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Chapter 23
Sexual arousal disorders in women

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Definitions

Arousal

Definitions of sexual arousal have in the past focused solely on the physiological aspect of genital arousal, i.e. genital vasocongestion, lubrication, tingling as well erection of the nipples and flushing of the skin as introduced by the largely phenomenological and objective descriptions by Dickinson (23), Kinsey (24) and Masters and Johnson (25).

However, in the clinical setting, women very often relate arousal to the subjective feeling of being 'turned' on more than the physiological response including vaginal lubrication, genital tingling and warmth. As such, there is a discrepancy between what has been defined as sexual arousal in many studies and what the women perceive as sexual arousal. In the clinical setting the women with decreased lubrication will typically complain of vaginal dryness or discomfort with intercourse and when referring to a lack of arousal, the complaints will more likely be about the lack of subjective excitement in her mind (26). This discrepancy was emphasised in the 2003 second consensus conference, which suggested a model including the genital response as well as the subjective response (27). Studies are being conducted to have more empirical evidence for the definitions proposed (28;29).

Arousal Disorder

Definitions of Female Sexual Arousal Disorder (FSAD) have undergone significant changes. In the Diagnostic and Statistical Manual of Mental Disorders (DSM-IV) FSAD was defined as: *"Persistent or recurrent inability to attain, or to maintain until completion of the sexual activity an adequate lubrication-swelling response to sexual excitement. The disturbance causes marked distress or interpersonal difficulty. The sexual dysfunction is not better accounted for by another AXIS I disorder (except another sexual dysfunction) and is not due to the direct physiological effects of substance abuse or a general medical condition"* (30).

The Consensus Conference 2000 defined FSAD as *"the persistent or recurrent inability to attain or maintain sufficient sexual excitement, causing personal distress, which may be expressed as lack of subjective excitement, or genital (lubrication/swelling) or other somatic responses"*. (31)

The Second International Consultation on Sexual Medicine made considerable changes in the definition of FSAD based on the observation that subjective arousal does not always correlate

strongly with genital congestion (32). This resulted in a subdivision of FSAD into three categories; subjective, genital and combined:

Subjective Arousal Disorder
"Absence of or markedly diminished feelings of sexual arousal (sexual excitement and sexual pleasure) from any type of sexual stimulation. Vaginal lubrication or other signs of physical response still occur" (33), p 982).

Genital Sexual Arousal disorder
"Complaints of absent or impaired genital sexual arousal. Self-report may include minimal vulval swelling or vaginal lubrication from any type of sexual stimulation and reduced sexual sensations from caressing genitalia. Subjective sexual excitement still occurs from non-genital sexual stimuli" (33), p 982).

Combined Genital and Subjective Arousal Disorder
"Absence of or markedly diminished feelings of sexual arousal (sexual excitement and sexual pleasure) from any type of sexual stimulation as well as complaints of absent or impaired genital sexual arousal (vulval swelling, lubrication)" (33), p 982).

Persistent Sexual Arousal Disorder (PSAD)

With the 2003 consensus a new category of female arousal disorder was described and recommended for inclusion in the diagnostic system, namely persistent sexual arousal disorder. It is defined as: *"Spontaneous, intrusive and unwanted genital arousal (e.g., tingling, throbbing, pulsating) in the absence of sexual interest and desire. Any awareness of subjective arousal is typically but not invariably unpleasant. The arousal is unrelieved by one ore more orgasms, and the feelings of arousal persist for hours or days"* (33) p 982. (PSAD will be discussed at the end of this chapter.)

For all definitions, FSAD can be divided into primary arousal problems, meaning that the woman has never experienced sufficient arousal despite sufficient desire and sexual stimulation, and secondary arousal disorder, in which the woman experiences decreased arousal but has previously been able to become aroused. The secondary arousal disorder can be generalized (it appears in all sexual situations) or situational (it only appears in some situations).

It is considered to be a disorder only if the woman is distressed by the problem (27) and assessment of relative distress is recommended as a part of the diagnosis. Furthermore, the degree of subjective distress may have implication for treatment motivation and in the end, treatment outcome (34).

At the present time, the DSM-IV or the first consensus report are the most widely accepted classifications. The revised definitions remain recommendations as they have not been included into the DSM or World Health Organization's International Classification of Disease (ICD-10). There is an ongoing evolvement of definitions of sexual disorders based on research and clinical data. The revised definitions provide greater specificity and refinement of the variety of sexual arousal disorders. These more specific and detailed diagnoses may be included in future diagnostic systems. In the meantime, they hopefully will be helpful in the clinical diagnosing and treatment of arousal disorders.

Prevalence

The prevalence of FSAD is based on the conventional definitions of arousal, namely genital measures, mostly lubrication. As such, most epidemiological research has focused on the genital arousal disorder. Furthermore, many epidemiological investigations haven't included the distress factor in their investigations, making it difficult to give accurate estimates on how large the problem really is. The epidemiological investigations of the prevalence of arousal problems show considerable differences between the different investigations, ranging overall from 6% up to 49% of the women who were asked, with a majority of prevalence ranging between 13 – 24% (35-41). Two studies have demonstrated that the prevalence of FSAD is increased with increasing age, peaking after the age of 50 years (39;40). In a Swedish study it was found that in women aged 50 or more, approximately 25 % complained of lubrication problems, while 6 -11 % of women aged 18- 49 had lubrication problems (40).

Pathophysiology

Biological factors

As described in the section on anatomy and physiology, lubrication and genital congestion rely on intact nerve-mediation and vascular function, as well as the hormonal milieu, which is crucial for a moistened vagina. Therefore, disruptions in any of these parameters may result in impaired genital arousal response.

An estrogenized milieu is strongly correlated with the ability to lubricate and genital arousal disorders are therefore correlated to the menopausal transition (42-44). Furthermore, genital arousal disorder may be associated with medical diseases, e.g neurological conditions affecting the autonomic nervous system, diabetes mellitus with neuropathy and vascular complications, medical therapies, e.g surgical procedures or radiation damaging tissue structures and autonomic nerves and vessels. Recurrent urinary tract infections also affect the arousal response as well as recurrent vaginal infections, which creates irritation and pain and decreased lubrication.

Psychosocial and context-dependent factors

Many factors may influence the women's arousal, both the genital and the subjective:

- Lack of desire
- Sexual inhibition
- Lack of awareness of genital responses
- Anxiety, fear, lack of energy
- Lack of intimacy or sufficient sexual stimulation
- Partner sexual problems
- Contextual factors which can be past, current or medical (e.g life situation, negative upbringing, losses, trauma, risk of unwanted pregnancy or of SDI, lack of privacy, the situation is inappropriate, time of the day, interpersonal problems, substance abuse)

Clinical approach

Loss of arousal is multifactorial and might be caused by biological, motivational, relational and cognitive factors. A thorough medical and sexological history and a medical examination is therefore of great importance when evaluating the women (as described in chapter 20 There is a focus on biological, sexological, psychological and relational factors, as well as predisposing, precipitating and maintaining factors. Finally the degree of distress should be evaluated. In box 1 are suggestions for questions that can be helpful in the initiation of the assessment of the problem.

Sexological history:

What type of arousal disorder does she have?

- Is she mentally sexual excited, e.g from:
    - reading, viewing, hearing erotica
    - stimulating the partner
    - receiving sexual stimulation to non-genital and genital areas
    - deliberate sexual fantasy or recall of sexual memories
- Direct awareness of genital congestion:
    - Tingling, pulsing, throbbing in response to the above stimuli, vaginal lubrication
- Indirect evidence of genital congestion:
    - Progressively intense sexual sensation from direct massaging of vulval structures with her or partners fingers, partners body, oral stimulation, dildo, penile-vulval contact
- Is there co-morbidity with other sexual disorders?
    - Is there a desire problem, a pain problem or an orgasm problem?
    - What came first? Is the arousal problem secondary to other sexual problems or the primary problem?
- Is she distressed by the condition? (27)

Psychological and relational history:

- Cognitive and affective evaluation
    - Clarify her thoughts: is she feeling distracted, feeling tired, feeling sexually substandard, worried that the outcome would be negative, unsafe situation (pregnancy, STIs), feeling used, not being considered, unhappy about their sexual intimacy/ practices?
    - Clarify her emotions: is there sadness, embarrassment, guilt, awkwardness, displeasure?
- Relational evaluation
    - Does the pa(lifertner have a sexual dysfunction? (erectile dysfunction, low desire, rapid or delayed ejaculation or orgasmic disorders)
    - Is she attracted to her partner, are there relational problems? (e.g is she disturbed by the inadequacy if his personal hygiene, are there conflicts, aggressiveness, abuse or limited privacy?) (27;45;46).

Medical and gynaecological history:

- Menstrual cycle, menopause (natural or surgical), pregnancy/ breast feeding:
    - Is it related to menstrual irregularities, breastfeeding, the menopause or oral contraceptives?
    - Gynaecological and obstetric history.
- Somatic problems. Does she have diseases known to predispose to lubrication problems?
    - Diabetes, recurrent lower urinary tract infections, recurrent vaginal infections, neurological diseases (multiple sclerosis, neuropathies, Sjögren's syndrome).
- Iatrogenic causes
    - Surgical procedures in the genital area, the pelvis or lower abdomen with damage of the genitalia as well as vasculature or nerves, e.g hysterectomy, pelvic cancer, episiotomy, raphy with retracted/painful scarring.
    - Radiation therapy of the pelvic/ genital area
- Psychiatric diseases that may influence the arousal response
    - Phobias, anxiety, depression
- Medication that may affect lubrication and/ or desire (see chapter 26)

Physical examination:

A general physical exam is highly recommended and can be directed by the medical history and its outcome. However, a gynaecological examination is always recommended. For women with genital arousal disorder, the information will be limited, as the genitalia are in the non-aroused state, but vaginal dystrophy suggesting estrogen deficiency or rarer conditions can be identified, as described below. For women with subjective or combined arousal disorders, there most likely will be no abnormality. Nevertheless a 'normal' exam can be highly informative for the woman (27;47).

The gynaecological examination should focus on:

- Inspection: vulvar anatomy. Are there any changes/ abnormalities?
    - e.g signs of inflammation, poor outcome of pelvic or perineal surgery, signs of Lichen Sclerosus or Lichen Planus, as well as involution or conglutination of the clitoris.
    - Skin colour and quality. Is the skin thin and dry, or pink, supple and elastic? Are there fissures, eczema, papules, pustules, vesicles or ulcerations?
    - Does the vaginal mucosa appear estrogenized and moistened or does it appear atrophic with inflammation, fissures, erosions and ulcers?
    - Does the speculum examination show signs of atrophy (e.g petechiae or atrophy discharge)?
- Palpation:
    - Signs of myogenic or referred pain, or associated uro-genital and rectal pain. If the women experience pain, the pain map should be identified as described in subchapter on Sexual pain disorders: dyspareunia and vaginismus. Pain is a strong reflex inhibitor of lubrication and therefore an important point to investigate.
    - Pelvic floor trophism, muscular tone and strength
    - Scarring
- Sampling:

- Determination of pH, which gives indirect evidence of tissue estrogen level and related vaginal ecosystems
- Sampling and culture of discharge when infection is suspected

Laboratory tests:

Laboratory tests may be directed by relevant symptoms or findings in the general medical assessment. If low desire is comorbid or suspected as the reason for low arousal (genital as well as subjective or combined), testosterone status is recommended (including free testosterone).
Plasma-levels of estrogens can give information on the endocrine component of arousal disorder and the menopausal status (see also subchapter on Hormonal Therapy after Menopause). However, plasma levels are not sufficient indicators of the experienced degree of vaginal dryness (48). Prolactin levels should be checked if there is co-morbidity with marked oligomenorrhea or amenorrhea, and/ or if bilateral breast milky discharge is present (not related to lactation). If the clinical history or objective findings suggest hypothyroidism, TSH should be evaluated.

Investigational tests:

Vaginal plethysmography may be used to quantify the haemodynamic changes with female sexual arousal. The every day use of the method in clinical work is questionable. This is due to the lack of a true baseline, the limited number of studies comparing women with disorders and functional women and the difficulties in drawing conclusions on findings from one measurement. Furthermore, several studies have not found a correlation between the subjective report of arousal and the objective measured by the method (28;49). As such the method is at the present time mostly investigational.

Duplex Doppler Ultrasound can be used to measure changes in the clitoral, vaginal, labial and urethral blood flow, e.g it can be measured before and after sexual stimulation. Use of this method as a standard part of the evaluation is uncertain as larger studies still need to be conducted to identify cut-off values, normative data, correlation between disorder and objective parameters, as well as correlation between subjective and objective data. In the future it may have a role in the diagnosing, e.g in women with atherosclerotic changes leading to genital arousal problems (10;49;50).

Principles of treatment of Sexual Arousal Disorder

If possible, treatment should be based on the etiologic diagnosis directed toward biological, psychological/relational or combined factors. In the clinical situation, arousal disorder is often combined with desire and/or orgasmic disorders and a more integrative treatment will then focus on the other disorders that may lead to arousal disorder (see also subchapters on desire, orgasm and pain-disorders). Furthermore, different treatment modalities should be chosen depending upon the type of arousal disorder.

Women with **subjective or combined arousal disorder** may benefit from a treatment focusing on awareness of genital responses and becoming subjectively aroused. The techniques that can be used

are cognitive-behavioural techniques and/or traditional sex-therapy with sensate focus or psychodynamic treatment. Women with **genital arousal** disorder may benefit from pharmacological treatment enhancing genital congestion and lubrication.

Non Pharmacological treatment of arousal disorder.

There are no published outcome studies describing psychological treatment of arousal disorders in women (27;29).

Pharmacological treatment of arousal disorder *can be* ***hormonal*** *and* ***non-hormonal treatment****.*

Hormonal treatment.

For women who are estrogen deficient, several studies have shown that local or systemic estrogens may improve vaginal lubrication and decrease vaginal irritation and dryness.

A Cochrane review showed that local estrogen in women with vaginal atrophy had a positive effect on dryness and dyspareunia, no matter how the local estrogens were applied (creams, tablets, vaginal ring or pessaries) compared to placebo when given regularly and continuously (51).

Systemic treatment with estrogens without or with progesterones has been shown to decrease vaginal dryness, irritation and pain compared to placebo in surgical and natural postmenopausal women, although a large interpatient variability has been observed (52-54). As discussed in the subchapter on Hormonal Therapy after Menopause, the latest knowledge on adverse events related to long-term hormone therapy (HT) after the menopause has changed the recommendations on how and how long HT should be used. It is therefore important to individualize recommendations and treatment of women with arousal problems who may benefit from HT. If HT is recommended for sexual problems and there is no effect it shall also be considered whether it shall be continued. For more discussion see the subchapter on Hormonal Therapy after Menopause.

Tibolone is a synthetic steroid with estrogen, progesterone and some androgenic effect. In one large study it has been demonstrated to improve lubrication, but it is doubtful whether the effect on lubrication is better than estrogen substitution. However, as Tibolone has a weak androgenic effect, it may be a choice for women with decreased desire and arousal, although larger scale studies still are needed (55-57).

Non-hormonal treatment

At the time of writing (January 2006) there are no approved non-hormonal pharmacological treatments for arousal disorders.

The success of vasoactive agents in the treatment of male sexual arousal dysfunction (i.e erectile dysfunction) has encouraged the search for vasoactive agents that enhance women's genital congestion and vaginal lubrication. However, the results until today are limited and mainly on postmenopausal women. The explanation is most likely that there is a lack of recognition of the

need to distinguish between genital arousal and subjective arousal, i.e the women may have impaired genital congestion that can be reversed by drugs, but the women do not necessarily identify this as decreased arousal.

Sildenafil has been investigated in several studies for treatment of female sexual problems. In a few studies in women identified with arousal disorder benefit has been shown, however in women with hypoactive desire disorder there is limited effect. As such, sildenafil (and other phosphodiesterase inhibitors), may be beneficial in specific groups of women with genital arousal disorder who recognize the effect on vasocongestion (28;58-60).

Local lubricants applied intravaginally can be useful for women with genital arousal disorder and are often used in the clinical setting. Oil based lubricants should not be used with latex products that are being used for birth control (such as the male condom) or for safer sex (such as a dental dam or male condom). The latex will be destroyed by oil based products and will not be effective."

The EROS-CTD device (Clitoral Therapy Device) has been approved by the FDA as therapy for FSD. The EROS-CTD is a small, battery-powered device designed to enhance clitoral engorgement, increase blood flow to the clitoris and vascular response. Only few, small non-controlled studies exist on the effect and no data exist on the long-term effect (61-64).

Conclusion

Arousal disorders with impaired arousal response can be defined as genital, subjective or combined arousal disorder. The prevalence varies and is increased with increasing age, especially at the time of menopause. Arousal disorders are often comorbid with desire disorder or orgasm and pain disorders. In the evaluation, a thorough sexological history as well as medical and gynaecological history and examination should be carried out. Treatment should be based on type of arousal disorder and clinical findings. PDE-5 inhibitors and HT may be of benefit if there is genital arousal disorder. Women with subjective or combined arousal disorder may benefit from a treatment focusing on awareness of genital responses and becoming subjectively aroused. The techniques that can be used are cognitive-behavioral techniques, traditional sex-therapy with sensate focus or psychodynamic treatment and vaginal lubricants.

Persistent Sexual Arousal Disorder (PSAD)

PSAD is a poorly documented condition characterized by persistent genital arousal in the absence of conscious feeling of sexual desire, which has recently included as a provisional diagnosis (32). The literature on PSAD is limited and is mainly based on case-reports.

Prevalence
The **prevalence** of PSAD is unknown.

Pathophysiology
To date the pathophysiology is unknown and no obvious hormonal, vascular, neurological or psychological causes have been identified. However, the major etiological hypothesis are: 1) central neurological changes; 2) peripheral neurological changes; 3) vascular changes; 4) mechanical

pressure against genital structures; 5) medication-induced changes; 6) psychological changes or combinations of all five (65-67).

Clinical approach

As very little is known about the condition, it is difficult to give clear guidelines for the clinical approach. As the women may be very embarrassed by the condition, it is important that the physician is aware of the condition and we recommend a medical and gynaecological history and examination as described above for decreased arousal disorder. Many women may benefit from realizing that they are not alone with the symptoms and can be referred to: www.TWSHF.org

If the condition is caused by abnormal clitoral blood flow, a Duplex ultrasound may help identifying this (65).

Principle of treatment

As no single cause for PSAD has been identified and there is a lack of substantial experience with treatment, therefore, no single treatment can be recommended (68).

Conclusion

PSAD is a poorly documented condition with unknown prevalence and etiology. No accepted treatment can be recommended. In the clinical evaluation it is important to be aware of the condition and perform a thorough medical and gynaecological examination and help the woman to feel that she is not alone with this condition and it probably is not psychological.

Box 1. Text: Questions of importance when evaluating women with FSAD

1. Can you describe your problem in your own words?
    - When she describes the problems ask clarifying question in order to find out whether it is the primary problem or secondary to other sexual disorders. Arousal disorders are very often secondary to desire disorders.
2. Has the problem always been there?
    - If yes, check psychosexual and relational factors first and awareness/lack of awareness of signs of genital arousal
    - If not, ask when it appeared and what - in the patient's opinion- might have triggered the problem. Did it come slowly or suddenly?
3. Are you sexually active? With or without a partner?
    - If she is regularly sexually active, is she pleased with the activity? Are there differences in her response?
    - Does she enjoy intercourse?
    - Does she masturbate? If yes, is the problem also present when she masturbates?
4. Is the problem limited to your partner/ and or to a special context/ situation?
    - If yes, check relational and contextual factors
    - If no, and the problem is generalized, check personal psychosexual factors and biological factors
5. Does your partner have a sexual problem?
    - e.g erectile dysfunction, desire problem, orgasm problem or rapid or delayed ejaculation? Be aware that she can be the 'carrier' of the partner's sexual dysfunction.

6. What does the problem mean to you?
   - To estimate the degree of distress. Does it lead to frustration, guilt, shame or other feelings?
7. What does the problem mean to your partner?
   - What does it mean for the relationship?

Reference List

1. O'Connell, H. E.; Sanjeevan, K. V. Anatomy of female genitalia. Goldstein, I., Meston, C., Davis, S. R, and Traish, A. Women's Sexual Function and Dysfunction. Study, Diagnosis and Treatment. London: Taylor & Francis; 2006. pp.105-12.

2. Tarcan, T., Park, K., Goldstein, I., Maio, G., Fassina, A., Krane, R. J., and Azadzoi, K. M. Histomorphometric Analysis of Age-Related Structural Changes in Human Clitoral Cavernosal Tissue. J.Urol. 1999;161(3):940-4.

3. Jannini, E. A.; D'Amati, G.; Lenzi, A. Histology and immunohistochemical studies of female genital tissue. Goldstein, I., Meston, C., Davis, S. R, and Traish, A. Women's Sexual Function and Dysfunction. Study, Diagnosis and Treatment. London: Taylor & Francis; 2006. pp.125-48.

4. Grafenberg, E. The Role of Urethra in the Female Orgasm. Int.J.Sexology 1950;3:145-8.

5. Meston, C.; Hull, E.; Levin, R. J.; Sipski, M. Women's Orgasm. Lue, T. F., Basson, R., Rosen, R., Giuliano, F, Khoury, S, and Montorsi, F. Sexual Medicine. Sexual Dysfunctions in Men and Women. 2 ed. Paris: Health publications; 2004. pp.783-850.

6. van Houten, T. Anatomy of the pelvic floor and pelvic organ support system. Goldstein, I., Meston, C., Davis, S. R, and Traish, A. Women's Sexual Function and Dysfunction. Study, Diagnosis and Treatrment. London: Taylor & francis; 2006. pp.134-48.

7. Giraldi, A.; Levin, R. J. Vascular physiology of female sexual function. Goldstein, I., Meston, C., Davis, S. R, and Traish, A. Women's Sexual Function and Dysfunction. Study, Diagnosis and Treatment. London: Taylor & Francis; 2006. pp.174-80.

8. Goldstein, I.; Heiman, J.; Johannes, C; Laan, E.; Levin, R. L; McKenna, K. E. Female Sexual Dysfunction. Jardin, A, Wagner, G., Khoury, S, Giuliano, F, Padma-Nathan, H., and Rosen, R. Erectile Dysfunction. 1st International Consultation on Erectile Dysfunction. 1 ed. Plymouth: Plymbridge Distributors Ltd; 2000. pp.507-56.

9. Giuliano, F; Julia-Guilloteau, V. Neurophysiology of female genital sexual response. Goldstein, I., Meston, C., Davis, S. R, and Traish, A. Women's Sexual Function and Dysfunction. Study, Diagnosis and Treatment. London: Taylor & Francis; 2006. pp.168-73.

10. Berman, J. R., Berman, L. A., Werbin, T. J., Flaherty, E. E., Leahy, N. M., and Goldstein, I. Clinical Evaluation of Female Sexual Function: Effects of Age and Estrogen Status

on Subjective and Physiologic Sexual Responses. Int.J.Impot.Res. 1999;11 Suppl 1:S31-S38.

11. Deliganis, A. V., Maravilla, K. R., Heiman, J. R., Carter, W. O., Garland, P. A., Peterson, B. T., Hackbert, L., Cao, Y., and Weisskoff, R. M. Female Genitalia: Dynamic MR Imaging With Use of MS-325 Initial Experiences Evaluating Female Sexual Response. Radiology 2002;225(3):791-9.

12. Maravilla, K. R., Cao, Y., Heiman, J. R., Garland, P. A., Peterson, B. T., Carter, W. O., and Weisskoff, R. M. Serial MR Imaging With MS-325 for Evaluating Female Sexual Arousal Response: Determination of Intrasubject Reproducibility. J.Magn Reson.Imaging 2003;18(2):216-24.

13. Maravilla, K. R., Heiman, J. R., Garland, P. A., Cao, Y., Carter, W. O., Peterson, B. T., and Weisskoff, R. M. Dynamic MR Imaging of the Sexual Arousal Response in Women. J.Sex Marital Ther. 2003;29 Suppl 1:71-6.

14. Levin, R. J. The Mechanisms of Human Female Sexual Arousal. Ann.Rev.Sex Res. 1992;3:1-48.

15. Levin, R. J. The Ins and Outs of Vaginal Lubrication. Sexual and Relationship Therapy 2003;18(4):509-13.

16. Wagner, G.; Levin, R. J. Vaginal fluid. Hafez, ESE and Evans, TN. The human vagina. Amsterdam: Elsevier/ North-Holland Biomedical Press; 1978. pp.121-37.

17. Giuliano, F., Rampin, O., and Allard, J. Neurophysiology and Pharmacology of Female Genital Sexual Response. J.Sex Marital Ther. 2002;28 Suppl 1:101-21.

18. Levin, R. J. and Macdonagh, R. P. Increased Vaginal Blood Flow Induced by Implant Electrical Stimulation of Sacral Anterior Roots in the Conscious Woman: a Case Study. Arch.Sex Behav. 1993;22(5):471-5.

19. Levin, R. J. VIP, Vagina, Clitoral and Periurethral Glans--an Update on Human Female Genital Arousal. Exp.Clin.Endocrinol. 1991;98(2):61-9.

20. Angulo, J, Cuevas, P, Bischoff, E, and Saenz De Tejada, I. Vardenafil Enhances Clitoral and Vaginal Blood Flow Response to Pelvic Nerve Stimulation in Female Dogs. Int.J.Impot.Res. 2003;15(2):137-41.

21. Laan, E., van Lunsen, R. H., Everaerd, W., Riley, A., Scott, E., and Boolell, M. The Enhancement of Vaginal Vasocongestion by Sildenafil in Healthy Premenopausal Women. J.Womens Health Gend.Based.Med. 2002;11(4):357-65.

22. Min, K., Kim, N. N., McAuley, I., Stankowicz, M., Goldstein, I., and Traish, A. M. Sildenafil Augments Pelvic Nerve-Mediated Female Genital Sexual Arousal in the Anesthetized Rabbit. Int.J.Impot.Res. 2000;12 Suppl 3:S32-S39.

23. Dickinson, R. L, Human Sex Anatomy. 2nd ed. London: Balliere, Tindal & Cox; 1949.

24. Kinsey, A. C, Pomeroy, W. B, Martin, C. E, and Gebhard, P. H, Sexual Behavior in the human female. Philadelphia: W.B.Saunders; 1953.

25. Masters, W. H and Johnson, V. E, Human sexual response. Boston: Little; Brown; 1966.

26. Laan, E., Everaerd, W., van, der, V, and Geer, J. H. Determinants of Subjective Experience of Sexual Arousal in Women: Feedback From Genital Arousal and Erotic Stimulus Content. Psychophysiology 1995;32(5):444-51.

27. Basson, R.; Weijmar Schultz, W. C. M; Binik, Y. M; Brotto, L. A.; Eschenbach, D. A; Laan, E.; Utian, W. H; Wesselmann, U; Lankveld Van, J; Wyatt, G; Leiblum, S.; Althof, S. E; Redmond, G. Woman's sexual desire and arousal disorders and sexual pain. Lue, T. F., Basson, R., Rosen, R., Giuliano, F, Khoury, S, and Montorsi, F. Sexual Medicine. Sexual dysfunctions in men and women. 2nd ed. Paris: Health Publications; 2004. pp.851-990.

28. Basson, R. and Brotto, L. A. Sexual Psychophysiology and Effects of Sildenafil Citrate in Oestrogenised Women With Acquired Genital Arousal Disorder and Impaired Orgasm: a Randomised Controlled Trial. BJOG. 2003;110(11):1014-24.

29. Brotto, L. Psychological-based desire and arousal disorders: treatment strategies and outcome results. Goldstein, I., Meston, C., Davis, S. R, and Traish, A. Women's Sexual Function and Dysfunction. Study, Diagnosis and Treatment. 1 ed. London: Taylor & Francis; 2006. pp.441-8.

30. American Psychiatric Association. DSM-1: Diagnostic and Statistical Manual of Mental Diorders. 2000. Washington DC.

31. Basson, R., Berman, J., Burnett, A., Derogatis, L., Ferguson, D., Fourcroy, J., Goldstein, I., Graziottin, A., Heiman, J., Laan, E., Leiblum, S., Padma-Nathan, H., Rosen, R., Segraves, K., Segraves, R. T., Shabsigh, R., Sipski, M., Wagner, G., and Whipple, B. Report of the International Consensus Development Conference on Female Sexual Dysfunction: Definitions and Classifications. J.Urol. 2000;163(3):888-93.

32. Basson, R., Leiblum, S., Brotto, L., Derogatis, L., Fourcroy, J., Fugl-Meyer, K., Graziottin, A., Heiman, J., Laan, E., Meston, C., Schover, L., van Lankveld, J., and Weijmar Schultz, W. Revised Definitions of Women's Sexual Dysfunction. J Sex med 2004;1(1):40-8.

33. Basson, R.; Althof, S. E; Davis, S. R; Fugl-Meyer, K.; Goldstein, I.; Heiman, J.; Leiblum, S.; Meston, C.; Rosen, R.; Wagner, G.; Weijmar Schultz, W. C. M. Summary of the Recommandations on Women's sexual Dysfunctions. Lue, T. F., Basson, R., Rosen, R., Giuliano, F, Khoury, S, and Montorsi, F. Sexual Medicine. Sexual Dysfunctions in men and women. 2 ed. Paris: Health Publications; 2004. pp.975-90.

34. Leiblum, S. Classification and diagnosis of female sexual disorders. Goldstein, I., Meston, C., Davis, S. R, and Traish, A. Women's Sexual Function and Dysfunction. Study, Diagnosis and Treatment. 1 ed. London: Taylor & Francis; 2006. pp.323-30.

35. Lewis, R. W; Fugl-Meyer, K. S; Bosch, R; Fugl-Meyer, A. R.; Laumann, E. O.; Lizza, E; Martin-Morales, A. Definitions, Classification, and Epidemiology of Sexual Dysfunction. Lue, T. F., Basson, R., Rosen, R., Giuliano, F, Khoury, S, and Montorsi, F. Sexual Medicine. Sexual Dysfunctions in Men and Women. 2 ed. Paris: Health Publications; 2004. pp.37-72.

36. Fugl-Meyer, A. R.; Fugl-Meyer, K. S. Prevalence data in Europe. Goldstein, I., Meston, C., Davis, S. R, and Traish, A. Women's Sexual Function and Dysfuncion. Study, Diagnosis and Treatment. 1 ed. London: Taylor & Francis; 2006. pp.34-41.

37. Paik, A.; Laumann, E. O. Prevalence of women's sexual problems in the USA. Goldstein, I., Meston, C., Davis, S. R, and Traish, A. Women's Sexual Function and Dysfunction. Study, Diagnosis and Treatment. 1 ed. London: Taylor & Francis; 2006. pp.23-33.

38. Oberg, K., Fugl-Meyer, A. R., and Fugl-Meyer, K. S. On Categorization and Quantification of Women's Sexual Dysfunctions: an Epidemiological Approach. Int.J.Impot.Res. 2004;16(3):261-9.

39. Dunn, K. M., Croft, P. R., and Hackett, G. I. Sexual Problems: a Study of the Prevalence and Need for Health Care in the General Population. Fam.Pract. 1998;15(6):519-24.

40. Fugl-Meyer, A. R. and Fugl-Meyer, K. S. Sexual Disabilities, Problems and Satisfaction in 18-74 Year Old Swedes. Scand.J.Sexol. 9-6-1999;2(2):79-97.

41. Laumann, E. O., Paik, A., and Rosen, R. C. Sexual Dysfunction in the United States: Prevalence and Predictors. JAMA 10-2-1999;281(6):537-44.

42. Hayes, R. and Dennerstein, L. The Impact of Aging on Sexual Function and Sexual Dysfunction in Women: a Review of Population-Based Studies. J Sex med 2005;2(3):317-30.

43. Graziottin, A. and Leiblum, S. Biological and Psychosocial Pathophysiology of Female Sexual Dysfunction During the Menopausal Transition. J Sex med 2005;2(Suppl.3):133-45.

44. Dennerstein, L. and Hayes, R. Confronting the Challenges: Epidemiological Study of Female Sexual Dysfunction and the Menopause. J Sex med 2005;2(Suppl 3):118-32.

45. Brandenburg, U; Schwenkhagen, A. Sexual history. Goldstein, I., Meston, C., Davis, S. R, and Traish, A. Women's Sexual Function and Dysfunction. Study, Diagnosis and Treatment. 1 ed. London: Taylor and Francis; 2006. pp.343-6.

46. Perelman, M. A. Psychosocial history. Goldstein, I., Meston, C., Davis, S. R, and Traish, A. Women's Sexual Function and Dysfunction. Study, Diagnosis and Treatment. 1 ed. London: Taylor & Francis; 2006. pp.336-42.

47. Stewart, E. G. Physical examination in female sexual dysfunction. Goldstein, I., Meston, C., Davis, S. R, and Traish, A. Female Sexual Function and Dysfunction. 1 ed. London: Taylor & Francis; 2006. pp.347-55.

48. Sarrel, P. M. Effects of Hormone Replacement Therapy on Sexual Psychophysiology and Behavior in Postmenopause. J Womens Health Gend.Based.Med 2000;9 Suppl 1:S25-S32.

49. Heiman, J.; Guess, M. K; Connell, K; Melman, A.; Hyde, J. S; Segraves, T.; Wyllie, M. Standards for clinical trials in sexual dysfunctions of women: Research designs and outcome assesment. Lue, T. F., Basson, R., Rosen, R., Giuliano, F, Khoury, S, and Montorsi, F. Sexual Medicine. Sexual dysfunctions in men and women. 2 ed. Paris: Health publications; 2004. pp.631-81.

50. Nader, S. G; Maitland, S. R; Munarriz, R.; Goldstein, I. Blood flow: duplex Doppler ultrasound. Goldstein, I., Meston, C., Davis, S. R, and Traish, A. Women's Sexual Function and Dysfunction. Study, Diagnosis and Treatment. 1 ed. London: Taylor & Francis; 2006. pp.383-90.

51. Suckling, J., Lethaby, A., and Kennedy, R. Local Oestrogen for Vaginal Atrophy in Postmenopausal Women. Cochrane.Database.Syst.Rev. 2003;(4):CD001500.

52. Dennerstein, L., Burrows, G. D., Wood, C., and Hyman, G. Hormones and Sexuality: Effect of Estrogen and Progestogen. Obstet.Gynecol. 1980;56(3):316-22.

53. Kovalevsky, G. Female Sexual Dysfunction and Use of Hormone Therapy in Postmenopausal Women. Semin.Reprod.Med. 2005;23(2):180-7.

54. Nathorst-Boos, J., Wiklund, I., Mattsson, L. A., Sandin, K., and von Schoultz, B. Is Sexual Life Influenced by Transdermal Estrogen Therapy? A Double Blind Placebo Controlled Study in Postmenopausal Women. Acta Obstet.Gynecol.Scand. 1993;72(8):656-60.

55. Wu, M. H., Pan, H. A., Wang, S. T., Hsu, C. C., Chang, F. M., and Huang, K. E. Quality of Life and Sexuality Changes in Postmenopausal Women Receiving Tibolone Therapy. Climacteric. 2001;4(4):314-9.

56. Kokcu, A., Cetinkaya, M. B., Yanik, F., Alper, T., and Malatyalioglu, E. The Comparison of Effects of Tibolone and Conjugated Estrogen-Medroxyprogesterone Acetate Therapy on Sexual Performance in Postmenopausal Women. Maturitas 31-7-2000;36(1):75-80.

57. Nathorst-Boos, J. and Hammar, M. Effect on Sexual Life--a Comparison Between Tibolone and a Continuous Estradiol-Norethisterone Acetate Regimen. Maturitas 1997;26(1):15-20.

58. Basson, R., McInnes, R., Smith, M. D., Hodgson, G., and Koppiker, N. Efficacy and Safety of Sildenafil Citrate in Women With Sexual Dysfunction Associated With Female Sexual Arousal Disorder.

59. Berman, J. R., Berman, L. A., Toler, S. M., Gill, J., and Haughie, S. Safety and Efficacy of Sildenafil Citrate for the Treatment of Female Sexual Arousal Disorder: a Double-Blind, Placebo Controlled Study. J.Urol. 2003;170(6 Pt 1):2333-8.

60. Caruso, S., Intelisano, G., Lupo, L., and Agnello, C. Premenopausal Women Affected by Sexual Arousal Disorder Treated With Sildenafil: a Double-Blind, Cross-Over, Placebo-Controlled Study. BJOG. 2001;108(6):623-8.

61. Billups, K. L., Berman, L., Berman, J., Metz, M. E., Glennon, M. E., and Goldstein, I. A New Non-Pharmacological Vacuum Therapy for Female Sexual Dysfunction. J Sex Marital Ther. 2001;27(5):435-41.

62. Billups, K. L. The Role of Mechanical Devices in Treating Female Sexual Dysfunction and Enhancing the Female Sexual Response. World J Urol. 2002;20(2):137-41.

63. Munarriz, R., Maitland, S., Garcia, S. P., Talakoub, L., and Goldstein, I. A Prospective Duplex Doppler Ultrasonographic Study in Women With Sexual Arousal Disorder to Objectively Assess Genital Engorgement Induced by EROS Therapy. J Sex Marital Ther. 2003;29 Suppl 1:85-94.

64. Schroder, M., Mell, L. K., Hurteau, J. A., Collins, Y. C., Rotmensch, J., Waggoner, S. E., Yamada, S. D., Small, W., Jr., and Mundt, A. J. Clitoral Therapy Device for Treatment of Sexual Dysfunction in Irradiated Cervical Cancer Patients. Int.J Radiat.Oncol.Biol.Phys. 15-3-2005;61(4):1078-86.

65. Goldstein, I.; De, E. j. B; Johnson, J. A. Persistent sexual arousal syndrome and clitoral priapism. Goldstein, I., Meston, C., Davis, S. R, and Traish, A. Women's Sexual Function and Dysfunction. Study, Diagnosis and Treatment. London: Taylor & Francis; 2006. pp.674-88.

66. Leiblum, S. and Nathan, S. G. Persistent Sexual Arousal Syndrome: A Newly Discovered Pattern of Female Sexuality. J.Sex Marital Ther. 2001;27(4):365-80.

67. Leiblum, S., Brown, C., wan, J., and Rawlinson, L. Persistent Sexual Arousal Syndrome: A Descriptive Study. J Sex med 2005;2(3):331-7.

68. Leiblum, S. Arousal Disorders in Women: Complaints and Complexities. MJA 2003;178(638):640.