

Female Sexual Function and Response

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Although female sexual dysfunction is a problem with low priority, it can have a profound impact on quality of life. In women, the cycle of sexual response begins in the brain, where a memory, an image, a scent, music, or a fantasy acts as a trigger to prompt sexual arousal. Thus, the brain is really the key and starting place for treatment of sexual dysfunction. Decreased libido, altered arousal, inability to achieve orgasm, and dyspareunia are the four broad types of sexual dysfunction in women. Decreased libido, thought to be related to androgenic hormones, results in delayed or altered arousal, decreased vaginal lubrication and dilation, delayed or absent orgasm, and pain or dyspareunia, which can lead to an aversion to sexual experiences.

Female sexual dysfunction, with an incidence that likely exceeds 40%, is infrequently addressed in the primary care setting. Often, clinicians fail to address the problem because to do so is time-consuming. It is best detected as a part of the preventive examination and in response to physicians' questions about patients' social life. If physicians ask the right questions, they will determine whether their female patients have a problem and are then able to initiate treatment.

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This article was developed from a lecture presented by Dr Arcos at an American College of Osteopathic Family Physicians symposium sponsored by Bayer Pharmaceutical Corporation at the 108th Annual AOA Convention and Scientific Seminar on October 15, 2003, in New Orleans, La. Ronnie B. Martin, DO, FACOFP, did the initial editing of the transcript of Dr Arcos' oral presentation on which this article is based.

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Because female sexual dysfunction, like male sexual dysfunction, is not life-threatening, it is considered a low-priority problem. Nonetheless, the problem can have a severe impact on quality of life.

Physiology

Sexuality evolves in all persons over a lifetime of experiences. It is, in part, based on a person's personality, moral values, experiences, and interpersonal relationships. The pioneering work by Masters and Johnson¹ reported in 1966 describes the physiology of the sexual experience and response (*Figure*). First is the excitement phase. Events and changes occur initially in the brain, the biggest female sex organ. A woman develops an image, an idea, a fantasy, a smell, a memory, anything that triggers the brain. Large stores of estrogen, androgen, and progesterone receptors are present in the hypothalamus, the region of the brain that controls mood, sexual processing, and response. The brain is really the key and starting place for treatment of sexual dysfunction, especially in women.

Next is the arousal phase. The brain response initiates increased estrogen responsiveness, increased blood flow to the vagina, and vaginal dilation and lubrication. As Masters and Johnson reported, this is a separate state in the movement from the excitement phase, through arousal, and then into the plateau phase. The arousal phase involves specific physiologic responses, with the labia, the clitoris, and the vagina becoming increasingly engorged with blood. This process may be a continuum or merging of the arousal and plateau phases.

Following the arousal phase is the response cycle, ie, the plateau state and the orgasmic response. The orgasmic response comprises eight to ten rhythmic contractions of the vaginal muscle, the uterus, and the levator ani muscle.¹ Women have an intense release of muscle tension that has built up through the sexual response cycle.

Last, is the resolution phase in which women have feelings of satisfaction, euphoria, and relaxation accompanied by a decrease in the blood flow to the sex organs and relaxation of muscle tone.

Osteopathic physicians should consider not only the biologic and the physiologic responses as reported by Masters and Johnson, but also the psychologic and sociocultural implications, as well as the woman's specific interpersonal relationships at that time as they relate to the female sexual response. This complex response is peculiar to women.

Women may respond emotionally to something that their partners do (eg, washing the dishes or vacuum cleaning). Many women often consider such a non-sexual act as an act of emotional intimacy that triggers them to seek a sexual response. The sexual act in this case truly does begin in the brain for these women. Once they have stimulated that trigger for the sexual response, they follow the four phases of sexual response described by Masters and Johnson.

Obviously, the social and cultural ramifications are enormous. It is important for physicians to be aware of their patients' background, expectations, and interpersonal relationships at any given

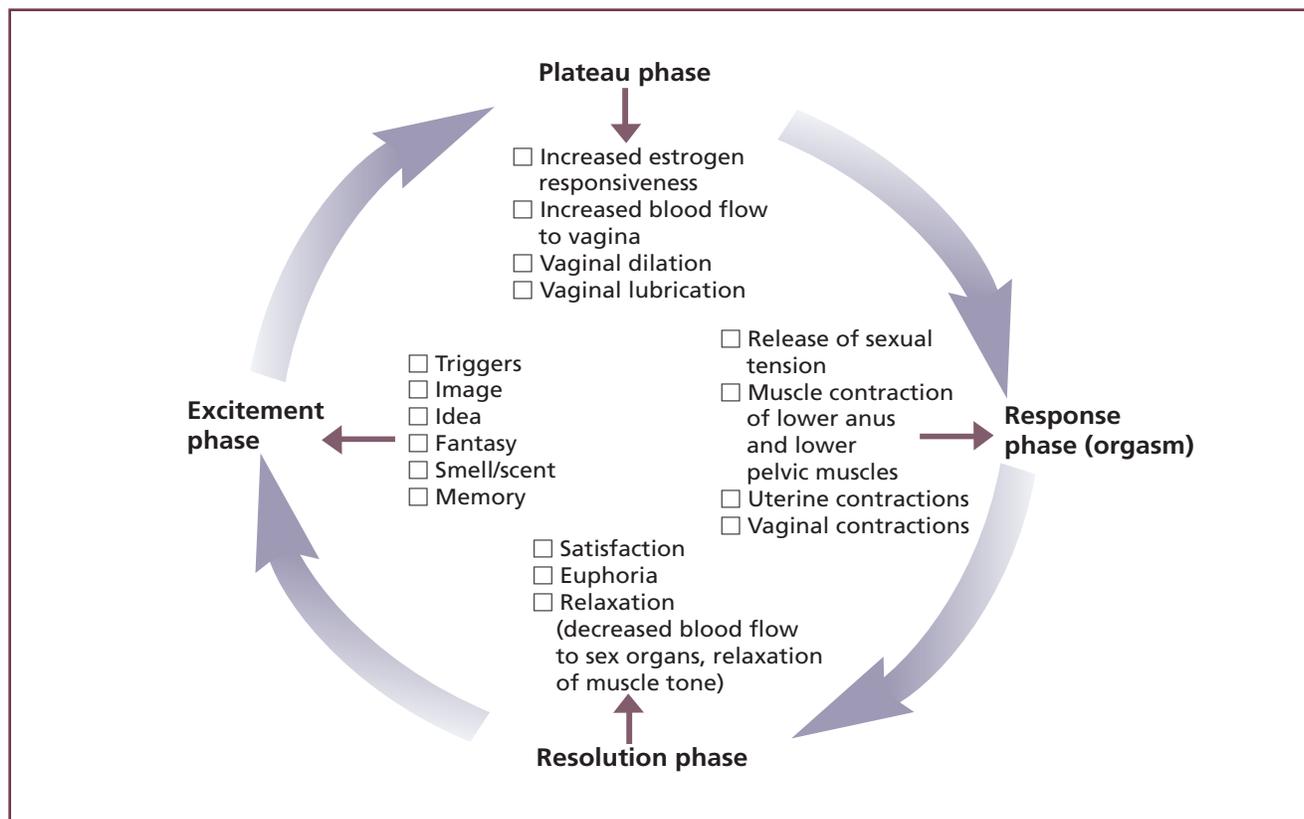


Figure. Depiction of physiology of the cycle of sexual experience and response in women, as described by Masters and Johnson in *Human Sexual Response*, published in 1966.

time to help define which treatment modality is most likely to provide the greatest benefit.

For women, satisfaction is not necessarily measured only by having an orgasm. In women who are regularly orgasmic, about 50% will not have an orgasm during any given sexual experience or encounter. Many women can be sexually satisfied during the plateau phase.

For most men, orgasm must be achieved in a sexual encounter for it to have been satisfactory. When men project that requirement to their female counterparts—the expectation that if they do not have an orgasm, it was not a good sexual experience—a vicious cycle is set in motion, producing performance anxiety in the women as well as the men. This expectation on both of the partners' part cascades into faking orgasms, decreased satisfaction, decreased response, etc.

It is important that we educate patients, both women and their partners,

to understand that many women are satisfied in the plateau phase. They are not just partially satisfied, but truly content and satisfied with a strong sense of pleasure, intimacy, and release of sexual tension and urgency.

Types of Sexual Dysfunction

Of the four broad types of female sexual dysfunction—decreased libido, altered arousal, inability to achieve orgasm, and dyspareunia—the first is thought to be primarily related to androgenic hormones. The deficit results in delayed or altered arousal, decreased vaginal lubrication and dilation, delayed or absent orgasm, and pain or dyspareunia, which may lead to an aversion to sexual experiences. Sexual dysfunction in a woman is like pain management in any other patient; it is her perception of dysfunction that defines the problem because it is based largely in the patient's perception. They just have to perceive a problem; it is not all performance.

A female patient who is fine with

having a sexual encounter once every 3 months and an orgasm once per year is not having dysfunction. Another female patient who does not meet her expectation of an orgasm every time she has a sexual encounter perceives such failed expectation as a problem. Then, it becomes a problem for her. It is then the patient—especially a woman, and not the clinician—who perceives a problem.

Treatment of female patients for loss of libido is different than for patients who have a normal sex drive but who are not becoming stimulated or having increased blood flow and lubrication of the vagina and perineal structures. The treatment of women for altered arousal is different from the treatment of women for anorgasmic response or dyspareunia.

Last, dyspareunia is a separate category that is beyond the scope of this article.

Both nonpharmacologic and pharmacologic treatment modalities are used in the treatment of women who have sexual dysfunction. Hormonal support

consists primarily of supplementation or replacement of androgens and estrogens. Pharmacologic options include compounds designed to increase genital blood flow, such as phosphodiesterase type 5 (PDE-5) inhibitors.

Nonpharmacologic Treatment

The principle for treatment is practice, practice, and practice. Repetition does make a difference, especially for women who have difficulty having an orgasm, because the climax becomes a facilitated response. The brain adapts to stimuli; the external genitalia, to repeated arousal. Both the adaptation to stimuli and repeated arousal then increase to movement to an orgasmic experience. Any kind of sexual activity has this beneficial effect in training the brain and the body. The practice can be with a partner or without a partner by using a sexual aid such as a vibrator or other sex substitute such as masturbation. Masters and Johnson¹ report that increased sexual experiences improve the vaginal pH by lowering it, improve oxygenation of the tissue, and improve the mucosal health of the vagina and the tone of the muscles involved in the sexual response.

When physicians discuss sexual dysfunction, it is important that they emphasize partner-to-partner communication. It seems intuitive that partners should relay their likes and dislikes, but couples have trouble communicating even general topics. When it comes to sexuality, such failure to communicate can create even more problems than the preference of the type of act itself, particularly in younger couples.

This communication process is also important as women go through the aging process because of the changes that their bodies are undergoing. For example, the decline in estrogen causes decreased elasticity of the vaginal muscles, a decreased stimulation response, and decreased vaginal lubrication. If a woman is not communicating these problems to her partner, the partner begins to wonder and doubt, a mental state that can cascade into another vicious cycle of sexual dysfunction for both partners.

Routine is the archenemy of a healthy sexual response. Being married or in a repetitive relationship for a long

time can have a severe impact on sexual experience. The relationship begins to lag, and the sexual experience becomes less enjoyable. Therefore, remembering that the sexual experience, especially for women, begins in the brain, physicians should suggest that couples change the time of day they have sex, the location, the position, the intimacy settings, or foreplay they use before the sexual encounter. In other words, the couple needs to do a little work so that the act does not become the same old thing and so that they remain involved or active in not only the act but also the anticipation and planning of the event. It requires continual work to be sure that the partners are not just going through the motions.

Affairs are difficult relationships to compete against because they offer so much novelty, stimulation, anticipation, and excitement. Female patients frequently relate that at the start of a new relationship, they are able to be orgasmic, but as time progressed, orgasm became less and less frequent.

Novelty such as offered by affairs, literature, videos, and sexual aids is a double-edged sword. What often happens is that the woman can become conditioned and facilitated to this stimuli as well, and like any other addict, it takes something even more stimulating to achieve the same response. In the beginning, the stimuli work on the brain, making for a great sexual experience, but, as time passes, progressively more and more stimuli are necessary.

Physicians need to discuss the negative implications of experimentation and stimulation with their patients; as with most things, just because a little is good does not mean that a lot is better.

Lifestyle changes and healthy lifestyles may often affect sexual interest and response. Changes to habits and lifestyle are not easy to accomplish, but they really do make a difference. Strength training, resistance training, and weight training particularly can create a change in sexual response and satisfaction. Positive results may primarily stem from the increased testosterone levels, increased endorphin levels, increased serotonin levels, and decreased depression seen in patients who practice well-

ness and regular physical activity. An increase in the testosterone level increases libido.

In most women, increased exercise also helps enhance body image, which is extremely important, especially for women who are going through changes in their physical appearance after child birth, the midlife perimenopausal transition, etc. These changes include loss of skin tone, increasing weight, hair changes from thinning to turning gray, changes in body habitus, and distribution of fat.

Because women respond emotionally to sexuality, their awareness of bodily changes and their perception that their body image appears worse to others decrease their libido. They may unconsciously avoid sexual encounters just because of their self-image as a sexual being. Strength training is one way to combat bodily changes and to promote health in other areas. Similarly, aerobic training also is of benefit, though it does not increase a woman's testosterone level as strength training does. As a result of such training, women will be more physically fit and have more stamina, not necessarily just for sexual encounters, but also to maintain an interest in sexuality.

Hydration is important for health and sexuality, especially for the response of mucosal membranes. Cardiovascular health and stability, general urinary tract health and function, avoidance of excessive alcohol or social drugs, and smoking cessation are all of benefit to improve overall health and sexual function.

As women age, they have decreased tactile sensation, which means they need more or different stimulation for the same response. With the decline in estrogen as women go through the changes associated with menopause, the sensitivity of the clitoris and the vaginal and perineal region decreases. Women also start to have changes and decline in the potential for reproduction with erratic ovarian function. Such changes occur in many women as soon as the early to mid-30s. This condition continues on intermittently through the years, at different times with an elevated estrogen level for a short time, and a normal or a decreased level at another time. Obviously, this bouncing back and forth affects women's emotional lability and thus their sexual

response. It may also affect their self-image as a “young sexual being.” Therefore, physicians need to provide their patients with education on these events.

Female patients need to understand that as a consequence of decreased sensitivity, they may need increased stimulation. A woman needs to be able to verbalize this need to her partner, and both of them need to understand that decreased sensitivity is part of the normal aging process, not something that is wrong with the woman or with her partner. The woman may need more time to reach satisfaction, somewhat analogous to what happens in aging men.

The sexual frequency desired by a couple may demonstrate a discrepancy between partners, in young, middle-aged, and older patients. While one partner considers the right frequency to be every day or several times a day, the other may consider twice a month to be plenty. This desire, as many others, changes as patients go through midlife and perimenopausal transition, and it changes in both men and women. Men often have a decreased libido in midlife, whereas women commonly have an increased libido, again due to relative testosterone levels. Communication again is key to a successful relationship.

Women may also have decreased arousal as already discussed, with an altered plateau phase or diminished peak resulting in their having more difficulty having an orgasm even if they did not have a problem before. Both partners frequently have a prolonged resolution phase whereby the time of satisfaction between sexual experiences may become a week or even a month whereas it used to be hours or days.

Treatment Options

Estrogen Replacement

Most clinicians may think of estrogen as the problem and the solution. Estrogen definitely has important benefits for female sexuality, especially benefits on the external genitalia and mucosa. The hormone encourages blood flow for the excitement or the arousal phase. It leads to vaginal lubrication, maintains the elasticity and health of the vaginal muscles and mucosa, improves the mood, and affects the woman’s responsiveness. It

also improves the clitoral sensitivity. However, at its best, estrogen has inconsistent outcomes when used primarily to treat female sexual dysfunction. It is best used in a patient who truly has a hypoestrogen state. Long-term use of estrogen increases sex hormone-binding globulin, which binds estrogen as well as androgens. In the long run, an overall decrease in the levels of these important sex hormones and increased dysfunction may occur. In some instances, use of oral contraceptives or hormone replacement therapy (HRT) causes more problems than it solves.

The author’s preferred routes for use of estrogen in the treatment of women with sexual dysfunction are the nonoral routes. Estrogen supplementation provided by the transdermal or intravaginal delivery systems or a vaginal topical cream may be more effective for such use, but the effect on osteoporosis and other systems is less well established. Also, estrogen does not consistently improve sexual arousal or excitement in most women. It inconsistently improves libido, but it does not appear to improve a woman’s ability to have orgasm.

Progestins

Progesterones downregulate the estrogen receptors. In sexual dysfunction due to decreased estrogen function, they make things even worse. They are important for maintaining the health of the endometrial lining in patients who have an intact uterus and who are using HRT or oral contraceptives, as it has been clearly established that they decrease the incidence of carcinoma. Overall, however, the estrogen-and-progestin compound may counteract the beneficial effects of estrogens on the brain, the cardiovascular system, bone mineral density to prevent osteoporosis, and effects on the genitalia.

Progesterone tends to decrease libido and blood flow to the genital region. The physiologic response to any given progestin is patient dependent, but the progestin that has the most significant negative impact on estrogen function and sexuality is medroxyprogesterone acetate (MPA). The combination of estrogen and MPA is the most commonly used compound.

Androgens

The final hormone group is the androgens. A classic example of a compound used for hormone replacement in an attempt to improve both libido and sexual response is the combination of estrogen and methyltestosterone, which is approved by the FDA and is indicated for vasomotor instability. Although this combination is not approved by the US Food and Drug Administration (FDA) for treatment of women with sexual dysfunction, there continues to be much off-label use for this effect and studies have been done to show an improvement in sexual function with the use of this and other androgen compounds.

Methyltestosterone alone is not commonly given for oral administration today, though such use was common just a few years ago. For one reason, women need only about 10% of what is generally available for male testosterone supplementation and not many compounds are available in the indicated strength. In the past, micronized testosterone was used orally at extremely low doses. Today, more topically applied compounds are being used, such as 2% testosterone compounded and applied to the clitoris. Although the compound’s effect may in reality be merely that from stimulation and foreplay, the compound used in this manner may make a difference in sexual response. This author has prescribed this compound to treat patients for sexual dysfunction with mixed results.

Dehydroepiandrosterone

Another compound is dehydroepiandrosterone (DHEA), which is available as 50-mg tablets over the counter. Some patients ask about using DHEA, particularly male patients for their female partners. It is an important precursor for testosterone. Anecdotal reports have claimed that it does make a difference with regard to increasing libido and arousal. Its greatest usefulness is with androgen supplementation in patients who have androgen deficiency.

Phosphodiesterase Inhibitors

At present, none of the phosphodiesterase type 5 (PDE-5) inhibitor compounds has an indication for use in women; however, such off-label use does

occur. It centers around the treatment of women who have problems with arousal, blood flow, and orgasm. Remember that the sex act starts in the brain with visualization of a picture, a thought, an image or smell, any thought or fantasy that triggers the release of nitrous oxide from terminal nerve endings. The reaction results in smooth muscle relaxation, which allows blood flow into the corpus of the penis or clitoris. Guanosine monophosphate (GMP), specifically cyclic GMP (cGMP), is dependent on both the rate of production and the rate of degradation. The PDE-5 inhibitors affect the levels of cGMP available and effect smooth muscle relaxation.

Currently, three PDE-5 inhibitors are on the market in the United States. Tadalafil, available in 5-mg, 10-mg, and 20-mg tablets is the most recently introduced. Vardenafil hydrochloride, available as 2.5-mg, 5-mg, 10-mg, and 20-mg tablets, preceded tadalafil. The recommended starting dose for both of these PDE-5 inhibitors in most men is 10 mg. The earliest PDE-5 inhibitor released to market is sildenafil citrate, available as 50-mg and 100-mg tablets. The starting dose is generally 50 mg for men.

At this time, the evidence for the off-label use of these compounds in women is mostly anecdotal. Some of the author's female patients have tried the compounds with mixed results. When one considers the actual pharmacology of these products, it is easy to speculate that they would be beneficial for both male and female patients as their genitalia have a common embryologic origin. The confounding factor, especially for women, is the strong emotional and cultural aspects of the sex act. Women have a total response, not just a physiologic response.

If a female patient's sexual function problem is a matter of performance anxiety, a PDE-5 inhibitor may work well for her because she believes that it will. If the defect is due to blood flow, stimulation, and lubrication, a PDE-5 compound may also be of benefit in achieving a more satisfactory sexual response. More studies are likely to be done in women with regard to the effect of these compounds on sexual dysfunction as this population potentially offers as large a

market, if not a larger market, than the male market in the United States. For these PDE-5 compounds to be the most effective, it may be important for female patients to have a normal testosterone level.

Herbal Therapy

Herbal modes of therapy have not been shown to be effective. Although *Ginkgo biloba* and yohimbine are used the most in both male and female patients, neither has been proved to be effective in either gender. L-arginine is touted as the natural sildenafil, but results are mixed and offer no proved outcomes in double-blinded studies.²

Comment

If primary care physicians suspect abuse—whether in childhood, young adulthood, or currently—they should always refer patients with sexual dysfunction, especially female patients. Abuse has a tremendous impact on the response of women. The trauma tends to be longlasting and demonstrates periods of remission between periods of acute symptoms.

Another indication for referral is the presence of chronic or multiple etiologies of dysfunction. Also requiring referral are patients with identified psychological issues that do not respond to therapy or that make primary care physicians uncomfortable treating patients for them. Physicians must investigate and rule out depression along with issues of self-image and psychosis. Finally, referral is necessary for patients when treatment fails, just as it is for patients with any other medical condition.

References

1. Masters WH, Johnson VE. *Human Sexual Response*. Philadelphia, Pa: Lippincott Williams & Wilkins Publishers; 1966.
2. Meston CM, Worcel M. The effects of yohimbine plus L-arginine glutamate on sexual arousal in postmenopausal women with sexual arousal disorder. *Arch Sex Behav*. 2002;31:323-332.