

SUCCESSFUL AGING

Aging and Sexuality

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Recent research suggesting that a high proportion of men and women remain sexually active well into later life refutes the prevailing myth that aging and sexual dysfunction are inexorably linked. Age-related physiological changes do not render a meaningful sexual relationship impossible or even necessarily difficult. In men, greater physical stimulation is required to attain and maintain erections, and orgasms are less intense. In women, menopause terminates fertility and produces changes stemming from estrogen deficiency. The extent to which aging affects sexual function depends largely on psychological, pharmacological, and illness-related factors. In this article I review the physiological sex-related changes that occur as part of the normal aging process in men and women. I also summarize the effects on sexual function of age-related psychological issues, illness factors, and medication use. An understanding of the sexual changes that accompany normal aging may help physicians give patients realistic and encouraging advice on sexuality. Although it is important that older men and women not fall into the psychosocial trap of expecting (or worse, trying to force) the kind and degree of sexual response characteristic of their youth, it is equally as important that they not fall prey to the negative folklore according to which decreased physical intimacy is an inevitable consequence of the passage of time.

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*[My] ... Age is as a lusty winter,
Frosty, but Kindly.*

WILLIAM SHAKESPEARE
*As You Like It*¹

Sexual desire and activity continue well into later life for both men and women but can be affected in various ways by aging. I begin by discussing these effects in men.

Men

Although an age-related decline in sexual activity and desire among men has been reported in numerous studies, maintaining a healthy interest in sexual activity is not uncommon among 70-, 80-, and even 90-year-old men. Pfeiffer and associates² reported that 95% of men aged 46 to 50 years and 28% of men aged 66 to 71 years have intercourse on a weekly basis. Diokno and co-workers³ have reported that nearly 74% of married men older than

60 remain sexually active, and Bretschneider and McCoy⁴ found that 63% of men aged 80 to 102 years continue to be sexually active. In view of the fact that sexuality in the literature is often defined exclusively in terms of intercourse, these estimates would probably be even higher if noncoital acts such as touching, caressing, fantasy, and masturbation were taken into account.

The age-related decrease in libido noted among men is most frequently attributed to a decline in testosterone levels and to changes in receptor site sensitivity to androgen. The sex hormone status of a healthy man remains relatively stable from puberty until the fifth decade of life, at which time androgen production gradually declines. The first sign of an alteration in endocrine function is a small increase in pituitary-stimulating hormone levels (gonadotropins), which signals the relative inability of the aging testes to efficiently produce testosterone.⁵ Serum testosterone levels gradually decline as a consequence, and by age 80 they may be only a sixth those of a younger man.⁶ Although the drop

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in serum testosterone levels clearly parallels the decline in sexual libido noted with age, there is little evidence to suggest that testosterone replacement therapy augments sexual drive in men with normal baseline testosterone levels. That is, administering massive doses of androgen to an 80-year-old will not restore his libido to what it was when he was 18.⁵

There appears to be a minimal level of testosterone necessary for adequate sexual functioning, above and beyond which additional amounts have no effect. This probably reflects limitations set by the number and sensitivity of functional testosterone receptors. Because most older men apparently have these receptors in numbers above the "critical" level, it is generally assumed that exogenous testosterone would be superfluous and would not restore age-related decreases in sexual drive. Using a placebo-controlled design, Morales and associates⁷ examined the effects of exogenously administered adrenal androgen dehydroepiandrosterone (DHEA) on a number of age-related factors in 13 men aged 40 to 70 years. When levels were restored to those of a younger age group, DHEA had no direct effect on sexual interest. Replacement DHEA did, however, have a beneficial effect on general measures of well-being. Such measures may, in turn, have a positive effect on sexual satisfaction and function. Further studies of the effects of DHEA on male sexual function and well-being are required before treatment considerations are warranted.

Women

A decline in sexual interest and desire is frequently reported to be more severe in aging women than aging men. Such assertions are often based on studies that compare the incidence of sexual activity in aging men with that in aging women. For example, recent research indicates that approximately 56% of married women older than 60 (compared with 75% of married men) are sexually active,³ as are approximately 30% of women aged 80 to 102 years (compared with 63% of men).⁴ As noted earlier, sexual interest and activity in studies of this nature are too often measured solely according to frequency of intercourse. Given that by the age of 80 or older there are 39 men for every 100 women,⁸ lack of opportunity may well account for a large portion of such gender differences. More importantly, gender differences in the incidence of intercourse and masturbation are apparent in adolescence and throughout adulthood,⁹ not only among older people. Hence, age-related changes in sexual activity may best be understood by examining change across a person's total lifespan rather than comparing incidence between genders. To this end, the Janus report¹⁰ indicated surprisingly little change in sexual activity across the average woman's lifespan. In this report, 68% of women aged 39 to 50 engaged in sexual activity at least once a week, as did 65% of women aged 51 to 64 and 74% of women older than 65. As is the case in men, masturbation frequency in women has been noted to decline with age, but it continues to be

practiced by approximately half of the healthy female population over the age of 60.¹² In contrast to research indicating that sexual desire declines with age, 9% of women interviewed for a Danish study¹³ reported an increase in sexual desire during or after menopause.

One of the primary causes of decreased sexual desire in postmenopausal women is decreased vaginal lubrication or a thinning of the vaginal lining, both of which may lead to pain during vaginal intercourse. In such cases, sexual desire generally returns once some form of treatment (for example, estrogen or lubricants) has relieved the symptoms.¹⁴ A lack of bioavailable testosterone may also reduce sexual desire in women. Although there is no absolute level of testosterone necessary for sexual desire, it has been suggested that there is a threshold level of circulating androgen below which the intensity of desire is affected.¹⁵ It is not clear why some menopausal women experience a sharp decline in testosterone production,¹⁴ nor has it been proved that androgen replacement therapy is of more than marginal therapeutic value in such cases.¹⁵ More importantly, the safety of prescribing testosterone is currently controversial. Testosterone may affect cholesterol and liver protein levels; at high doses, it may also cause masculinizing effects such as facial hair or lowered vocal pitch.¹⁴ Researchers have recently examined the effect of the adrenal androgen DHEA on the sexuality of women aged 40 to 70 years.^{7,16} Although neither circulating nor replacement levels of DHEA were directly linked to measures of sexuality in women, DHEA was significantly associated with measures of overall well-being.^{7,16} Well-being in turn was shown to be predictive of the quality of sexual relationships.¹⁶ Further studies of this nature are required before suggestions for treatment can be made.

The less frequent reports of increased sexual desire among older women may also be explained by hormonal changes that occur following menopause. When estrogen levels decline, levels of follicle-stimulating hormone and luteinizing hormone increase in an effort to stimulate estrogen production. The increase in these two hormones stimulates certain cells in the ovarian stromal tissue to produce testosterone. Women vary widely with regard to efficiency in producing testosterone in this manner.¹⁴ Women who have an increase in testosterone production during or after menopause may possibly have increased sexual desire. Psychological factors such as elimination of the fear of conception may also play a role in increasing sexual desire after menopause.¹⁴

Physiologic Aspects of Aging and Sexuality in Men

With regard to actual physiologic changes that occur with age and affect sexual functioning, much individual variation exists. It has been estimated that 55% of men experience impotence by the age of 75.¹⁷ This should not be taken to mean that erectile failure is a normal stage in the aging process. The alterations that lead to decreased sexual functioning, particularly erectile failure, are

multifactorial, made up of elements that may be both organic (such as the effects of disease or medication) and psychological (for example, anxiety and guilt). It is clear that all stages of the human sexual response cycle, as defined by Masters and Johnson,¹⁸ are influenced by age-related factors, but there is no evidence to suggest that erectile failure is inevitable among aging men who are psychologically and physiologically healthy.

The Sexual Response Cycle

Normal age-related changes that accompany the excitement stage of sexual response in men include a decrease in, or lack of, elevation in testosterone levels; a decrease in scrotal vasocongestion; reduced tensing of the scrotal sac; and delayed erection. Where a young man may achieve a full erection in seconds, an older man may require several minutes to attain a similar response. Age-related changes in adrenergic and cholinergic mechanisms may partly explain these changes. The process of erection is a vascular event mediated by the autonomic nervous system. Corporeal smooth-muscle tone plays a primary role in erectile ability; gap junctions and ion channel mechanisms, in turn, are largely responsible for determining the degree of smooth-muscle tone.¹⁹ With advancing age, there is evidence that a decline occurs in the number of β -adrenergic and cholinergic receptors, which may lead to increased dominance of α^1 -adrenergic activity (that is, increased corporeal smooth-muscle tone). This in turn may interfere with the corporeal smooth-muscle relaxation necessary for initiation and maintenance of the erectile response.¹⁹ Age-related cellular changes may also negatively affect the erectile response through an increased deposition of connective tissue, causing a decrease in penile distensibility.¹⁹ This loss of corporeal elasticity may lead to lowered compression among emissary veins, resulting in venous leakage and consequent difficulty achieving erection.

Penile sensitivity also decreases with age.²⁰ Attaining and maintaining an erection, therefore, becomes more dependent on direct physical stimulation and less dependent on, or responsive to, centrally controlled visual, psychological, or nongenital excitation.¹⁹ As a result, partners may need to facilitate the erectile response by providing manual or oral stimulation before intromission and possibly at periods throughout the sexual act to help sustain erection until orgasm. Penile rigidity declines gradually, beginning in most men at age 60.¹⁹ Generally, rigidity remains adequate for vaginal intercourse, but couples may need to experiment with different coital positions or supplement intercourse with manual stimulation.

The plateau stage of sexual response is prolonged with age, and pre-ejaculatory secretions and emissions are reduced or cease to occur. Prior difficulties with premature ejaculation may be resolved in older men because of the increase in stimulation and time required to reach orgasm. The duration of orgasm decreases with age, there are fewer and less intense spastic prostate and urethral muscle contractions, and there is a decrease in

expulsive ejaculatory force. The period of inevitability before ejaculation is reduced from between 2 to 4 seconds in younger men to approximately 1 second in older men, and there is a slow but gradual decline in semen volume per ejaculation.¹⁹ Occasionally orgasm may occur without ejaculation. The final postorgasmic or resolution stage of sexual response is marked by more rapid loss of vasocongestion and an increase in the length of the refractory period. For a man in his 20s the refractory period may last only minutes; for a man in his 80s it may extend to several days—probably the amount of time required for ionic and neurotransmitter concentrations to be restored to normal levels.¹⁹

Physiologic Aspects of Aging and Sexuality in Women

Effects of Menopause

Menopause, which occurs in most women at about age 50, is associated with substantial reductions in estrogen, progesterone, and androgen levels. Following menopause, estrogen is almost exclusively derived from the peripheral conversion of adrenal androgens. Around age 65, there is a further decrease in adrenal androgen production, often referred to as adrenopause.¹⁵ The decline in estrogen that accompanies menopause leads to a number of normal age-related changes in genital appearance. Such changes include a reduction in pubic hair, loss of fat and subcutaneous tissue from the mons pubis, atrophy of the labia majora, and shortening and loss of elasticity of the vaginal barrel. Vaginal secretions decrease in quantity as a result of both atrophy of the Bartholin glands and a decrease in the number and maturity of vaginal cells. The vaginal epithelium, which is highly estrogen dependent, becomes flattened and loses glycogen; this leads to a decrease in *Lactobacillus* species and lactic acid and an increase in vaginal pH.²¹ These alterations affect the vaginal microbial population and put aging women at greater risk for developing bacterial infections.²² Together with decreased vaginal lubrication, the reduction in thickness of the epithelium from approximately eight to ten cell layers to three to four may lead to postcoital bleeding, mild burning sensations during intercourse, and pain.²² For such reasons, dyspareunia is the most common sexual complaint among older women seeking gynecologic consultation.²³ With decreased estrogenic stimulation, the uterus is reduced in size and the total collagen and elastic content decreases by 30% to 50%.²⁴ The uterine cervix also atrophies and loses fibromuscular stroma, and the ovaries, with no remaining follicles, become reduced in size and weight and the ovarian stromal tissue becomes fibrotic and sclerotic.²² Estrogen replacement therapy, when given systemically at high doses, has a beneficial effect on urogenital tissue²² but is associated with an increased risk of breast and endometrial cancer.²⁵ In the absence of other postmenopausal symptoms, vaginal estrogen cream administered a few times per week may be equally effective.

The Sexual Response Cycle

A number of age-related changes affect the female sexual response cycle. During the excitement phase, vaginal blood flow and genital engorgement are less intense than in younger women and take longer to occur. This phenomenon may be less pronounced in women who continue to be sexually active than in those who are celibate, although its mechanism is not well understood.¹⁵ Vaginal lubrication is delayed and reduced in quantity. Whereas in younger women the excitement stage with lubrication may take only 10 to 15 seconds, in postmenopausal women it may take as long as 5 minutes or longer.²⁶ The decrease in vaginal vasocongestion and lubrication may contribute to dryness of the vagina and may make intercourse painful. A variety of topical lubricants have been used successfully to compensate for insufficient vaginal lubrication. For women who prefer not to use a lubricant during intercourse, nonhormonal preparations such as Replens or oil from a vitamin E capsule, applied vaginally every other day, may greatly alleviate vaginal dryness, as may taking zinc orally.¹⁴ Despite these age-related physiologic changes, several studies have reported that postmenopausal women report little or no change in the subjective experience of sexual arousal.²⁷

The plateau phase of sexual response is prolonged in older women, uterine elevation is reduced, the labia majora do not elevate to the same degree as in younger years, the breasts become less vasocongested, and nipple erection is less likely to occur.^{1,15} The orgasmic response does not appear to be substantially affected by age. Women retain multiorgasmic capacity, although the number and intensity of vaginal and rectal contractions are reduced.⁵ While younger women average five to ten vaginal contractions with orgasm, older women average two or three.⁵ As is the case in men, the resolution stage of sexual response in older women is characterized by a rapid loss of vasocongestion.

Illness, Medication Use, and Sexuality Among Older Persons

Physical illness can affect sexual function directly by interfering with endocrine, neural, and vascular processes that mediate the sexual response, indirectly by causing weakness or pain and psychologically by provoking changes in body image and self-esteem. The scope of this article precludes a comprehensive discussion of the effects of medical illness on sexuality; accordingly, only the most prevalent age-related medical illnesses, prescribed medications, and their effects on sexuality will be mentioned here (for a review, see Badeau²⁸).

Men

Medical or surgical therapy for a number of age-related diseases can affect erectile function by interfering with the neurologic innervation of the penis. Interventions that may have this effect include lower abdominal surgery, pelvic irradiation, and certain types

of prostate surgery.⁵ Transurethral resection of the prostate has been reported to cause erectile failure in 4% to 12% of cases.² Radical prostatectomy for prostate cancer, cystectomy for bladder cancer, and colorectal surgery may all damage the neuromuscular bundle of the penis. Although increasing attention has been paid to preservation of the neurovascular bundle, men with aberrant cavernous arteries more often than not suffer erectile dysfunction from such procedures.¹⁹ A number of age-related disease states may interfere with erectile function directly. The atherosclerosis associated with cardiovascular disease may involve the penile arteries as well as the coronary arteries. Occlusion of the abdominal aorta or the iliac arteries may also be associated with the failure to attain erection.⁵ Because the act of intercourse increases heart rate and blood pressure, fear of chest pain during intercourse may further impede sexual relations. Diabetes mellitus is commonly associated with erectile failure. Within only five years after the onset of type II disease, 60% of male patients have some form of sexual dysfunction.¹⁹ The causes of erectile failure in diabetic men are largely neurogenic and vascular, but also include alterations in corporeal smooth-muscle reactivity and microangiopathy, which may cause arterial insufficiency.¹⁹ Somatic and autonomic neuropathy may produce neurogenic impotence in older diabetic men. Other endocrine or metabolic disorders associated with erectile problems include hypothyroidism, hyperthyroidism, hypogonadism, hyperprolactinemia, and Cushing's disease. Systemic disorders known to impair erection include renal failure, chronic obstructive pulmonary disease, cirrhosis, and myotonia dystrophica. Among the neurologic disorders that may inhibit erection are spinal cord injury, cerebrovascular accidents, temporal lobe epilepsy, multiple sclerosis, and sensory neuropathy.^{1,5}

A wide variety of drugs have been reported to impair erectile ability, particularly among older persons. The aging process influences physiologic drug distribution, metabolism, and excretion and renders older persons more vulnerable to the side effects of medication.¹⁹ Among medications, antihypertensive agents that act either centrally (for example, methyldopa and clonidine) or peripherally (for example, reserpine, guanethidine), β -blockers (such as propranolol or labetalol), α -blockers (including prazosin and terazosin), and diuretics (for example, thiazide and spironolactone) appear to be the primary offenders in causing impaired erection.¹⁹ In addition, cardiovascular drugs (such as disopyramide), cancer chemotherapy agents, anxiolytics (benzodiazepines), antipsychotics (for example, haloperidol, thioridazine, and chlorpromazine), a wide range of antidepressants (such as imipramine, amitriptyline, trazodone, and fluoxetine), lithium, and numerous drugs of abuse (including cocaine, alcohol, narcotics, and amphetamines) have all been linked to impaired erectile function (for reviews, see Schiavi and Rehman¹⁹ and Meston and Gorzalka³⁰). With diseases such as depression, hypertension, and atherosclerosis, it is difficult to determine the extent to which the sexual dysfunction is a result of the

prescribed medication or the disease per se, given that both may negatively affect the sexual response.

Women

Surgical treatment of gynecologic and breast cancer often has a deleterious effect on sexual function in women by assaulting body image. Although breast or vulvovaginal surgery undoubtedly affects self-esteem in women of all ages, the psychological damage may be further compounded in older women whose body image is perhaps already affected by age-related body changes. Urinary incontinence occurs in up to 25% of older women during intercourse.³¹ This disorder commonly leads to dissatisfaction with the sexual relationship or withdrawal from sexual contact because of embarrassment. Renal failure has been reported to cause anorgasmia, decreased libido, and impaired vaginal lubrication in women on dialysis.¹

Hysterectomy is the most commonly performed operation in women: more than a third of women in the United States have had a hysterectomy by age 60. This procedure has not been shown to have a direct effect on sexual function; some women, however, report a decline in orgasmic pleasure following hysterectomy because of the absence of uterine contractions. For women who view hysterectomy as a further loss of femininity, self-esteem and body image may be damaged by this type of surgery. Conversely, for women who experience relief from pain, abnormal bleeding, or cramping, hysterectomy may result in improved sexual function.¹

In contrast to an abundance of research on diabetes and male sexual function, there is a paucity of studies examining the effects of diabetes on female sexual function. Decreased sexual desire, anorgasmia, and difficulty obtaining sufficient vaginal lubrication during sexual arousal have been identified in some women with type II diabetes mellitus.^{5,15} The duration of diabetes, age, or insulin dosage does not appear to be correlated with sexual function among women with diabetes,³² and there is no evidence that peripheral or autonomic neuropathies directly affect the female sexual response.¹⁵

Research into the effects of medication use on sexual function in women has lagged considerably behind that in men. Antidepressant drugs are commonly reported to affect sexual functioning in women. Side effects associated with antidepressant medications include decreased sexual desire, impaired arousal and lubrication, vaginal anesthesia, delayed orgasm, and anorgasmia (for a review, see Meston and Gorzalka³⁰). Serotonergic systems are frequently implicated in antidepressant-induced sexual side effects, although data are inconsistent as to whether the role of serotonin in sexual behavior is inhibitory, excitatory, or both.³⁰ Antipsychotic and neuroleptic medications have also been linked to impaired sexual function in women. Most recently, the antihypertensive drug clonidine has been shown to impair physiologic sexual response in women by decreasing vaginal blood volume and pressure pulse responses.³³ Clearly, there is a need for further research in this area.

Psychological Aspects of Aging and Sexuality

Not surprisingly, a number of psychological factors that influence the sexuality of younger persons also affect older men and women. Of particular importance is the nature of the interpersonal relationship. Marital conflict, relationship imbalances, commitment issues, intimacy and communication problems, lack of trust, mismatches in sexual desire, boredom, and poor sexual technique are just some of the common sources of sexual dissatisfaction noted among couples of all ages.^{5,34} In older people these factors may be amplified by anger and resentment that may have built over the years, as well as by feelings of entrapment and resignation if the option to leave the relationship no longer seems viable. As with younger couples, marital satisfaction is closely linked to sexual satisfaction in older couples.³⁴

Increases in psychosocial stresses, such as the death of a spouse, loss of a job or social status, deterioration of support networks, and health- and finance-related family problems, are common experiences among the aged. These life changes may contribute to sexual difficulties in older people by increasing the likelihood of depression or anxiety. "Widower's syndrome" refers to the onset of sexual difficulties in older persons who resume sexual interactions after a period of celibacy following the death of a spouse. Sexual difficulties in this situation are generally attributable to unresolved feelings of grief, guilt, anger, or even relief in cases in which the partner had been ill for a long period before death.⁵ Performance anxiety related to beginning a new sexual relationship may be a problem for both men and women, but may play a particularly detrimental role in male sexual function because of the well-known adverse effects of anxiety on erectile function.

Because women generally marry men older than themselves, and are likely to outlive men by an average of seven to eight years, women are more likely than men to experience the death of a spouse in old age. Given the shortage of available older male partners, women are also more likely than men to spend the later years of life alone. Many older women report feeling sexually frustrated at the lack of an available sexual partner. Although masturbation is a viable option, older persons may have been brought up to believe that masturbation is unnatural or even unhealthy. Education and permission from a health care professional may help to alter such misconceptions.⁵ Also common among older people are false expectations regarding the effects of aging on sexuality. Self-critical anxieties about one's sexual abilities or physical imperfections can be distracting or even destructive to sexual pleasure and excitement. The societal emphasis that has linked sexuality almost exclusively to young people may lead some older people to feel ashamed of their continued sexual interest and may consequently discourage them from seeking sexual advice. Information from physicians regarding normal age-related changes in sexuality and encouragement, together with advice on how to continue meaningful sexual relations, may play a key role in altering such negative attitudes.

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