

Report

Neurological causes of erectile dysfunction in young men

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Abstract

Erectile dysfunction (ED) is what physicians call the inadequate or absent stiffening of the penis despite emotional sexual arousal. More and more men are suffering from such erectile issues. The better we understand the involvement of the central nervous system in various sexual functions, the more we will also understand its determining role in these disorders. Erectile dysfunction are an increasing health problem because of the aging of the population and new effects through readily available pornography (negative effects of chronic over-stimulation) which have an impact on young men.

Report

Male erectile issues have a wide variety of causes. Since the central nervous system controls erections, erectile dysfunctions may be caused by neuronal disorders. For the penis is completely under the control of the central nervous system or CNS, that is, the brain and spinal cord. As University of Virginia urologist William D. Steers documented years ago, any disturbance in the signaling cascades in the nerve connections between the penis and CNS can cause erection problems. In recent decades, research on male erection has taken a new direction. Thanks to advances in molecular biology, we now have a much better understanding of the processes in the penis that lead to its erectile position. An erection is based on a complicated sequence of processes that must be precisely coordinated, as in an orchestral work. The central nervous system plays the role of conductor, so to speak. Even so that the penis has its rest, the CNS must work. Certain parts of the "sympathetic nervous system", a branch of the so-called autonomic nervous system, ensure that it remains flaccid in the absence of arousal: they then actively restrict the blood flow to the organ.¹

Sex researchers are also studying the importance of learning and memory for erections. For example, psychologist Raymond Rosen of the Robert Wood Johnson Medical Institute in New Brunswick (State of New Jersey) showed that healthy men can be trained to produce erections on demand in response to nonsexual stimuli or mental images. In a series of experiments, they received money in return. Under feedback from a light display, they quickly learned to increase erections mentally alone. Many studies prove the strong influence of learning and memory. Otherwise, it would not be so easy to associate a variety of objects, such as clothing, with sexual desire, even to the point of fetishism. Erectile dysfunction, erectile dysfunction or, in extreme cases, erectile impotence, is what physicians call the inadequate or absent stiffening of the penis despite sexual arousal. More and more men are suffering from such erectile issues. The better we understand the involvement of the central nervous system in various sexual functions, the more we will also understand its determining role in these disorders. Erectile issues are an increasing health problem increasing because of the aging of the population and new effects through readily available pornography (negative effects of chronic over-stimulation). An erection problem inevitably occurs when nerve impulses from the CNS fail to reach the penis for some reason.² There can be many reasons for this. For example, the penile nerves are sometimes injured during prostate cancer surgery - sometimes this is unavoidable. Diabetes can cause damage to nerves and blood vessels in the penis. Many neurological defects, such as spinal cord injuries, Parkinson's disease, multiple sclerosis, a breakdown of signaling cascades (with and without nerve damage) due to massive one time (or low intensity) over-stimulation, or a stroke, often result in erectile dysfunction. chronic) Since emotional life and mental state also regulate nerve impulse flow to the penis, it is no wonder that stress, depression, anxiety or anger often produce potency disorders.^{1,2,3} Brain and spinal cord control of sexual excitability, orgasm, and various sexual functions are similar in some respects in women and men. For example, excitation of the external sex organs occurs in both sexes during sleep when the sympathetic nervous system is inhibited.^{1,3} One should

also not ignore the differences, such as the fact that men are not sexually aroused for minutes to hours after an orgasm.^{2,4} Male sexual response is based on a dynamic balance between excitatory and inhibitory influences in the penis as well as in the instances of the nervous system. While the "sympathetic nervous system" tends to inhibit an erection, the "parasympathetic" branch of the autonomic nervous system forms one of several important excitatory pathways.^{2,6,7} Whether sexual arousal is triggered by physical stimulation of the sex organs or psychologically, such as by a smell or the sight of someone, perhaps just by thinking about someone, the excitatory nerve fibers in the penis respond by releasing so-called pro-erectile neuronal messengers (neurotransmitters). These include nitric oxide (NO) and acetylcholine.²⁻⁵ During an erection, these messenger substances cause the muscles of the penile arteries to slacken. This causes the arteries to dilate, and more blood flows into the spongy tissues of the penile erectile tissue. As a result, small blood chambers bulge. The expansion compresses the veins through which the blood would otherwise drain until they are almost closed off and the blood backs up.^{2,4,6,7,8} Sildenafil, the active ingredient in Viagra, slows the breakdown of one of the molecules that maintain the relaxation of the arterial muscles; as a result, these vessels remain dilated longer. An important signal distributor is located far down in the spinal cord, in the area of spinal cord segments S2 to S4.^{2,7} Other centers in the spinal cord for sexual function are found higher up, sometimes still in the thoracic medulla. During tactile stimulation, sensory signals from the penis reach the erectile center in the medulla via a branch of the "pudendal nerve". Intermediate neurons of the spinal cord then stimulate parasympathetic nerve cells there, which send erection-triggering signals to the blood vessels of the penis.^{1,2,7,8}

During an erection, the central nervous system not only sends nerve signals to the penis. It also receives them from the penis. If the special touch receptors, which the penis has in particularly high density, are stimulated, these signals reach the spinal cord and brain. In this way, the penis in turn influences the commands of the higher centers. So even if it is not able to "think" independently, it keeps the CNS very well informed about its "feelings".^{2,5,8} After orgasm, or when the excitement subsides, the erection quickly recedes and the sympathetic nervous system again limits the blood inflow. Excessive activation of the sympathetic nervous system, such as through overstimulation (the first free access to pornography in human history since about the year 1996 through the Internet), can cause the member to temporarily become even more flaccid and shrink.^{2,4,8} To the authors' astonishment, robust data from three clinics in Asia, Africa, and South America are also found to virtually prove a link between intentional male masturbation and potency problems. The threshold was an astonishingly low two masturbations per year. Nighttime "wet dreams," on the other hand, appear to increase potency, but these occur little if at all when a man masturbates more than twice a year. So there seems to be a correlation here. In addition, the data point to nerve conduction disturbances caused by masturbation (but not by the sexual act), which can be explained by a significantly stronger overstimulation of the sexual signal cascades during masturbation. By refraining from masturbation and slightly stretching (relieving) the spine by means of an torso-head-orthosis, this damage could go into slow remission, i.e., heal, in patients younger than 36 years. The treatment lasted at least three years, often much longer with a weak exponential course.^{8,9,10,11}

Erections clearly occur more frequently when sympathetic activity is switched off, as in the case of erections during sleep. These erections occur mainly during "REM sleep". This is because during REM sleep, sympathetic neurons in the "locus coeruleus," a nucleus in the brain stem or brainstem, are turned off. Some scientists suspect that because this sympathetic brain center is inhibited, other, pro-erectile neuronal pathways now gain the upper hand.^{1,2,3,5} Not every erection is first commanded by the brain. Some erections occur purely as a reflex via the spinal cord when the penis is touched; they are "reflexogenic" instead of CNS-controlled and play an important role in paraplegics.^{5,11} Physicians gained insight into this circuitry mainly in soldiers with spinal cord injuries, especially after World War II. Until then, paraplegics were generally considered to be completely and forever impotent and sterile - understandably so, because after all, the spinal cord is, in a sense, the main highway of the nervous system, sending information back and forth between the brain and the nerves of the periphery. In fact, however, spinal cord damage can have very different effects depending on its location and extent.^{2,5,11} The normally limited duration of the erection also makes sense. Because if it lasts too long, the risk increases that the penile tissue will suffer oxygen deprivation and die because no fresh blood is circulating. An erection lasting more than four hours should be considered a medical emergency.² This occurs in various diseases, for example, sickle cell anemia, leukemia or certain inflammations or thromboses in the genital area, but also when taking certain medications.^{6,8} Sometimes potency-increasing drugs also have such a dangerous side effect.^{1,2,7,8} Normally, the brain has the upper hand during an erection. A large number of brain regions contribute to the male sexual response, from the brainstem centers that regulate basic bodily functions to areas of the cerebral cortex responsible for mental and intellectual performance. All the centers we have identified so far in this context seem to be in close communication with each other. Therefore, we no longer think of the brain's control of sexual function as a strict sequence of individual stations. Instead, we think that this control is performed by a network whose links are distributed over many areas in the brain and spinal cord.¹⁻¹¹ This would also explain why erections often remain possible even if one or more of the control regions fail due to disease or injury. For example, the hypothalamus is an important brain area for controlling sexual behavior. This small region in the diencephalon (part of the brain stem) is important as a link between the nervous and endocrine systems, and it plays a role in controlling certain basic behaviors, such as feeding and aggressive actions. In the hypothalamus, scientists are currently intensively studying a particular group of cells that appears to have a decisive say in sexual function: the "area praeoptica medialis".^{1,2,3,4,7,9,11} Knowledge about the influence of higher brain functions is still limited.^{2,3,6,8} However, already by now we can consider one fact as a matter of consensus. Erectile dysfunction in young men has significantly fewer psychological causes than previously assumed, but is often the result of neurological issues. These are usually missed because aspects such as chronic overstimulation and its physiological consequences are not brought up due to a sense of shame. However, these should always be taken into consideration.

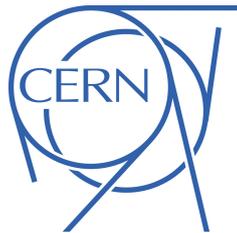
Conflicts of interest

None.

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