

REVIEW

Rethinking low sexual desire in women

Introduction

The apparent high prevalence of low sexual desire in women leads to a questioning of the traditional view of women's sexual response and the nature of their sexual desire. Is the traditional model of sexual arousal and potential orgasmic release, initiated by sexual desire (as manifested by sexual thinking, fantasising and conscious sexual neediness), actually true for women? Are other cycles of response more common and would their acknowledgement clarify causes of apparent low desire and thereby facilitate management? This review compares the traditional model of the human sexual response cycle with an alternative model whose component parts are frequently faulty or entirely missing in the experiences of women complaining of low sexual desire. Continuous modulation of this cycle occurs as feedback is obtained from genital and non-genital physical responses, as well as from emotions and perceptions. The new model illustrates the difficulty experienced by most women in distinguishing between desire and arousal and the common lack of both. There are implications for the management of low desire in the context of chronic dyspareunia, chronic infertility, gradual reduction of ovarian androgen from midlife onwards, and for the management of sudden complete loss of ovarian androgen in premature, surgical or medical menopause.

Prevalence of low sexual desire in women

Community studies of women point to a 33%–39% prevalence rate of self-diagnosed low sexual desire^{1,2} and low desire is the most common problem for women attending sexual therapy clinics³. Of 964 North American women attending for routine gynaecological care from family practitioners and gynaecologists, 67% reported problematic low sexual desire⁴. It is accepted that whether studies are by interview or questionnaire only those women willing to be questioned about an extremely private area of their lives will be included. Rather than concluding that some one-third of women have a 'disorder', the reasons for this apparently common perception of failing to meet some sexual standard must be sought. To date, clinicians, including gynaecologists, have found management of low sexual desire to be highly challenging. Women speak of their lack of an 'emotion' (sexual desire) that they once had or feel they should have. The medical response has been largely to

clarify medical, including psychiatric and gynaecological history, confirm normal genital and pelvic anatomy and state that nothing organic is amiss. The relevance of a normal pelvic exam is frequently over-emphasised. Often the woman is then dismissed with the conclusion: "your problem must be psychological". Indeed, being an emotion, sexual desire is a psychological entity, but it also has a biological and interpersonal basis and women expect their gynaecologist to accept their sexual difficulties as a legitimate women's health issue and be prepared and able to address it. This aspect of gynaecological care is clearly stated in Guidelines of National Regulatory Bodies⁵ and the website of the International Federation of Gynaecology and Obstetrics.

What is meant by low sexual desire

The presence of sexual thoughts, fantasies and an innate urge to experience sexual tension and release, alone or with a partner, have been considered the markers of desire⁶. The traditional model of the human sexual response cycle of Masters, Johnson and Kaplan, as shown in Fig. 1, depicts the stage of desire leading on to arousal, a plateau of heightened arousal which peaks briefly and releases in the experience of orgasm(s) to be followed by resolution⁶. Management has been unclear when the woman is complaining of lack of these presumed markers of desire, but is neither depressed nor medically unwell, and not taking medication likely to interrupt her desire.

If women are asked the reasons for agreeing to or instigating a sexual experience with their partner, their list is extensive^{7,8}. Reasons include wanting to be emotionally close, to show love and affection, to share physical pleasure for the sake of sharing, to increase a sense of attractiveness and attraction, to increase a sense of commitment and bonding, but only sometimes to satisfy a truly 'sexual' need. These intimacy-based reasons appear particularly important in the longer term monogamous relationship. Even the need for masturbation has varied causes, including to soothe and comfort, to relax, and to sleep but only sometimes primarily to release sexual tension.

Alternative model of women's sexual response

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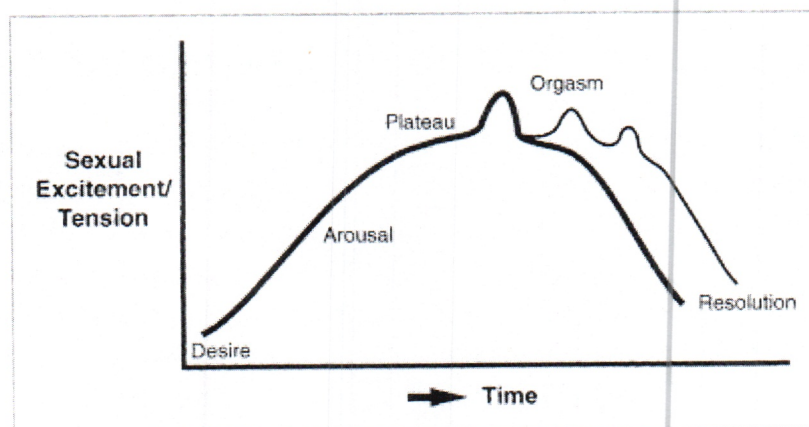


Figure 1.

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Traditional human sex response cycle of Masters, Johnson and Kaplan. Reprinted with permission from the American College of Obstetricians and Gynecologists (*Obstetrics and Gynecology*, 2001, Vol. 98, pp. 350–353).

pleasure for the sake of sharing, to increase a sense of attractiveness and attraction, to increase a sense of commitment and bonding, but only sometimes to satisfy a truly 'sexual' need. These intimacy-based reasons appear particularly important in the longer term monogamous relationship. Even the need for masturbation has varied causes, including to soothe and comfort, to relax, and to sleep but only sometimes primarily to release sexual tension.

Alternative model of women's sexual response

A recently proposed alternative intimacy-based model appears to be relevant to women by clarifying the component parts of their response cycles that may be faulty or absent⁹. A woman frequently begins a sexual experience sexually neutral. She, for the intimacy-based reasons described, deliberately finds or receives sexual stimuli that potentially could move her from neutrality to a state of sexual arousal (Fig. 2). An attempt to include this 'receptivity' component of women's sexual desire has been made in the new definitions and classifications of female sexual dysfunction by the American Foundation of Urological Disease¹⁰.

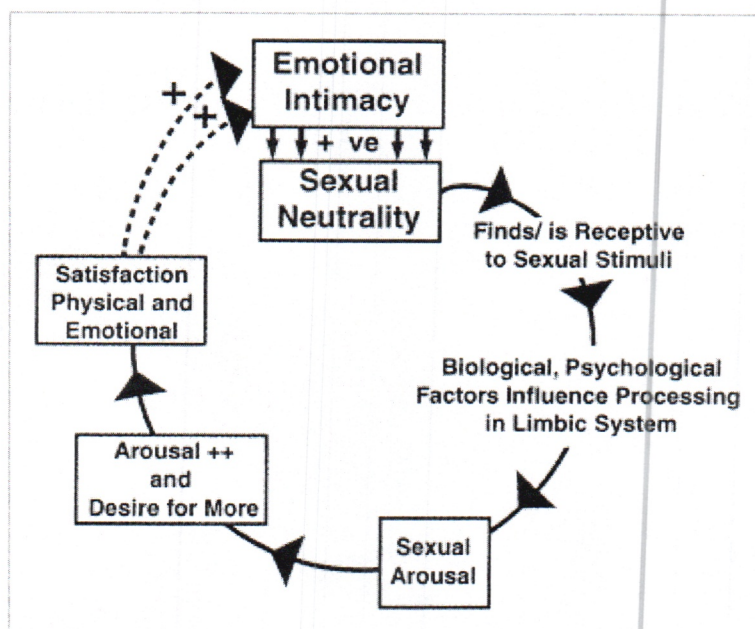


Figure 2.

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Alternative model of women's sexual response.

Many psychological and biological factors may potentially preclude arousal, but if the processing of the stimuli in the woman's limbic and paralimbic centres is such that a degree of arousal is experienced, she can potentially continue to focus on the stimuli. Further arousal follows and in time, in addition to her original intimacy-based motivation, she achieves definite desire in order to continue the experience for the sake of the sexual tension and sexual enjoyment.

In this cycle, departing from the traditional one, sexual stimuli are integral; arousal is experienced before desire and orgasm is not mandatory for a normal or healthy response. The power behind the cycle is the couple's emotional intimacy and this power or 'motor' may be enhanced or diminished by the experience itself.

The emotional intimacy may be so minimal that the woman is not motivated to find or receive sexual stimuli that could allow her sexual response. Gynaecologists may not wish to address the intimacy problems themselves, but they can clarify the normality of the woman's low desire in this context. This in itself is therapeutic since the woman no longer feels that she is labelled as sexually dysfunctional. If the partners are motivated to improve their emotional intimacy, professional counselling can be suggested: the problem is not inherently sexual but to do with the non-sexual interpersonal relationship.

Frequently, sexual stimuli are entirely absent. The day is filled with non-sexual interactions. Often the needed stimuli are related more to the behaviour of the partner during the day, than specifically at the moment of physical interplay. However, heterosexual women frequently express a wish both for more non-genital and genital non-penetrative stimuli, but without sexual intercourse.

Many psychological factors negatively influence the processing of sexual cues in the limbic centres. Included are non-sexual distractions, feeling sexually substandard, past negative or painful experiences, previous discrediting of the woman's sexuality, and fears of infertility, pregnancy, sexually transmitted diseases, or fear for her emotional or physical safety. Sometimes there is a dysphoric reaction to any physical arousal that takes place, perhaps more commonly when there has been past abuse¹¹.

Biological factors are only just beginning to be clarified. Some neurotransmitters that appear to be 'prosexual' include dopamine, oxytocin, noradrenaline, and serotonin via 5HT1A receptors. Some that are sexually negative include serotonin acting via 5HT2 and 5HT3 receptors, prolactin, and gamma amino butyric acid. The production of prosexual neurotransmitters is decreased with androgen deficiency. Depression distorts the balance of neurotransmitters, as do anti-depressants and anti-psychotics. However, the possibility that some women (and men) may have a stronger 'inhibitory tone' that itself may be to some degree innate, is only recently being investigated^{12,13}. Infrequently, low thyroid or hyperprolactinemic states affect the limbic areas so that arousal is not reached.

Despite achieving arousal and subsequent desire, if the outcome is negative, the woman's cycle is broken and her intimacy with her partner is not enhanced. Examples include chronic dyspareunia, partner's sexual dysfunction, effects of medication (e.g. serotonin re-uptake inhibitor-induced orgasmic disorder or deficient oestrogen or testosterone). Lack of oestrogen, by reducing the bioavailability of nitric oxide, can lead to insufficient smooth muscle relaxation in the vulval, bulbar, spongiosal and clitoral erectile tissue, limiting their engorgement. Similarly, vaginal, vascular and non-vascular smooth muscle relaxation is impaired reducing vaginal lubrication and accommodation, respectively. The action of vasointestinal polypeptide is also influenced by oestrogen, and is most likely the major neurotransmitter. It is possible that testosterone is also involved in the congestion of the vulva and vagina by regulating α_1 adrenergic responsiveness as is postulated for penile cavernosal smooth muscle¹⁴.

Blending of traditional and alternative cycles

Clearly, some women, spontaneously or cyclically or even frequently, experience innate apparently spontaneous sexual hunger or need as in the traditional model. The two cycles may blend as shown in Fig. 3. Cyclical spontaneous desire may well be related to the mid-cycle peaks of testosterone and androstenedione.

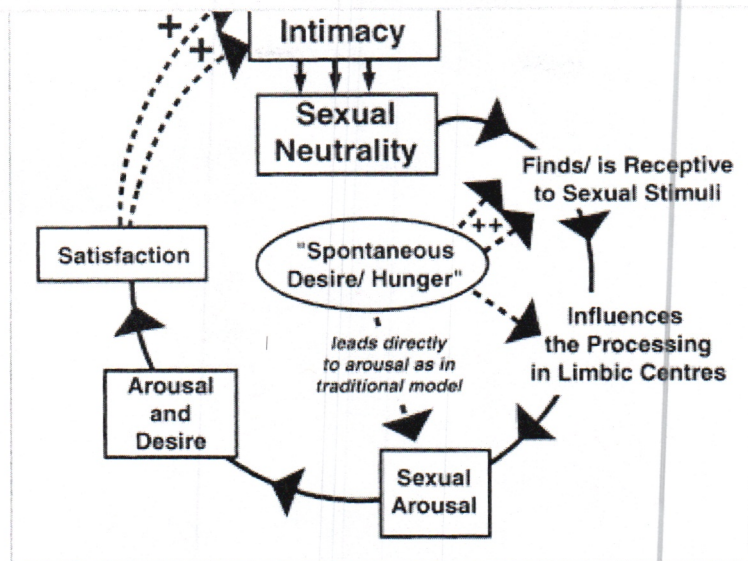


Figure 3.

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Blended sexual response cycles.

Interestingly, many women report easy spontaneous desire early on in a relationship³. However, careful questioning clarifies that many sexual stimuli and deliberately organised sexual contexts were all part of the 'dating' atmosphere such that 'spontaneity' was perhaps more apparent than real. The newness itself, the unpredictability, even the lack of commitment or legitimacy, may be potent stimuli in a new relationship.

Modulation of the cycle from somatic and emotional responses

In men, mental sexual arousal alters the descending neurotransmission from limbic centres to the lumbar sacral centres of the spinal cord. Probably this involves increasing oxytocinergic signalling from the paraventricular nuclei of the hypothalamus with concurrent reduction of inhibitory serotonergic input, particularly from the nucleus paragigantocellularis in the medulla¹⁵. When this balance of signalling to the pelvic autonomic outflow occurs in men, the subsequent physical tumescence itself constitutes an additive or compounding second level sexual stimulus. The engorgement is accurately detected and enjoyed. Only men with chronic situational erectile dysfunction typically under-rate their physical response¹⁶. By contrast, women in good health typically under-rate their physical response¹⁷. Psychophysiological data of objective increase in the vaginal blood flow in the laboratory in response to erotic stimulation repeatedly shows lack of correlation with the woman's subjective arousal¹⁷⁻¹⁹. Thus, women typically do not have this genital confirmation of their arousal in any direct way. Many women need direct stimulation to their congesting vulval structures to receive that second level confirmatory stimulus²⁰. Clearly, some sexual styles, particularly intercourse-focused, may preclude this.

There is also moment-to-moment feedback from the emotions²¹. This feedback may be positive: one of enjoyment, pleasurable mood, self-affirmation, or it may be negative: one of embarrassment, shame or guilt. Feedback from the genitalia and from the emotions are depicted in Fig. 4.

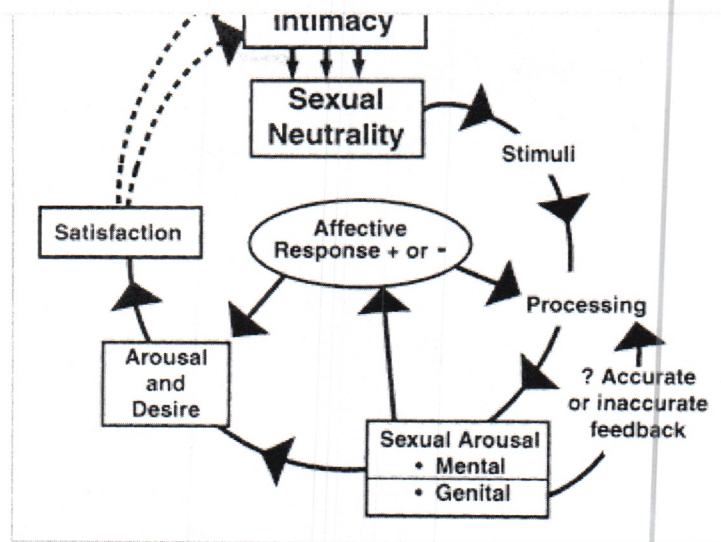


Figure 4.

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Somatic (genital) and affective feedback cycles.

Although the term *sexual response cycle* has been in common use since Masters and Johnson's publications, the true cyclicity comprises physical, emotional and cognitive feedback. This is not appreciated in the traditional linear model.

If the emotional response to any perceived physical arousal is negative (dysphoric arousal), the sexual centres may cease to transmit excitatory input to the lumbar sacral centres. For some women, it appears that excitatory neurotransmission does continue: the genitalia remain engorged but the woman does not feel sexually aroused. This response is typically shown by women diagnosed with arousal disorders, who in the laboratory setting, demonstrate a normal genital congestive response to erotic stimuli but feel no subjective arousal¹⁸. Similarly, in clinical settings, women will report that their fingers can detect some genital swelling and lubrication, but massaging these engorging structures is not appreciated as pleasurable sexual arousal. The genital physiological response would appear to be an involuntary reflex mediated by the (unconscious) autonomic nervous system³ (note the occurrence of genital response in situations of genital assault and rape)³. Clearly, the subject of sexual arousal and any lack thereof is highly complex, with the result that the role of genital vasoactive medication in women complaining of arousal difficulties is far from clear^{20,22,23}. To date, the only large placebo controlled studies of sildenafil given to women have failed to show benefit over placebo²³. Of note, these studies (one on oestrogenised and one on non-oestrogenised women), included women with a broad range of sexual dysfunction which included lack of arousal. The arousal disorder was not analysed in any way (e.g. to determine whether the women were complaining of lack of subjective arousal or lack of both subjective and genital arousal)²². Current research is attempting to focus on the use of vasoactive drugs in women with an acquired reduction in genital response and a smaller placebo controlled study showing benefit of sildenafil in premenopausal women has been recently published²⁴. The traditional view that vaginal lubrication constitutes sexual arousal in women is thus not only restrictive but misleading when arousal disorder is under discussion. Women tend to focus mostly on how mentally exciting they find the stimulus when they rate their sexual arousal¹⁸. Future research may profitably focus on those women who reliably

These models of blended intimacy-based and 'drive-based' sexual response cycles with ongoing modulation from emotional, cognitive and physical feedback include many concepts of previous authors^{3,6-8,25-27}. However, the traditional model familiar to gynaecologists still remains that of Kaplan, Masters and Johnson where conscious sexual thinking and sexual needs initiates the sex response.

Women with chronic dyspareunia

Sharing this alternative model with women allows them to recognise the multiple consequences of their chronic dyspareunia. The woman has learned to avoid many sexual stimuli; any that remain are unlikely to lead to arousal because of the mindset associated with the anticipated painful outcome. The couple's emotional intimacy has suffered because of the repeated feelings of being hurt, being used, even abused. Confusion, resentment, anger, sadness replace feelings of closeness. The needed therapy is clearly more than pain management (Fig. 5).

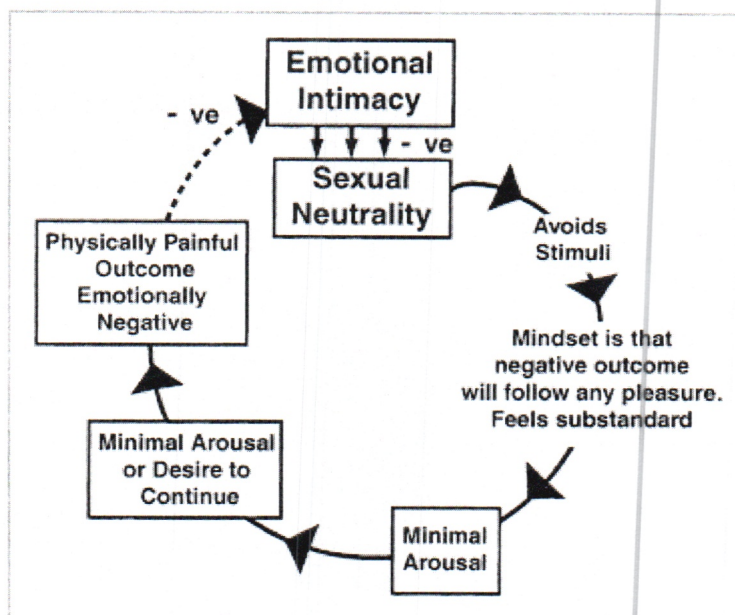


Figure 5.

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The repercussions of chronic dyspareunia on the woman's sex response cycle.

Women with sudden complete loss of ovarian androgen

The woman with premature, surgical or medical menopause is more distressed by her inability to respond to formerly effective sexual stimuli than her lack of spontaneous sexual thoughts and fantasies. The androgen needed for processing the stimuli in generating subjective arousal is insufficient. She may also suffer the consequences of lack of peripheral testosterone action on the smooth muscle response involved in vulval and vaginal congestion. The couple's emotional intimacy may suffer from both the lack of rewarding physical times together and the confusion and misunderstanding as to its cause. The breaks in her cycle are shown in Fig. 6. In one study²⁸ 47 consecutive couples referred for female low sexual desire were assessed. Although lack of

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women whose surgical menopause was thought to be the cause of acquired low sexual desire and response, benefit only was seen in the older women and only if they achieved high normal (as opposed to mid-normal) premenopausal testosterone levels²⁹. No therapy other than testosterone replacement was given.

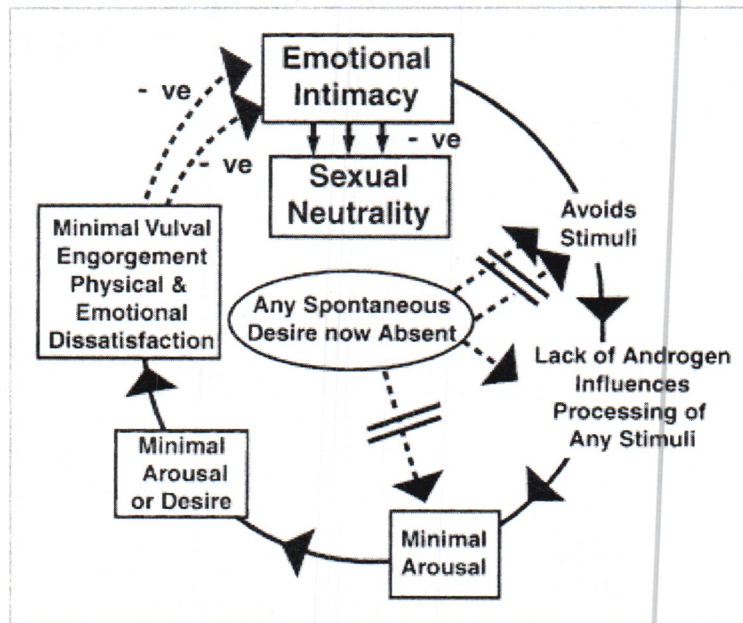


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The repercussions of sudden complete loss of ovarian androgen on the woman's sex response cycle.

Little detail is known about the exact role of testosterone in either innate sexual need or in the processing of sexual stimuli. Post mortem evidence of uptake of androgen (and oestrogen) in various areas of the brain has shown highest levels in the medial preoptic area, medial and basal hypothalamus and the substantia nigra³⁰. Whether testosterone needs to be converted in brain cells to both dihydrotestosterone via 5 α hydroxylase and aromatised to oestradiol to exert its action, as is necessary in rodents, is not clear. The practice of giving women aromatase inhibitors after a diagnosis of breast cancer, may clarify this question. Adrenal androgen is nevertheless sufficient for many women. Clearly, the sensitivity of androgen receptors (currently not measurable in clinical practice) is likely as important as blood levels.

Women with gradual loss of testosterone

The usual slow decline in testosterone levels from the early 40s onwards appears to be far less often associated with unresponsiveness to formerly effective stimuli³¹. Beginning in the early 40s, some but not all studies indicate testosterone levels decline progressively but not usually to undetectable levels^{32,33}. Although this slow decline appears often to be asymptomatic, certainly some peri and naturally postmenopausal women do complain of loss of genital response and mental response comparable with the loss experienced by some women with surgical menopause. For both groups of women, loss of energy may also be linked to the androgen lack³⁴. Unfortunately, scientific study of androgen replacement therapy in women is minimal³⁵. We lack both efficacy and safety data. Prior to the study by Shifren *et al.*²⁹, there were minimal data on

designed to give high normal premenopausal testosterone levels; but interestingly, the women were recruited for bone density reasons rather than sexual dysfunction. Non-physiological androgen administration (i.e. methyl testosterone), acting via the androgen receptor and via reduction of sex hormone binding globulin (SHBG), has also been associated with sexual benefit in postmenopausal women but the dose needed (2.5mg) is associated with unwanted reduction of high density lipoprotein cholesterol³⁷. Tibolone has oestrogenic properties as well as some androgenic activity via its $\Delta 4$ metabolites and its ability to reduce SHBG. It also has been shown to improve the effects of lack of oestrogen associated with dyspareunia³⁸. Tibolone's androgenic activity is thought to account for increased sexual desire and responsiveness in women receiving tibolone, compared with those receiving either conjugated oestrogen plus medroxyprogesterone acetate³⁹, or oestradiol plus norethisterone^{40,41}. Also, tibolone allowed comparable increases in sexual responsiveness compared with oestradiol plus dihydro-androsterone, the latter causing untoward lipid effects⁴². Of note, these studies were of otherwise healthy postmenopausal women rather than women complaining of sexual dysfunction.

Women of all ages are currently requesting (and in some centres being given)^{43,44} testosterone supplementation in various forms, without safety and efficacy data, and without the documentation that sexual desire and responsiveness correlate with testosterone (or any other androgen) levels, other than those in the supraphysiological range. Additional basic requirements include a testosterone assay sensitive and accurate in the female range. More data are needed of androgen levels in women of different ages (and health status), who do not have sexual dysfunction. Scientific studies of testosterone replacement in peri and naturally postmenopausal women are needed, including the use of local testosterone in restoring vulval congestion without necessarily achieving high normal premenopausal testosterone levels systemically. Replacing testosterone in a pattern that varies through the four-week period to mimic a younger premenopausal ovulating cycle would be a useful strategy to study.

Discussion of the alternative cycle is helpful in identifying the subgroup of menopausal women who previously experienced conscious intrinsic sexual desire, and were less aware of beginning a sexual experience from a state of sexual neutrality. This particular subgroup acknowledges that their sexual response can still occur but they are dissatisfied; they mourn the loss of their former 'hunger', that appeared to be spontaneous rather than triggered. Fortunately, adaptation to the need for creating a sexual context (and removing their often self-imposed label of dysfunction) is possible.

Women with chronic infertility

Emotional intimacy frequently suffers due to the stressors of multiple medical appointments, investigations, adverse effects of fertility drugs, failed cycles, and failed *in vitro* fertilisation. The experience of intercourse being required on certain days, can lead to mechanical emotionally unrewarding experiences. The woman's sense of sexual self-confidence and attractiveness may suffer, thereby inhibiting the processing of any stimuli. The outcome can remain unrewarding owing to the limited psychosexual interaction, the focus for so long being on the mechanical act of intercourse, dispensing with erotic play.

Illustrated in these common clinical situations is the multifactorial nature of the complaint of low sexual desire (Fig. 7). Careful integration of any future libido enhancing medication will be critical²⁰.

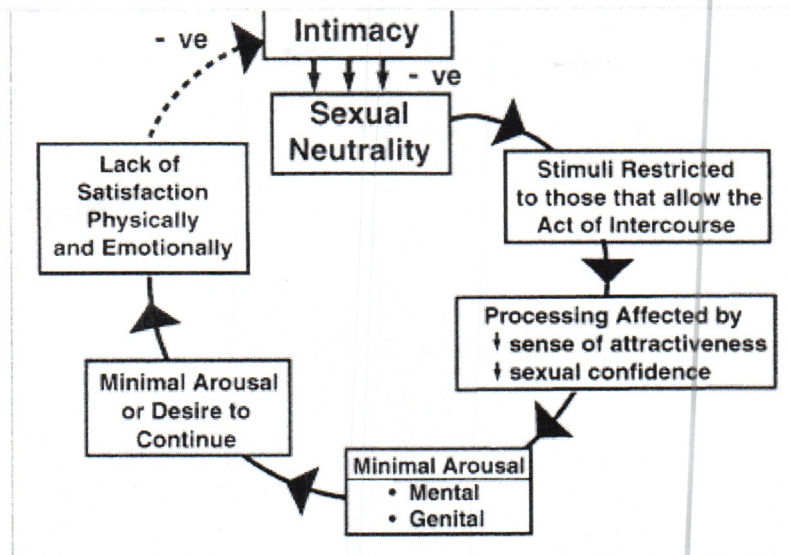


Figure 7.

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The repercussions of infertility on the woman's sex response cycle.

Conclusion

Understanding her sexual response cycles and identifying faulty or absent components motivates the woman to address them. Her difficulties are explicable, stemming not only from herself but from her general circumstances, including her partner and her past experiences. She may also see the fallacy of the idea that a medical solution in the form of a pill (hormonal or otherwise) will suffice. Even when biological factors are strong, she can see that focusing only on them without addressing the rest of her cycle will be ineffectual.

Gynaecologists can address the subject of low sexual desire by understanding women's sex response cycles, keeping up-to-date with the biological components and being aware of the psychological components. When lack of emotional intimacy weakens sexual motivation, the appropriate referral to a relationship therapist can be made. Similarly, when sexual stimuli and context are minimal, gynaecologists can clarify their 'normal' necessity especially in the longer term monogamous relationship.

Future research might profitably include combining psychosexual and biological management. Biological areas in need of scientific study include the development of testosterone assays sensitive and accurate for the range found in women, documentation of testosterone levels in women of various ages and various health status, who do not have sexual complaints, testosterone replacement in ways which more accurately reflect the variable levels of younger women, and the potential benefit of genital as opposed to systemic androgen replacement. The use of agents to enhance genital vasocongestion in women with acquired loss of genital responsiveness merits further investigation. A much-needed area of psychosexual research is the disconnection between subjective arousal and genital congestive response.

Acknowledgements