

## REVIEWS

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# Pelvic Floor Involvement in Male and Female Sexual Dysfunction and the Role of Pelvic Floor Rehabilitation in Treatment: A Literature Review

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### ABSTRACT

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**Introduction.** The sphincteric and supportive functions of the pelvic floor are fairly well understood, and pelvic floor rehabilitation, a specialized field within the scope and practice of physical therapy, has demonstrated effectiveness in the treatment of urinary and fecal incontinence. The role of the pelvic floor in the promotion of optimal sexual function has not been clearly elucidated.

**Aim.** To review the role of the pelvic floor in the promotion of optimal sexual function and examine the role of pelvic floor rehabilitation in treating sexual dysfunction.

**Main Outcome Measure.** Review of peer-reviewed literature.

**Results.** It has been proposed that the pelvic floor muscles are active in both male and female genital arousal and orgasm, and that pelvic floor muscle hypotonus may impact negatively on these phases of function. Hypertonus of the pelvic floor is a significant component of sexual pain disorders in women and men. Furthermore, conditions related to pelvic floor dysfunction, such as pelvic pain, pelvic organ prolapse, and lower urinary tract symptoms, are correlated with sexual dysfunction.

**Conclusions.** The involvement of the pelvic floor in sexual function and dysfunction is examined, as well as the potential role of pelvic floor rehabilitation in treatment. Further research validating physical therapy intervention is necessary. **Rosenbaum TY. Pelvic floor involvement in male and female sexual dysfunction and the role of pelvic floor rehabilitation in treatment: A literature review. J Sex Med 2007;4:4–13.**

**Key Words.** Pelvic Floor; Physical Therapy; Sexual Dysfunction

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### Introduction

The main functions of the pelvic floor are to provide support of the pelvic organs and prevent incontinence by promoting voluntary closure of the urethral and anal sphincters. Adequate pelvic floor muscle function is a necessary component of bowel and bladder control. Pelvic floor rehabilitation has been demonstrated to be effective in restoring continence in women with urinary stress incontinence (USI) in randomized controlled studies [1]. It is unclear to what extent pelvic floor rehabilitation is routinely offered by urologists to their patients before undertaking corrective surgery.

### *The Pelvic Floor: Pathophysiology Related to the Life Cycle*

The pelvic floor muscles attach from the pubic bone anteriorly, to the coccyx posteriorly and form a bowl-like structure, along with ligaments and fascial tissue. The functions of the pelvic floor are to provide support of the pelvic organs and promote voluntary closure of the urethral and anal sphincters for maintenance of continence. In women, the pelvic floor is compromised by pregnancy and delivery, predisposing women to complications of organ prolapse and urinary incontinence, due to stretch weakness of the supporting muscular and connective tissue structures.

However, as early as childhood in both men and women, learned motor patterns, such as “holding in” of urination and bowel movements, may facilitate predisposal to a chronic pelvic floor “holding” pattern, also referred to as “hypertonus.” This pattern may then perpetuate conditions such as chronic constipation, urinary retention, or irritable bladder symptoms of urgency frequency and dysuria.

Chronic pelvic floor hypertonus may also be the factor connecting certain urological, urogynecologic, and anorectal conditions with sexual dysfunction. Pelvic floor hypertonus is a component of conditions such as constipation, anismus, irritable bowel syndrome, and proctalgia fugax. Electromyogram (EMG) studies of patients with vaginismus have demonstrated not only hypertonus but pelvic floor dyssynergy, which correlated with constipation [2]. Patients with dyssynergia tend to empty their bladder by pushing and straining, rather than gently releasing, the pelvic floor muscles. Symptoms of pelvic floor muscle dysfunction have been divided into five groups by the International Continence Association [3]. (See Table 1)

#### *Pelvic Floor Muscle Assessment*

Physical therapists’ evaluation of muscles includes assessment of both strength and tone. Strength is defined as the maximal force a muscle can generate, and is often referred to as the weight that the muscle can lift once or the one repetition maximum [4]. There is currently no standard agreement on the definition of pelvic floor muscle strength; however, it has been suggested that it is defined by the recruitment of muscle fibers in a

**Table 1** Pelvic floor muscle dysfunction symptoms

1.1. Lower urinary tract symptoms
Urinary incontinence
Urgency and frequency
Slow or intermittent stream and straining
Feeling of incomplete emptying
1.2. Bowel symptoms
Obstructed defecation
Functional constipation
Fecal incontinence
Rectal/anal prolapse
1.3. Vaginal symptoms
Pelvic organ prolapse
1.4. Sexual function
In women: dyspareunia
In men: erectile and ejaculatory dysfunction
In both: orgasmic dysfunction
1.5. Pain
Chronic pelvic pain
Pelvic pain syndrome

**Table 2** Manual muscle testing grading scale

0	No response
1	Flicker
2	Weak contraction
3	Moderate contraction, some degree of lift
4	Good contraction, against some resistance
5	Normal muscle contraction, strong squeeze, and lift

maximum voluntary contraction [5]. While intra-vaginal or intra-anal surface EMG can effectively measure muscle activity in microvolts, the cost prohibits EMG as a standard method of testing. Additionally, it lacks the ability that the palpating practitioner has to assess symmetry and balance, and the ability to differentiate the closure muscles (puborectalis and external ani sphincter) from the lifting muscles (pubococcygeous and iliococcygeus.) Intra-vaginal and inter-anal palpation are therefore considered the most sensitive method to evaluate pelvic floor muscle strength and tone. The strength grading system that is considered standard in pelvic floor muscle testing is the modified Oxford scale (see Table 2) [6]. There is no standard agreement on a system for rating tonus of the pelvic floor.

Assessment of tonus in patients with neurological conditions generally refers to flaccidity (low tone) and spasticity (high tone). Regarding the pelvic floor, hypotonus describes weakness, whereas hypertonus describes muscle contraction, or tightness. Increased muscle contraction, however, does not preclude weakness, and in fact, muscle weakness and instability is associated with hypertonus. Vaginal and anal hypertonus have also been referred to as “spasm”; however, spasm refers to a reactionary condition, usually in response to acute pain, rather than a constant one. There currently exists no standardized method for grading pelvic floor muscle tone, nor has inter-therapist reliability been assessed. However, Reissing and colleagues reported high reliability and diagnostic agreement among physical therapists in diagnosing pelvic floor pathology [7].

#### **Pelvic Floor Involvement in Arousal and Orgasm**

##### *Male Sexual Function and Dysfunction*

The pelvic floor of the male appears to have some impact on sexual function, although its exact role is unclear. The phases of male sexual function include desire, mediated by testicular androgens, erection, ejaculation, orgasm, and detumescence. Erection is a neurovascular event that relies on interplay between the autonomic and somatic

innervation of the penis, the smooth and striated musculature of the corpora cavernosa and pelvic floor, and the arterial inflow supplied by the paired pudendal arteries [8]. Ejaculation is controlled by the sympathetic nervous system and consists of seminal emission. Orgasm is a cortical sensory phenomenon in which the rhythmic contraction of the bulbocavernous and ischiocavernous muscles is perceived as pleasurable. The final phase, detumescence, is the result of the constriction of the trabecular smooth muscle and vasoconstriction of the arterioles supplying blood to the erectile tissue [9].

Drainage of the venous sinuses occurs, resulting in penile flaccidity. Organic causes of male erectile dysfunction (ED) generally point to the neurologic, vascular, or endocrine systems. Pharmacologic agents are responsible for sexual dysfunction by various mechanisms in many cases. Pelvic floor muscle function may be involved in the enhancement of blood flow to the penis. While the ischiocavernous muscle facilitates erection, the bulbocavernous may be involved in maintaining the erection. Contraction of the bulbocavernous muscles blocks the blood from escaping by pressing on the deep dorsal vein of the penis.

Ejaculation is controlled by the sympathetic nervous system. The proposed mechanism whereby active pelvic floor muscle control may delay its onset may be related to inhibition of the ejaculation reflex through intentional relaxation of the bulbocavernous and ischiocavernous muscles active during arousal. This may be facilitated by “releasing” the levator ani muscles through an active relaxation of the pelvic floor muscles with avoidance of valsalva. This is a learned technique, which may be mastered using pelvic floor biofeedback. Pelvic floor exercise and biofeedback for the treatment of both ED and premature ejaculation (PE) have been reported on in the literature.

### **Erectile Dysfunction**

A randomized comparison of physical therapy administered pelvic floor exercise vs. surgery for the treatment of 150 patients with ED due to venous leakage found that surgery was not superior to exercise, and that 42% were sufficiently satisfied with the outcome and refused surgery [10]. Investigations prior to treatment included hormonal testing (testosterone and prolactin), arterial (Doppler or arteriography), venous (dynamic cavernosography and cavernosometry), and pharmacological studies [11,12]. The pelvic floor exercises program consisted of at least five

individual lessons in which patients were taught to isolate and identify the various trunk and pelvic muscles. They were instructed in a home program of pelvic floor-strengthening exercises varying in position and increasing in intensity. Patients were evaluated initially, and 4 and 12 months later by history taking and pharmacological tests. In a Belgian study of 51 men with ED secondary to venous occlusion, 47% regained a normal erection after treatment with pelvic floor exercise, biofeedback, and electrical stimulation [13]. In another study, 55 men with ED were randomized to an intervention group consisting of exercise and biofeedback or a control group in which patients received advice in “lifestyle changes.” At 3 months, compared with controls, men in the intervention group showed significant mean increases in the various erectile function domains [14].

### **Premature Ejaculation**

Pelvic floor exercise has been reported in the treatment of PE [15]. La Pera and Nicastro [16] published their findings that 61% of patients with PE (N = 18) reported that they were better able to control the ejaculatory reflex after 15–20 sessions of pelvic floor rehabilitation. The rehabilitation protocol included exercise, intra-anal electrostimulation, and biofeedback with an anal pressure probe. The exercise portion of the treatment consisted of basic pelvic floor isometric strengthening activities in supine and standing. The mechanism behind actually controlling the ejaculation reflex through the pelvic floor is not clearly understood; however, the exercises do provide self-familiarity and body awareness, which may help improve self-confidence and sense of control.

### **The Pelvic Floor and Female Sexual Function**

In addition to maintaining pelvic support and bowel and bladder continence, the pelvic floor has a critical role in female sexual function. Early studies maintained that strong pelvic floor muscles in women, particularly the ischiocavernous muscle that attaches to the clitoral hood, were crucial for adequate genital arousal and attainment of orgasm [17], and that weak or deconditioned muscles may provide insufficient activity necessary for vaginal friction or blood flow, and inhibit orgasmic potential [18]. It has also been proposed that during sexual activity, sexual pleasure is enhanced for both partners by genital responses provided by contraction of the levator ani, consisting of the pubococcygeous and iliococcygeus muscles [19]. It stands

to reason, therefore, that pelvic floor muscle strengthening should improve sexual function. However, few studies are available to support this notion. Bo and colleagues have reported results of a randomized controlled study in which pelvic floor muscle training has been demonstrated to improve quality of life and sexual function in women with USI [20]. In a Turkish study, improvement in sexual desire, performance during coitus, and achievement of orgasm were reported in women (N = 42) who received pelvic floor muscle rehabilitation [21].

### *Urinary Dysfunction*

The subjects in the above studies were undergoing pelvic floor rehabilitation for the purpose of improving urinary control, and their sexual response improved as a result. The conclusion may be drawn that pelvic floor dysfunction syndromes affecting the urological system, affect sexual function as well. In fact, sexual dysfunction is co-morbid with symptoms associated with pelvic floor and urinary dysfunction in both men and women. Impaired sexual arousal is significantly associated with lower urinary tract symptoms (LUTS) in women, and it is reported that 40–46% of women with LUTS suffer from impairment in their sex lives [22]. In a clinical trial, one-third of patients with prolapse reported that their pelvic floor condition affected their ability to have sexual relations [23]. Low libido, vaginal dryness, painful intercourse, decreased orgasm rates and intensity, and decreased overall sexual satisfaction have been reported in women with urinary incontinence [24]. The relationship between urological and sexual problems has prompted the suggestion that women with urinary problems should be questioned about their sexual function [25].

LUTS is associated with sexual dysfunction in men as well as in women. LUTS is related to decreases in sexual function in aging men [26]. There is ample evidence from many epidemiological studies that LUTS and sexual dysfunction are strongly linked, independently of age and co-morbidities, such as hypertension, diabetes, dyslipidaemia, and coronary heart disease [27]. Various pathophysiological mechanisms have been proposed for the association between LUTS and male sexual dysfunction, particularly ED. These include autonomic hyperactivity, alterations in Rho/Rho kinase pathway, endothelial (nitric oxide synthase/nitric oxide) dysfunction, pelvic ischemia, and age-related hormone imbalances [28]. Psychological mechanisms have been proposed as well [29]. Pel-

vic floor hypertonus or hypotonus dysfunction syndromes should certainly be considered as a possible factor in this co-morbid symptomatology, which may respond to pelvic floor treatment. This correlation is not well considered in reviewing the literature, and studies are needed to support this hypothesis.

### **Pelvic Floor Hypotonus and Sexual Activity**

Since Dr. Arnold Kegel, in 1952, identified pelvic floor muscle weakness in women as a source of urinary and sexual dysfunction, pelvic floor hypotonus has been purported to impact negatively on sexual activity. However, pelvic floor hypotonus also has the potential to impact negatively on sexual function when lack of sphincter control leads to symptoms during intercourse of flatus and urinary or bowel leakage. In cases of rectocele or prolapse of the posterior vaginal vault, penile thrusting may put pressure on structures, causing bowel urgency and expelling of gas, and in more severe cases, feces. Urinary leakage can occur either during penetration, during orgasm, or both. The pathophysiology leading to incontinence during penetration may have to do with displacement of the anterior vaginal wall and bladder neck or an increase in intra-abdominal pressure [30]. In this case, it is reasonable to anticipate improvement with pelvic floor exercise. Leakage during orgasm is more likely associated with involuntary detrusor contractions. Simultaneous bladder contractions and urethral relaxation have been demonstrated in urodynamic studies during orgasm [31]. Patients may be taught techniques to inhibit bladder contractions using active pelvic floor contraction, which provides reflex inhibition of the detrusor muscle through Mahoney's reflex [32].

### **Postsurgical Sexual Problems**

Another potential role for physical therapists trained in pelvic floor rehabilitation is in the treatment of poor sexual outcomes post urological surgery in both women and men. The exact incidence of sexual dysfunction following urogynecologic surgical procedures is not known, and there are few randomized controlled studies comparing different surgical techniques with evaluation of sexual function [33]. A decrease in sexual function has been correlated with surgery for USI [34], tension-free vaginal tape [35], and prolapse repair [36,37]. Sexual dysfunction associated with surgical procedures includes altered orgas-

mic response, postoperative loss of libido, and postoperative dyspareunia. Ahtari and Dwyer have proposed that operative damage to the dorsal nerve of the clitoris may explain orgasmic function impairment [33]. Postoperative dyspareunia is most likely due to vaginal shortening and narrowing following excessive vaginal excision [38]; however, simple adhesive scarring can be a source of pain during intercourse. Pain, restricted mobility, and decreased sensation are common side effects of surgery. In men, USI and ED are common postsurgical side effects of radical prostatectomy. The role of pelvic floor rehabilitation and biofeedback for treatment of post-prostatectomy incontinence has been well studied [39–44]. As in orthopedic surgery, for example, physical therapists possess the modalities and skills that are required to facilitate enhanced circulation, improve soft tissue mobility, and increase muscle strength and stability to improve the overall surgical outcome. This is certainly the case post surgery for USI and prolapse. In light of the findings of possible decreased sexual function as a result of these procedures, viewing enhanced sexual activity as a goal of postoperative treatment provides an additional arena in the physical therapy scope of practice.

### Physical Therapy Treatment for Sexual Dysfunction

#### *Sexual Pain Disorders*

According to the Diagnostic and Statistical Manual of Mental Disorders (DSM-IV-TR), sexual pain disorders are divided into *dyspareunia*, describing a condition of painful sexual intercourse, and *vaginismus*, which has been traditionally described as a condition of vaginal muscle spasm preventing sexual intercourse. Vaginismus is traditionally described as a contraction of the outer third of the vaginal muscles in response to penetration [45], and has been purported to result from a variety of possible psychological and emotional causes, i.e., sexual inhibitions due to repression, religion, or resentment toward men [46,47]. Recently, vaginismus has been redefined by the International Consensus Panel as “The persistent or recurrent difficulties of the woman to allow vaginal entry of a penis, a finger, and or any object, despite the woman’s expressed wish to do so. There is often (phobic) avoidance, involuntary pelvic muscle contraction, and anticipation/fear/experience of pain. Structural or other physical abnormalities must be ruled out/addressed.” [48,49]

Rather than refer to vaginismus as a “reflexive contraction,” the new definition recognizes variable hypertonus of the pelvic floor as a possible component and recognizes the component of pain involved in vaginismus. Vaginismus clearly overlaps with conditions of painful intercourse, most notably, vulvar vestibulitis syndrome (VVS).

In the mid-1980s, the International Society for the Study of Vulvar Disease identified and named VVS, a condition also known as *vestibulodynia*, which is the most common cause of dyspareunia in premenopausal women, affecting 15% of women in this age group. The defining criteria used to diagnose VVS [50] are:

1. pain with attempted penetration;
2. pain at points along the vestibule (vaginal entry) with touch; and
3. erythema (redness) of varying degrees.

The causes of VVS are multifactorial, and they involve the nervous system, musculoskeletal system, immune system, and vascular systems [51]. On a cellular level, findings at the vulvar vestibule of VVS patients include increased mast cells, indicating chronic inflammation [52], increased nociceptors, pain receptors, and increased vascularity [53]. Genetic findings [54] include variation of interleukin-1 receptor antagonist and melanocortin-1 receptor genes. This variation affects the ability to fight inflammation and may explain why certain women are more vulnerable to recurrent bacterial and yeast infections. Although not a defining criteria, often a woman with VVS will present with the inability to allow penetration due to the pain, or the fear thereof. In some cases, she is unable to allow the physician to examine her to determine her diagnosis. Therefore, in a clinical setting, VVS and vaginismus often present as overlapping conditions, and the usefulness of separating these conditions diagnostically and therapeutically is questionable [55,56]. As a result of the attention paid by medical health practitioners to conditions contributing to pain with intercourse, the treatment of sexual pain disorders has extended to health professionals outside of the sex therapy realm [57]. Alternative approaches to sexual pain disorders now recognize the importance of a multidisciplinary team that includes the discipline of physical therapy.

The role of the physical therapist in the multidisciplinary treatment of sexual pain disorders in women has been addressed in the literature [58,59]. Reissing and colleagues recently published their findings that 90% of women reporting

pain due to VVS demonstrated pelvic floor pathology [60].

Significant to the physical therapy profession is their finding that physical therapists who were blinded to the diagnostic status of participants reached almost perfect agreement in the diagnosis of pelvic floor pathology. However, there is admittedly a paucity of literature describing, as well as validating empirically, the role of the physical therapist. There also exists confusion between the terms biofeedback and physical therapy.

The physical therapy approach to treatment of women with complaints of inability to have intercourse, or painful intercourse, includes taking a detailed history, performing a physical examination, and providing a treatment plan that is consistent with the goals of the patient. Treatment tools utilized by the physical therapist range from the educational, providing anatomical and physiological information; cognitive behavioral, particularly with vaginal dilators; rehabilitative, as in pelvic floor muscle strengthening and relaxation with tools such as biofeedback; and palliative treatment methods to decrease pain and improve tissue mobility. Manual techniques, including massage, stretching, soft tissue, and joint mobilizations, are important components of treatment. The physical therapy intervention generally consists of evaluation and treatment with education and cognitive behavioral therapy, exercises, manual therapy techniques and modalities, including pelvic floor biofeedback, and electrical stimulation [61].

Pelvic floor surface electromyography (sEMG) biofeedback is one of the many tools available, is commonly used by physical therapists in the treatment of vulvar pain syndromes, and has a role in the assessment and treatment of vaginismus as well [62]. Of all the physical therapy interventions mentioned, to this date only biofeedback has undergone controlled studies. Glazer and colleagues were the first to demonstrate the findings of increased pelvic floor hypertonus and decreased pelvic floor muscle stability in vulvar pain syndromes and demonstrated at least 50% effectiveness in reducing VVS pain with pelvic floor biofeedback [63]. Subsequent studies produced similar findings [64,65]. A recent Korean study that combined electrical stimulation with biofeedback in the treatment of 12 vaginismus patients reported that all patients achieved successful sexual intercourse during and after the treatment [66].

To date, randomized controlled studies demonstrating the effectiveness of physical therapy in treating sexual pain disorders have not been pub-

lished in the literature. Retrospective studies have reported on a success rate of 77% improvement [67,68]. However, conceptual articles on physical therapy treatment of vulvar and pelvic pain syndromes have been published. The conceptual formula presented by Bergeron and colleagues describes the role of the physical therapist, although the tendency to designate only the physiological and musculoskeletal aspects of treatment to the physical therapist is noted [69]. They state that the main goals of physical therapy are to: (i) increase awareness and proprioception of the musculature, (ii) improve muscle discrimination and muscle relaxation, (iii) normalize muscle tone, (iv) increase elasticity at the vaginal opening and desensitize painful areas, and (v) decrease fear of vaginal penetration. Rosenbaum expands on the physical therapist's role in providing cognitive behavioral therapy, helping to relieve anxiety regarding penetration, and in identifying psychological components to be further addressed with a qualified mental health professional [61]. Fitzgerald and Kotarinos well describe physical therapy assessment and treatment techniques in the management of conditions of hypertonus of the pelvic floor resulting in dyspareunia, including pelvic and vulvar pain syndromes and interstitial cystitis [70].

Modalities other than biofeedback reported in the literature have included a case report on the use of ultrasound in the treatment of dyspareunia [71]. Electrical stimulation also has been studied and found to be effective in the treatment of pelvic pain [72] and in the treatment of sexual pain disorders [73].

Male chronic pelvic pain syndrome (CPPS) is associated with sexual dysfunction, including ED, PE, and painful erection and orgasm. In a Turkish study, of 66 patients with CPPS, 51 had PE (77.3%), and in 10 (15.2%) patients, PE and ED were found together [74]. Male pelvic pain has traditionally been associated with infectious causes or prostate gland inflammation. In many cases, however, evidence of a bacterial etiology is nonexistent, while evidence of prostatic inflammation is conflicting and nonspecific. More plausible causes of prostatitis-like symptoms may include musculoskeletal pain, pelvic floor muscular dysfunction, myofascial pain syndromes, or functional somatic syndromes [75]. A recent study comparing pelvic floor muscle EMGs of male patients with chronic pelvic pain to normal subjects reported that men with pelvic pain manifest pelvic floor muscle instability compared with normals. The study concluded that pelvic floor mus-

cle sEMG may be a valuable screening tool to identify patients with CPPS who may benefit from therapies aimed at correcting pelvic floor muscle dysfunction [76]. In fact, pelvic floor biofeedback has been studied and found effective in the treatment of men with CPPS [77,78]. Physical therapy that includes pelvic floor biofeedback and manual therapy techniques should be considered as well in the treatment of male chronic pelvic pain.

### Other Female Sexual Dysfunctions

While Bo and colleagues have reported their findings that pelvic floor exercises improved sexual function [20], there have been few published studies regarding the use and effectiveness of physical therapy and treatment modalities unique to physical therapy, in the assessment and treatment of sexual dysfunctions other than pain disorders. Wurn and colleagues have reported that in the course of treating female infertility with a manual physical therapy technique, patients reported decreases in dyspareunia as well as improvement in all areas of sexual function, including improved arousal and orgasm [79]. This is an important first step in demonstrating the role of manual therapy in effecting a change in sexual response, and clearly further studies are indicated.

### Conclusion

Sexual dysfunction usually results from more than one factor, and several components, biological, psychosocial, and relational, can contribute to dysfunction in both men and women. Among the multiple factors involved in sexual dysfunction, the pelvic floor appears to have an important influence. Physical therapists skilled in urogynecologic rehabilitation possess skills and knowledge in an area that is relevant to both the medical and mental health communities. Pelvic floor physical therapists utilize a range of treatment tools, including manual therapy, therapeutic exercise, biofeedback, and electrical stimulation. A literature review on the efficacy of such techniques on the treatment of sexual dysfunction in both men and women reveals that physical therapists have a potential role as integral members of the health care team involved in the improvement of sexual health. Further randomized controlled studies are necessary to validate the success of physical therapy intervention.

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