχει)

μαζί με τους συνοδευόμενους υπερσυνδέσμους.

