Neuropathic and psychogenic itch

1. Gil Yosipovitch[1,2],
2. Lena S Samuel[1]

Article first published online: 4 MAR 2008

DOI: 10.1111/j.1529-8019.2008.00167.x

Issue

Dermatologic Therapy

Volume 21, Issue 1, (/doi/10.1111/dth.2008.21.issue-1/issuetoc) pages 32–41, January 2008

Additional Information

How to Cite

Yosipovitch, G. and Samuel, L. S. (2008), Neuropathic and psychogenic itch. Dermatologic Therapy, 21: 32–41. doi: 10.1111/j.1529-8019.2008.00167.x

Author Information

1 Department of Dermatology and

2 Neurobiology and Anatomy, Wake Forest University Health Sciences, Winston-Salem, NC

*Address correspondence and reprint requests to: Gil Yosipovitch, MD, Wake Forest Medical Center, Department of Dermatology, Medical Center Blvd., Winston Salem, NC 27157-0001, or email: gyosipov@wfubmc.edu (mailto:gyosipov@wfubmc.edu).

Publication History

1. Issue published online: 4 MAR 2008
2. Article first published online: 4 MAR 2008

- Abstract (/doi/10.1111/j.1529-8019.2008.00167.x/abstract)
- Article
- References (/doi/10.1111/j.1529-8019.2008.00167.x/references)
- Cited By (/doi/10.1111/j.1529-8019.2008.00167.x/citedby)

Get PDF (116K) (/doi/10.1111/j.1529-8019.2008.00167.x/pdf)

Keywords:

hypersensitization; neuropathic pruritus; neuropeptides; psychogenic pruritus

Abstract

ABSTRACT: Neuropathic and psychogenic itch are two entities that have not been well studied. Neuropathic itch is related to pathology located at any point along the afferent pathway of the nervous system. It could be related to damage to the peripheral nervous system, such as in postherpetic neuropathy, brachioradial pruritus, notalgia paresthetica, and in central nervous system damage as a result of spinal cord tumors and demyelinization diseases such as multiple sclerosis. It has many clinical features similar to neuropathic pain. Patients complain of itch, which coincides with burning sensation, aching, and stinging. Psychogenic itch is related to psychologic abnormalities e.g., itch in obsessive compulsive disorders, depression, and delusions of parasitosis. Although no controlled studies have been conducted for treatment of neuropathic and psychogenic itch, medications that are part of the treatment armentarium for neuropathic pain, depression, and anxiety seem to be effective.

Introduction

Neurophysiological research in the last 10 years has enabled more accurate descriptors of neural pathways involved in itch response. Microneurography studies in humans demonstrated a small subset of specific C-nerve fibers that are histamine sensitive to transmit itch and not pain (1). These fibers activate spinal neurons in lamina 1 of the dorsal horn that are histamine sensitive (2). Furthermore, these C-nerve fibers have been shown to have spontaneous activity in patients with chronic itch (2,3). Recent neurophysiology studies in both humans and primates suggest that there are other C-nerve fibers that transmit itch that are histamine insensitive and responds to cowhage, a plant that induces itch and mechanical stimuli. These new fibers are found both in the peripheral nervous system as well as in ascending sensory neurons in the spinal cord and thalamus (4,5). These nerve fibers also respond to painful stimuli. Therefore, it is quite clear that any damage along the afferent pathway can elicit chronic itch. Psychogenic pruritus involves brain abnormalities that are as yet not well defined. Chronic itch involves multidimensional phenomena including emotional and cognitive factors. Therefore, it is not surprising that psychiatric disorders play a role in the etiology of chronic itch. In the last 5 years there is growing awareness regarding these types of itch, although these types of itch are significantly less studied in comparison to other types of itch.

Definition of neuropathic itch

Neuropathic itch has been defined as an itch initiated or caused by a primary lesion or dysfunction at any point along the afferent pathway of the nervous system (6). It could be acute but in most cases is chronic and persistent. In many cases neuropathic itch is accompanied by sensory damage experienced as parasthesia, hyperesthesia, or hypothesia. It may also occur during recovery from isolated nerve injury such as after burns. Patients can have in the same site both pain sensation and itch.

In many cases it involves peripheral and central sensitization of nerve fibers. This sensitization induces alloknesis, which is an itchy phenomenon that results from an innocuous stimulus that does not normally provoke itch. This is similar to allodynia, a common phenomenon in patients with neuropathic pain where a light touch can induce pain. Of note, this phenomenon is not unique to neuropathic itch and has been reported in inflammatory itch such as atopic eczema (3). Alloknesis and allodynia can coincide in several forms of

peripheral neuropathies (6). Characteristics of neuropathic itch that differentiate it from other forms of itch include the following:

1 Itch is associated with other sensory symptoms in a dermatomal distribution.

2 The presence of other neurological sensory signs or neural damage including motor damage, or autonomic damage.

The presence of neuropathic itch does not exclude the concurrent presence of other types and mechanisms of itch, e.g., patients with chronic kidney disease itch and human immunodeficiency syndrome may have neuropathy as well as other systemic causes for their itch.

Pathophysiology

Mechanisms of neuropathic itch are incompletely understood. Some of the proposed mechanisms include itch associated with local nerve damage; central neuronal deprivation of afferent input; and central hypersensitivity of nerve fibers. The first mechanism suggests that itch fibers, which have large innervation territories extending beyond dermatomes, present when local damage occurs to C nerve fibers that transmit both pain and itch. The second hypothetical mechanism suggests that central itch neurons fire excessively when they are deprived of their afferent input. Another possible mechanism is lack of inhibitory neurons for itch in the spinal tract. Chronic neuropathic itch can also result from long-term changes in cortical somatosensory pathways. This can explain the occurrence of alloknesis and allodynia in neuropathic itch which are related phenomena of central sensitization (3)

Clinical signs of neuropathic itch

Neuropathic itch can coincide with pain as seen in postherpetic neuralgia and notalgia paresthetica. Characteristic sensory complaints associated with neuropathic itch are burning, parasthesia, tingling, and stinging. Localized itching can follow dermatomes such as the dorsolateral aspect of the arms in brachioradial pruritus and unilateral itch midback in dermatomes at the level of T2-T6 in notalgia parasthetica.

Patients with neuropathic itch can complain of sensory deficits for touch and temperature such as in postherpetic neuralgia. Also, patients often report unilateral itch after a stroke. Perinasal itch or persistent unilateral scalp itch may be associated with brain tumors (6).

Evaluation of a patient with neuropathic itch

Patients with neuropathic itch may present with varying symptoms. Therefore, a thorough history and physical examination are paramount in distinguishing symptoms and approaching the correct therapeutic options. Patients with neuropathic itch (with or without accompanying pain) have sensory losses in the affected areas. Close attention to features exhibited on presentation such as parasthesia, hypoesthesia, and hyperalgesia can guide the clinician in diagnosing neuropathic itch. A thorough neurologic exam performed by a neurologist may help uncover associated sensory abnormalities, e.g., light touch, pinprick, temperature strength, perception, and vibratory sense. In patients with facial and scalp itch a full neurologic exam of cranial nerve functions is required. This can be followed by skin biopsy to assess nerve fibers density with PGP9.5 (Protein Gene Product 17.5) marker could be helpful in establishing the diagnosis (7). Quantitative sensory testing to assess the function of C-nerve fibers can provide important information about the function of the C-nerve fibers is affected areas. Electromyography and nerve conduction studies in cases suspected of impingements of nerve roots. Magnetic resonance imaging of the spine is recommended to locate suspected nerve impingement such as in brachioradial pruritus and notalgia parasthetica. Brain magnetic resonance imaging should be performed in cases with nasal itch to rule out brain tumors in the ventricles as well as cases of trigeminal trophic syndrome (TTS) where a meningioma could cause this itch. Neuropathic itch can occur with secondary skin findings such as prurigo, lichenification, as well as excoriations; however, the itch could also be without any skin signs. A normal neurophysical examination does not necessarily rule out neurologic disease.

Peripheral neuropathic itch

Postherpetic neuralgia (PHN). PHN is considered the prototype of painful neuropathy. Oaklander was the first to perform a study on postherpetic itch (PHI) and found that among 153 patients with prior shingles, 48% reported itching (8). A larger study analyzing data of 600 patients from three independent centers demonstrated that PHI is a common symptom among patients with PHN (9). Itch severity can range from

mild to severe. Severe PHI is more frequent on the face and head (8). The patients can experience the itch and pain simultaneously in the same dermatomal distribution affected by PHN. Common descriptors in addition to itch were burning and stinging sensation. The present authors previously documented a significant loss of epidermal nerve fibers in patients with PHN, some of which had itch, which correlated to their loss of sensation to warmth and heat pain (10). Treatments for PHI are similar to those of PHN pain including neurotropic drugs such as gabapentin or pregabalin (11–15), as well as topical anesthetics, e.g., Eucteic mixture of local anesthetics (EMLA) cream and lidocaine patch as well as applications with capsaicin (16).

Brachioradial pruritus

Brachioradial pruritus (BP) is a localized neuropathic pruritus of the dorsolateral aspect of the arm (17–19). It can also involve the shoulders and neck (17). It is aggravated in many cases during sun exposure and is more frequent during the summer while it remits during winter. It is more common in those who are active in outdoor sports such as tennis players and cyclists. It has been suggested that in many cases it is a result of compression to the cervical nerve root in the level of C5-C8 (19,20). Rarely BP can also be associated with spinal tumors, especially in those patients who present with multiple sensory and motor deficits (17,21). There are cases were there is no evidence for spinal nerve damage, and patients have classical clinical presentation associated only to sun exposure. Wallengren found BP to be associated with a reduction in epidermal nerve fibers in the epidermis and papillary dermis (18) very similar to changes that occur after phototherapy. Therefore it was suggested that neurological damage to nerve fibers in this disorder may arise from either the cutaneous nerves or from the more proximal sensory pathways (22). A common clinical symptom in patients with BP is the “ice pack sign,” patients reporting that application of ice pack on the affected areas temporarily reduces their itch.

Brachioradial pruritus is often refractory to treatment; however, successful treatments were achieved with topical capsaicin, oral gabapentin (23,24) and pregablin, carbamazepine, lamotrigine, and surgical approaches for tumors or when there are significant sensory and motor deficits (17).

Notalgia parasthetica

Notalgia paresthetica (NP) is a sensory nerve entrapment syndrome involving the posterior rami of T2-T6 nerve root associated mainly with degenerative changes in the vertebra (25). Patients typically present with unilateral itching of the mid and upper back in the distribution of T2-T6 dermatomes. The itch is occasionally accompanied by burning pain, paresthesia, and/or hyperesthesia, which results in a well-circumscribed hyperpigmented patch in the symptomatic area (26,27) similar clinically to macular amyloidosis.

Notalgia paresthetica can be successfully treated with capsaicin (28), gabapentin, EMLA cream, and paravertebral local anesthetic blocks, cervical epidural steroid injection, phenytoin. Other therapies include physiotherapy, neck traction, and cervical manipulation.

Cheiralgia parasthetica

Cheiralgia parasthetica is an itch that is confined to the radial aspect of the lower arm caused by entrapment of the radial nerve (18).

Trigeminal trophic syndrome

Trigeminal trophic syndrome (TTS) is an uncommon cause of localized itch and pain resulting from damage to the trigeminal nerve. It can be associated with numbness, burning and crawling sensations. Physical signs include excoriations and facial ulcerations. The nasal ala is almost universally involved, but the cheek, temple, and frontal scalp can also be affected. TTS most commonly occurs (75% of cases) after surgical ablation of the Gasserian ganglion. Many cases are initially misdiagnosed as dermatitis artefacta or psychogenic pruritus. The treatment for TTS includes neuroleptics such as carbamazepine, gabapentin, and pregabalin (29).

Keloid and burn scars

Keloids can cause neuropathic itch mainly along the border of a keloid lesion, whereas less frequently, pain involves the center of the keloid. Mechanistically, collagen deposition may induce an entrapment neuropathy affecting pain fibers in the center of the keloid and unmyelinated C nerve fibers that transmit itch at the periphery (30). Pruritus is a common manifestation during recovery from burns (31).

Pruritus in postmastectomy scars is suggested to be a phantom itch similar to phantom pain (6).

Other forms of neuropathic localized itch have been reported such as anogenital pruritus is a symptom of lumbosacral radiculopathy (32).

Central neuropathic itch

Itch from central nervous system lesions is far less common than from peripheral nerve lesions. Several underlying brain pathologies include tumors, strokes (33), abscesses (34), and Creutzfeldt-Jakob disease (35).

Spinal tumors and neuropathic itch.

Cavernous hemangiomas (cavernomas) of the spinal cord are rare congenital malformations that comprise 5% of all intramedullary lesions. The rostral dorsal location of the cavernoma increases its likelihood of causing both pain and itch (36). Other tumors such as ependymoma have been associated with neuropathic itch (2). Peripheral acting lidocaine reduced the central itch in cavernomas (36). 5% lidocaine patch, EMLA cream, or gabapentin provide moderate itch relief.

Multiple sclerosis

Pruritus has been reported in 5% of patients with multiple sclerosis (MS) (6). It presents with a paroxysmal pattern of itch. The paroxysmal itching often awakens the patient from sleeping, and may be spontaneous or triggered by movement similar to the Lhermitte sign, causing pain. These paroxysmal symptoms are considered to be the initial presentation of MS (37). The symmetrical, segmental, and paroxysmal nature of these MS phenomena supports their neurological origin. The pruritus and dysesthesias of MS are amendable to therapy with carbamazepine.

Phantom itch has been reported following mastectomies, as mentioned previously, this in fact could be related to peripheral damage from scars or from brain alterations post nerve damage.

Psychogenic pruritus

Psychogenic pruritus is considered psychiatric in origin. It is characterized as an excessive impulse to scratch, gouge, or pick at normal skin. Although psychogenic pruritus poses a clinical challenge to the dermatologist and the psychiatrist, it has not been labeled a distinct diagnostic entity in the *Diagnostic and Statistical Manual of Mental Disorders*, Fourth Edition (DSM-IV). Generally, psychogenic pruritus is a diagnosis of exclusion and can be made after ruling out other causes of pruritus that may mimic this condition. Its incidence in the general population is unknown; however, its incidence is 2% in patients seen in dermatology clinics (38). There is a female predominance with average age of onset between 30 and 45 years of age.

Psychogenic pruritus can occur along with a known psychologic abnormality, or concurrently in a patient suffering from another type of itch. Psychiatric disturbances are common in patients who suffer from chronic itch (39). In a large population study in Oslo there was a significant correlation between mental stress and itch as well as pain (40–42). Depression, obsessive compulsive disorder, anxiety, somatoform disorders, mania, psychosis, and substance abuse have been associated with itch (43). Some studies suggest depression may be the primary clinical state in psychogenic pruritus (44). Several psychiatric comorbidities such as body dysmorphic disorder, trichotillomania, kleptomania, and borderline personality were reported in these patients (38). The secondary skin changes associated with psychogenic pruritus are commonly found on body areas that are most accessible to the hand such as extensor surfaces of the arms and legs, abdomen, thighs, and upper parts of the back and shoulders (38,44), with the face being the most common site (45). The secondary skin signs can be seen in varying stages of evolution from discrete superficial excoriations, erosions, or even ulcers to thickened hyperpigmented nodules to hypopigmented atrophic scars (46). These may vary in number from a few to several hundred and vary in size from a few millimeters to several centimeters. Often, patients report picking, rubbing, scratching, or inserting objects to relieve the pruritus. Therefore, the lesions may be painful, bleed, itch, ulcerate with features of delayed healing as a result of recurrent picking similar to chronic itch sufferers of other types. However, the itch could also be without any skin signs. Although the patients may be fully aware of what they are doing they are often powerless to stop.

Patients with itch suffer from low self image and have difficulties coping with aggression (47). A recent study in 111 hospitalized psychiatric patients in an open ward who suffer from schizophrenia and affective disorders, found that 32% of those screened reported suffering from itch after other causes of itch were ruled out (48). These result suggest that psychogenic itch may be a common symptom among psychiatric patients.

Obsessive compulsive disorder is a common comorbid condition in psychogenic pruritus (49). Obsessive-compulsive symptoms are chronic and patients can present with behaviors that are preceded by increased tension and anxiety followed by gratification or relief when excoriating the skin (47). Pruritus associated with obsessive-compulsive spectrum disorder is characterized as that of recurrent, intrusive thoughts that lead to compulsive skin picking, hair pulling, and excoriations (39). Mast cell degranulation and cytokine release is seen with the itch-scratch cycle. Therefore, recurrent itching can lead to an itch-scratch cycle releasing pruritogenic factors further contributing to the obsessive-compulsive interplay.

Delusions of parasitosis

Although delusions of parasitosis are a purely psychiatric problem, patients typically present to a dermatologist with primarily dermatologic complaints. They typically resist referral to psychiatrists and often seek help from several medical professionals for evaluation of symptoms that have spanned over a period of several months or years (46,50,51). Therefore it is important to establish trust in these patients through the doctor–patient relationship. Initially, a thorough evaluation to properly diagnose delusions of parasitosis is important.

Delusion of parasitosis, or psychogenic parasitosis, is a rare psychiatric disorder in which the patient has a fixed, false belief that he or she is infested with an insect or parasite. Defined as a monosymptomatic hypochondrial psychosis (MHP), sufferers of delusions of parasitosis have lesions produced consciously in response to the demands of a delusional belief (44).

Patients often describe self-mutilating behavior by picking or scratching a discrete area of skin in an effort to remove the insect and may also complain of insomnia. When evaluating a patient who may have delusions of parasitosis, it is important to rule out other thought disorders. Other differentials include alcoholism or drug addictions, and delusions secondary to another mental or physical illness other than the fixed false belief that one is infested with parasites. Alcohol withdrawal, cocaine, and amphetamine use can induce formication and a delusional state similar to that of delusions of parasitosis. Therefore, appropriate physical, laboratory and toxicology examination, skin biopsy, and wet preparations of skin scrapings can be performed to rule out a substance abuse and/or an organic cause.

On physical examination, skin findings range from none at all to discrete scars, ulcers and excoriations, and prurigo nodularis visible on the face, legs, and arms, which may indicate a factitious origin: evidence of the patient's effort to dig out parasites (52). The matchbox sign is a pathognomonic sign where patients present with specimens of “parasites” they have collected including bits of skin, lint, dried blood, and tissue paper as evidence (52).

Evaluation of a patient with psychogenic pruritus

In psychogenic pruritus, an evaluation of whether the disease is purely psychiatric, medical, or a combination of both should be determined. Systemic, neuropathic, and dermatologic causes of itch should be ruled out. A good history and thorough physical examination followed by laboratory investigation with a complete blood count including an erythrocyte sedimentation rate, thyroid, liver, and renal function tests should be performed.

A full dermatologic examination should be conducted to survey for excoriations, scars, ulcerations, erythema, and any evidence of infection. A detailed history of the excoriation episodes should begin with inquiries into the location, onset, timing, method, precipitants, alleviating, and aggravating factors surrounding the excoriations, thoughts and emotions before, during, and after the excoriation episode.

A history taking of sleep patterns, history of depression, suicidal ideations, or other negative feelings and self mutilating behaviors should be conducted. It is also important to ascertain previous use of psychiatric medications and their effect on itch. Referral to a psychiatrist or a psychologist is highly recommended after the initial evaluation by the dermatologist. The mental health professionals can assess the patient with psychogenic itch with a structured psychiatric interview including a full mental status, and the Beck Depression Inventory for self-reported depression symptoms. Complications of psychogenic pruritus span medical and psychiatric lines. Patients experience shame or embarrassment surrounding their behavior and often do not disclose their habit to doctors or relatives. As mentioned previously, cases of psychosis or delusions of parasitosis who present to dermatologists are difficult to deal with. It is not recommended to confront the patient with the diagnosis and it is often helpful to suggest to him to seek the help of a mental health expert as an adjunctive measure to reduce his itch intensity and anxiety.

Similar systemic treatments for neuropathic itch and psychogenic itch

Neuropathic itch and psychogenic itch are a therapeutic challenge for dermatologists. Treatment with standard measures used by dermatologists for itch such oral antihistamines and topical steroids are of no help. Therapies for treating neuropathic itch often include the same medications used for psychogenic itch such as neuroleptics e.g., gabapentin, pregablin, antidepressants from the tricyclic medications, amytriptyline as well as selective serotonin and norepinephrine inhibitors, mirtazapine, and duloxetine as well as paroxetine. Often, a combination of therapies is needed to treat the itch and pain symptoms. There are no controlled studies that examine the efficacy of these medications for both entities and therefore it is currently difficult to accurately assess the efficacy of these treatments. Table 1 summarizes the treatment modalities for neuropathic and psychogenic itch.

Table 1. Treatment for neuropathic and psychogenic itch

Condition	Therapy
	Central neuropathic itch
Multiple sclerosis	Carbamazepine, gabapentin
Spinal tumors	Lidocaine patch, EMLA cream, gabapentin
Phantom itch	Regional and intrathecal nerve blocks
	Peripheral neuropathic itch
Post herpetic neuralgia	Gabapentin, pregablin, carbamazepine, IV anesthetics, topical capsaicin
Brachioradial pruritus	Gabapentin, pregablin, carbamazepine, topical capsaicin topical 1% menthol
Notalgia paresthetica	Gabapentin, botulism toxin A, EMLA cream, paravertebral nerve blocks, phenytoin, cervical epidural steroid injection, topical capsaicin
Trigeminal trophic syndrome	Carbamazepine, gabapentin, pregablin
	Psychogenic itch
Depression	SSNRIs, SSRIs, TCAs, doxepin, psychotherapy
Obsessive compulsive disorders	SSNRIs, SSRIs, TCAs, behavioral therapy
Delusions of parasitosis	Antipsychotics, e.g., pimozide, risperidone, olanzapine, quetiapine

Common treatment modalities used in dermatology, psychiatry, and neurology for neuropathic and psychogenic itch conditions.

SSRIs, selective serotonin reuptake inhibitors; SSNRIs, selective serotonin and norepinephrine reuptake inhibitors; TCAs, tricyclic antidepressants.

Neuroleptics

Anticonvulsants such as gabapentin, pregabalin carbamazepine, and lamotrigine have demonstrated efficacy in case reports in treatment of neuropathic itch. These drugs appear to have mood-stabilizing properties and anxiolytic benefits (53).

Gabapentin is a structural analog of the neurotransmitter gamma-aminobutyric acid and a potent anticonvulsant. It is commonly used for neuropathic pain and approved by the FDA for postherpetic neuralgia. Its exact mechanism is unknown, but it has been effective in the treatment of brachioradial pruritus (24), and MS (14). It is also used for anxiety. The initial dose is 300 mg once daily titrated every 3 days by 300 mg up to maximum dose of 2400 mg/day. Pregablin is a new oral medication that is chemically related to gabapentin. It is used for treating neuropathic pain and seems to work for neuropathic itch as well (53) as for depression and anxiety (54). The initial dose is 50–75 mg and can be increased up to 300 mg a day.

Selective neuroepinephrine re-uptake inhibitors

Duloxetine, a selective serotonin and norepinephrine reuptake inhibitor, is the first antidepressant to be licensed for the treatment of diabetic peripheral neuropathic pain (55,56). The authors' limited experience with this drug for neuropathic itch does not seem to suggest that it is effective treatment for neuropathic itch; however, it may be effective for psychogenic itch associated with depression and anxiety. Another SNRI mirtazapine seems to be effective in patients with chronic neuropathic itch especially those with nocturnal attacks and suspected central sensitization (57). The effective antipruritic dose is 15 mg, higher doses do not seem to be of any additional effect and cause more side effects. Paroxetine, a SSRI has been reported to be effective for itch of different types in a small controlled double blind study (55). A recent study from Germany (58) has also shown that this antidepressant has anti itch properties in different types of itch.

Tricyclics antidepressants

For many years TCIs have been used for depression as well as for neuropathic pain. Amityriptyline was reported to be useful in some cases of neuropathic itch. The initial dose is 10 mg three times daily or 25 mg once a day at bedtime. Doxepin (Sinequan) is an antidepressant with potent antipruritic, antihistaminic, and antidepressant properties. It has been used for different types of itch including psychogenic (45) and neuropathic itch. It is prescribed at doses of ranging from 25 mg up to 150 mg at bedtime as a result of its highly sedating properties. Typically 6–8 weeks of therapy is needed before results are seen. Nowadays, the use of tricyclic antidepressants in psychiatry is limited as a result of the higher efficacy and safety profile of the SSRIs (59).

Combination therapy

A combination of mirtazapine and pregablin or gabapaentin has been reported to be useful to control chronic itch. The present authors have gained experience in using this regimen in several cases of chronic severe neuropathic itch of PHN itch and brachioradial pruritus.

Specific treatments for neuropathic itch

Botulinium toxin A injection

Recently a pilot study described the successful use of Botulinium toxin A (Botox) for the treatment of notalgia paresthetica in two patients (60). The toxin was injected to several points along the involved dermatome in a dose ranging between 16 and 25 units. The rationale for the use of Botox is that it blocks acetylcholine, which is a mediator involved in itch transmission. This treatment has also been reported to be successful for PHN neuropathic pain (61,62).

Specific pharmacotherapy for psychogenic itch

Pimozide, a neuroleptic medication, is the treatment of choice for delusions of parasitosis given at doses of 1–10 mg/day. The most common side effects are extrapyrimodal symptoms (tremor, rigidity, bradykinesia) and anticholinergic side effects (dry mouth, blurry vision, tachycardia, constipation). Extrapyrimidal side

effects can be treated with benztropine 1–2 mg up to four times daily as needed, or diphenhydramine 25 mg three times daily as needed. Reports indicate that pimozide can cause prolonged QT interval requiring baseline and periodic electrocardiographic monitoring. Recently, olanzapine, a newer atypical antipsychotic has been reported to be an effective therapy for delusions of parasitosis with initiation dosage of 2.5–5 mg/day increased up to 10 mg/day (63). Major side effects of this drug were high levels of triglycerides and hyperglycemia. Risperdone and other antipsychotics are effective for therapy for delusions of parasitosis with therapeutic dosages beginning at 1 mg once daily as initial starting dosage (64). Common side effects include anxiety, dizziness, and rhinitis (65).

Psychotherapy

Basic psychodynamic intervention and counseling with a psychotherapist are important to address mood and personality disorders and family tension. There are few studies on psychotherapy for treatment of itch and scratching in dermatologic patients. Cognitive behavioral therapy to prevent scratching may be of help to patients with obsessive compulsive disorders as well as depression. Behavioral therapy based on positive reinforcement of tension reduction and not scratching (66). For alteration of itching perception, techniques of imagination training of relaxation and perceptions of sensations involved in attenuating itch such as cooling may be of help in reducing the itch intensity. The importance of insight counseling for the cessation of the skin picking, compulsive and impulsive behaviors should be stressed to the patient (66).

Dermatologic approach to neuropathic and psychogenic itch

The dermatologic approach to the treatment and management of psychogenic pruritus may include antihistamines, moisturizers, topical steroids, antibiotics, and occlusive dressing. Moisturizing with lotions and other lubricants can help with the xerosis that can often exacerbate the pruritic condition and is also associated with repetitive scratching, damaging the stratum corneum.

Patients can present with inflammation, infections, and ulcers as a result of their itch. Therefore, wound care is paramount along with antibiotics when there is evidence of underlying infection. Occlusive dressing is helpful in preventing further manipulation of existing skin lesions by trauma or excoriations. This approach is particularly helpful in patients who excessively pick on their skin such as in prurigo nodularis.

Cooling of the skin with topical 1% menthol may have some role in itch relief in patients with brachioradial pruritus, who report that ice packs reduce their itch for hours.

Topical anesthetics such as lidocaine patches and EMLA cream have been reported to be effective for different types of neuropathic itch especially the peripheral types. Pramoxine is a less potent anesthetic with anti pruritic effect (67).

Topical capsaicin, the active ingredient in chili peppers, has been reported to be useful for postherpetic neuralgia, notalgia paresthetica, and brachioradial pruritus (23). Topical capsaicin exerts its effects by

rendering the skin insensitive to pain. Topical capsaicin at higher concentrations of 0.075% and 0.1% seem to be significantly more effective than the lower one of 0.025%. Topical capsaicin initially causes burning sensations and is not recommended to be used in patients with psychogenic itch. The addition of topical anesthetic EMLA cream prior to initiation of topical capsaicin has been instituted to further counteract the sensation and irritation (68) and can also increase the antipruritic affect as both medications target different receptors.

Topical aspirin has been reported to reduce itch of lichen simplex chronicus, a form of localized itch (69). The authors have found it a useful treatment in several forms of peripheral neuropathic itch e.g., PHN and notalgia parasthetica.

Conclusion

Neuropathic and psychogenic itches remain challenging diagnostic and therapeutic conditions. They require in many cases the help of neurologist, pain specialist, and psychiatrists. Future studies in this field and in particular therapeutic controlled trials will enable us to provide better treatment to these tormenting types of itch.

References

1 *Schmelz M, Schmidt R, Bickel A, Handwerker HO, Torebjork HE. Specific C-receptors for itch in human skin. J Neurosci 1997: **17**: 8003–8008.*
PubMed (/resolve/reference/PMED?id=9315918), CAS (/resolve/reference/CAS?id=1:CAS:528:DyaK2sXms1egu7k%3D), Web of Science® Times Cited: 283 (/re/reference/ISI?id=A1997XZ44900039)

2 *Yosipovitch G, Greaves MW, Schmelz M. Itch. Lancet 2003: **361**: 690–694.*
CrossRef (/resolve/reference/XREF?id=10.1016/S0140-6736(03)12570-6), PubMed (/resolve/reference/PMED?id=12606187), Web of Science® Times Cited: 98 (/resolve/reference/ISI?id=000181129500025)

3 *Ikoma A, Rukwied R, Stander S, Steinhoff M, Miyachi Y, Schmelz M. Neurophysiology of pruritus: interaction of itch and pain. Arch Dermatol 2003: **139**: 1475–1478.*
CrossRef (/resolve/reference/XREF?id=10.1001/archderm.139.11.1475), PubMed (/res/reference/PMED?id=14623707), Web of Science® Times Cited: 25 (/resolve/reference/ISI?id=000186638300012)

4 *Johanek LM, Meyer RA, Hartke T, et al. Psychophysical and physiological evidence for parallel afferent pathways mediating the sensation of itch. J Neurosci 2007: **27**: 7490–7497.*
CrossRef (/resolve/reference/XREF?id=10.1523/JNEUROSCI.1249-07.2007), PubMed (/resolve/reference/PMED?id=17626210), CAS (/resolve/reference/CAS?id=1:CAS:528:DC%2BD2sXnvFyhurY%3D), Web of Science® Times Cited: 30 (/resolve/reference/ISI?id=000248147900014)

5 *Davidson S, Zhang X, Yoon CH, Khasabov SG, Simone DA, Giesler GJ Jr. The itch-producing agents histamine and cowhage activate separate populations of primate spinothalamic tract neurons. J Neurosci 2007: **27**: 10007–10014.*
CrossRef (/resolve/reference/XREF?id=10.1523/JNEUROSCI.2862-07.2007), PubMed (/resolve/reference/PMED?id=17855615), CAS (/resolve/reference/CAS?id=1:CAS:528:DC%2BD2sXhtVyksbnO), Web of Science® Times Cited: 27 (/re/reference/ISI?id=000249415000021)

6 *Yosipovitch G, Goodkin R, Wingard EM, Bernhard J. Neuropathic pruritus. In: YosipovitchG, GreavesM, FleischerA, McGloneF, eds. Itch: basic mechanisms and therapy. New York: Marcel Dekker, 2004: 231–239.*

7 *Oaklander AL. The density of remaining nerve endings in human skin with and without postherpetic neuralgia after shingles. Pain 2001: **92**: 139–145.*
CrossRef (/resolve/reference/XREF?id=10.1016/S0304-3959(00)00481-4), PubMed (/resolve/reference/PMED?id=11323135), CAS (/resolve/reference/CAS?id=1:STN:280:DC%2BD3Mvitlanuw%3D%3D), Web of Science® Times Cited:

(/resolve/reference/ISI?id=000168776500016)

8 *Oaklander AL, Cohen SP, Raju SV. Intractable postherpetic itch and cutaneous deafferentation after facial shingles. Pain 2002:* ***96****: 9–12.*
CrossRef (/resolve/reference/XREF?id=10.1016/S0304-3959(01)00400-6), PubMed (/resolve/reference/PMED?id=11932056), Web of Science® Times Cited: 33 (/resolve/reference/ISI?id=000175738800003)

9 *Oaklander AL, Bowsher D, Galer B, Haanpaa M, Jensen MP. Herpes zoster itch: preliminary epidemiologic data. J Pain 2003:* ***4****: 338–343.*
CrossRef (/resolve/reference/XREF?id=10.1016/S1526-5900(03)00637-0), PubMed (/resolve/reference/PMED?id=14622691), Web of Science® Times Cited: 25 (/resolve/reference/ISI?id=000184905000007)

10 *Rowbotham MC, Yosipovitch G, Connolly MK, Finlay D, Forde G, Fields HL. Cutaneous innervation density in the allodynic form of postherpetic neuralgia. Neurobiol Dis 1996:* ***3****: 205–214.*
CrossRef (/resolve/reference/XREF?id=10.1006/nbdi.1996.0021), PubMed (/resolve/reference/PMED?id=8980021), CAS (/resolve/reference/CAS?id=1:STN:280:DyaK2svlsVOltg%3D%3D), Web of Science® Times Cited: 70 (/resolve/reference/ISI?id=A1996VU96200006)

11 *Porzio G, Aielli F, Verna L, et al. Efficacy of pregabalin in the management of cetuximab-related itch. J Pain Symptom Manage 2006:* ***32****: 397–398.*
CrossRef (/resolve/reference/XREF?id=10.1016/j.jpainsymman.2006.07.006), PubMed (/resolve/reference/PMED?id=17085262), Web of Science® Times Cited: 5 (/resolve/reference/ISI?id=000242204900003)

12 *Sonnett TE, Setter SM, Campbell RK. Pregabalin for the treatment of painful neuropathy. Expert Rev Neurother 2006:* ***6****: 1629–1635.*
CrossRef (/resolve/reference/XREF?id=10.1586/14737175.6.11.1629), PubMed (/resolve/reference/PMED?id=17144773), CAS (/resolve/reference/CAS?id=1:CAS:528:DC%2BD2sXmsVSisg%3D%3D)

13 *Tassone DM, Boyce E, Guyer J, Nuzum D. Pregabalin: a novel gamma aminobutyric acid analogue in the treatment of neuropathic pain, partial-onset seizures, and anxiety disorders. Clin Ther 2007:* ***29****: 26–48.*
CrossRef (/resolve/reference/XREF?id=10.1016/j.clinthera.2007.01.013), PubMed (/reference/PMED?id=17379045), CAS (/resolve/reference/CAS?id=1:CAS:528:DC%2BD2sXjsVOnsr0%3D), Web of Science® Times Cited: 29 (/resolve/reference/ISI?id=000244289500003)

14 *Yesudian PD, Wilson NJE. Efficacy of gabapentin in the management of pruritus of unknown origin. Arch Dermatol 2005:* ***141****: 1507–1509.*
CrossRef (/resolve/reference/XREF?id=10.1001/archderm.141.12.1507), PubMed (/reference/PMED?id=16365250), CAS (/resolve/reference

/CAS?id=1:STN:280:DC%2BD2Mnns1Ggug%3D%3D), Web of Science® Times Cited (/resolve/reference/ISI?id=000233950300002)

15 *Gore M, Sadosky A, Tai KS, Stacey B. A retrospective evaluation of the use of gabapentin and pregabalin in patients with postherpetic neuralgia in usual-care settings. Clin Ther 2007: **29**: 1655–1670.*

CrossRef (/resolve/reference/XREF?id=10.1016/j.clinthera.2007.08.019), PubMed (/res /reference/PMED?id=17919547), CAS (/resolve/reference /CAS?id=1:CAS:528:DC%2BD2sXhtFyjt7jL), Web of Science® Times Cited: 4 (/resolv /reference/ISI?id=000249682900011)

16 *Summey BT Jr, Yosipovitch G. Pharmacologic advances in the systemic treatment of itch. Dermatol Ther 2005: **18**: 328–332.*

Direct Link:

- Abstract (/doi/10.1111/j.1529-8019.2005.00035.x/abstract)
- Full Article (HTML) (/doi/10.1111/j.1529-8019.2005.00035.x/full)
- PDF(60K) (/doi/10.1111/j.1529-8019.2005.00035.x/pdf)
- References (/doi/10.1111/j.1529-8019.2005.00035.x/references)

17 *Wallengren J. Brachioradial pruritus: a recurrent solar dermopathy. J Am Acad Dermatol 1998: **39**: 803–806.*

CrossRef (/resolve/reference/XREF?id=10.1016/S0190-9622(98)70058-1), PubMed (/resolve/reference/PMED?id=9810902), CAS (/resolve/reference /CAS?id=1:STN:280:DyaK1M%2FislShtQ%3D%3D), Web of Science® Times Cited: 1 (/resolve/reference/ISI?id=000076796100021)

18 *Wallengren J, Sundler F. Brachioradial pruritus is associated with a reduction in cutaneous innervation that normalizes during the symptom-free remissions. J Am Acad Dermatol 2005: **52**: 142–145.*

CrossRef (/resolve/reference/XREF?id=10.1016/j.jaad.2004.09.030), PubMed (/resolve /reference/PMED?id=15627097), Web of Science® Times Cited: 10 (/resolve/reference /ISI?id=000226240300020)

19 *Cohen AD, Masalha R, Medvedovsky E, Vardy DA. Brachioradial pruritus: a symptom of neuropathy. J Am Acad Dermatol 2003: **48**: 825–828.*

CrossRef (/resolve/reference/XREF?id=10.1067/mjd.2003.494), PubMed (/resolve/refe /PMED?id=12789170), Web of Science® Times Cited: 15 (/resolve/reference /ISI?id=000183594900003)

20 *Goodkin R, Wingard E, Bernhard JD. Brachioradial pruritus: cervical spine disease and neurogenic/neuropathic (corrected) pruritus. J Am Acad Dermatol 2003: **48**: 521–524.*

CrossRef (/resolve/reference/XREF?id=10.1067/mjd.2003.203), PubMed (/resolve/refe /PMED?id=12664013), Web of Science® Times Cited: 22 (/resolve/reference /ISI?id=000181953500005)

21 *Kavak A, Dosoglu M. Can a spinal cord tumor cause brachioradial pruritus? J Am Acad*

*Dermatol 2002: **46**: 437–440.*

CrossRef (/resolve/reference/XREF?id=10.1067/mjd.2002.113674), PubMed (/resolve/reference/PMED?id=11862184), Web of Science® Times Cited: 18 (/resolve/reference/ISI?id=000174269200016)

22 *Crevits L. Brachioradial pruritus – a peculiar neuropathic disorder. Clin Neurol Neurosurg 2006: **108**: 803–805.*

CrossRef (/resolve/reference/XREF?id=10.1016/j.clineuro.2005.12.001), PubMed (/resolve/reference/PMED?id=16423451), CAS (/resolve/reference/CAS?id=1:STN:280:DC%2BD28nmvV2iug%3D%3D), Web of Science® Times Cited: (/resolve/reference/ISI?id=000242708300018)

23 *Winhoven SM, Coulson IH, Bottomley WW. Brachioradial pruritus: response to treatment with gabapentin. Br J Dermatol 2004: **150**: 786–787.*

Direct Link:

- Abstract (/doi/10.1111/j.0007-0963.2004.05889.x/abstract)
- Full Article (HTML) (/doi/10.1111/j.0007-0963.2004.05889.x/full)
- PDF(58K) (/doi/10.1111/j.0007-0963.2004.05889.x/pdf)
- References (/doi/10.1111/j.0007-0963.2004.05889.x/references)

24 *Bueller HA, Bernhard JD, Dubroff LM. Gabapentin treatment for brachioradial pruritus (letter). J Eur Acad Dermatol Venereol 1999: **13**: 227–228.*

Direct Link:

- Abstract (/doi/10.1111/j.1468-3083.1999.tb00890.x/abstract)
- PDF(190K) (/doi/10.1111/j.1468-3083.1999.tb00890.x/pdf)
- References (/doi/10.1111/j.1468-3083.1999.tb00890.x/references)

25 *Savk E, Dikicioglu E, Culhaci N, Karaman G, Sendur N. Immunohistochemical findings in notalgia paresthetica. Dermatology 2002: **204**: 88–93.*

CrossRef (/resolve/reference/XREF?id=10.1159/000051823), PubMed (/resolve/reference/PMED?id=11937731), CAS (/resolve/reference/CAS?id=1:CAS:528:DC%2BD38XjtFSjsLY%3D), Web of Science® Times Cited: 7 (/resolve/reference/ISI?id=000175071500003)

26 *Springall DR, Karanth SS, Kirkham N, Darley CR, Polak JM. Symptoms of notalgia paresthetica may be explained by increased dermal innervation. J Invest Dermatol 1991: **97**: 555–561.*

CrossRef (/resolve/reference/XREF?id=10.1111/1523-1747.ep12481889), PubMed (/resolve/reference/PMED?id=1831466), CAS (/resolve/reference/CAS?id=1:STN:280:DyaK3MzktFagsg%3D%3D), Web of Science® Times Cited: 35 (/resolve/reference/ISI?id=A1991GD66800030)

27 *Marcusson JA, Lundh B, Siden A, Persson A. Notalgia paresthetica – puzzling posterior pigmented pruritic patch. Report on two cases. Acta Derm Venereol 1990: **70**: 452–454.*

PubMed (/resolve/reference/PMED?id=1980988), CAS (/resolve/reference

/CAS?id=1:STN:280:DyaK3M7jsFehtg%3D%3D), Web of Science® Times Cited: 9 (/r
/reference/ISI?id=A1990DY10800022)

28 *Wallengren J. Treatment of notalgia paresthetica with topical capsaicin. J Am Acad Dermatol 1991:* ***24****: 286–288.*
CrossRef (/resolve/reference/XREF?id=10.1016/S0190-9622(08)80609-3), PubMed (/resolve/reference/PMED?id=2007679), CAS (/resolve/reference/CAS?id=1:STN:280:DyaK3M7nvVWhug%3D%3D), Web of Science® Times Cited: 4
(/resolve/reference/ISI?id=A1991EW31000025)

29 *Hancox JG, Wittenberg GF, Yosipovitch G. A patient with nasal ulceration after brain surgery. Arch Dermatol 2005:* ***141****: 796–798.*
CrossRef (/resolve/reference/XREF?id=10.1001/archderm.141.6.796), PubMed (/resolv
/reference/PMED?id=15967941), Web of Science® Times Cited: 4 (/resolve/reference/ISI?id=000229628800032)

30 *Lee SS, Yosipovitch G, Chan YH, Goh CL. Pruritus, pain, and small nerve fiber function in keloids: a controlled study. J Am Acad Dermatol 2004:* ***51****: 1002–1006.*
CrossRef (/resolve/reference/XREF?id=10.1016/j.jaad.2004.07.054), PubMed (/resolve
/reference/PMED?id=15583600), Web of Science® Times Cited: 13 (/resolve/reference
/ISI?id=000225745300026)

31 *Vitale M, Fields-Blache C, Luterman A. Severe itching in the patient with burns. J Burn Care Rehabil 1991:* ***12****: 330–333.*
CrossRef (/resolve/reference/XREF?id=10.1097/00004630-199107000-00008), PubMe
(/resolve/reference/PMED?id=1682327), CAS (/resolve/reference/CAS?id=1:STN:280:DyaK38%2Fkt1amtw%3D%3D)

32 *Cohen AD, Vander T, Medvendovsky E, et al. Neuropathic scrotal pruritus: anogenital pruritus is a symptom of lumbosacral radiculopathy. J Am Acad Dermatol 2005:* ***52****: 61–66.*
CrossRef (/resolve/reference/XREF?id=10.1016/j.jaad.2004.04.039), PubMed (/resolve
/reference/PMED?id=15627082), Web of Science® Times Cited: 8 (/resolve/reference/ISI?id=000226240300008)

33 *King CA, Huff FJ, Jorizzo JL. Unilateral neurogenic pruritus: paroxysmal itching associated with central nervous system lesions. Ann Intern Med 1982:* ***97****: 222–223.*
PubMed (/resolve/reference/PMED?id=7103281), CAS (/resolve/reference/CAS?id=1:STN:280:DyaL383lsV2ltw%3D%3D), Web of Science® Times Cited: 33
(/resolve/reference/ISI?id=A1982PA87800014)

34 *Summers CG, MacDonald JT. Paroxysmal facial itch: a presenting sign of childhood brainstem glioma. J Child Neurol 1988:* ***3****: 189–192.*
CrossRef (/resolve/reference/XREF?id=10.1177/088307388800300308), PubMed (/res
/reference/PMED?id=3145300), CAS (/resolve/reference/CAS?id=1:STN:280:DyaL1M%2FptlyntA%3D%3D), Web of Science® Times Cited: 8
(/resolve/reference/ISI?id=A1988P388800008)

35 *Shabtai H, Nisipeanu P, Chapman J, Korczyn AD. Pruritus in Creutzfeldt-Jakob disease. Neurology 1996: **46**: 940–941.*

CrossRef (/resolve/reference/XREF?id=10.1212/WNL.46.4.940), PubMed (/resolve/reference/PMED?id=8780068), CAS (/resolve/reference/CAS?id=1:STN:280:DyaK28zntlOktQ%3D%3D), Web of Science® Times Cited: 12 (/resolve/reference/ISI?id=A1996UG63500010)

36 *Dey DD, Landrum O, Oaklander AL. Central neuropathic itch from spinal-cord cavernous hemangioma: a human case, a possible animal model, and hypotheses about pathogenesis. Pain 2005: **113**: 233–237.*

CrossRef (/resolve/reference/XREF?id=10.1016/j.pain.2004.09.032), PubMed (/resolve/reference/PMED?id=15621384), Web of Science® Times Cited: 12 (/resolve/reference/ISI?id=000226592400030)

37 *Taylor RS. Multiple sclerosis potpourri. Paroxysmal symptoms, seizures, fatigue, pregnancy, and more. Phys Med Rehabil Clin N Am 1998: **9**: 551–559.*

PubMed (/resolve/reference/PMED?id=9894108), CAS (/resolve/reference/CAS?id=1:STN:280:DyaK1M7gvFKktg%3D%3D)

38 *Arnold LM, Auchenbach MB, McElroy SL. Psychogenic excoriation. Clinical features, proposed diagnostic criteria, epidemiology and approaches to treatment. CNS Drugs 2001: **15**: 351–359.*

CrossRef (/resolve/reference/XREF?id=10.2165/00023210-200115050-00002), PubMed (/resolve/reference/PMED?id=11475941), CAS (/resolve/reference/CAS?id=1:CAS:528:DC%2BD3MXkt1Ols7c%3D), Web of Science® Times Cited: 53 (/resolve/reference/ISI?id=000168840200002)

39 *Laihinen A. Assessment of psychiatric and psychosocial factors disposing to chronic outcome of dermatoses. Acta Derm Venereol Suppl (Stockh) 1991: **156**: 46–48.*

PubMed (/resolve/reference/PMED?id=2048376), CAS (/resolve/reference/CAS?id=1:STN:280:DyaK3M3mtlGqsg%3D%3D)

40 *Dalgard F, Svensson A, Sundby J, Dalgard OS. Self-reported skin morbidity and mental health. A population survey among adults in a Norwegian city. Br J Dermatol 2005: **153**: 145–149.*

Direct Link:

- Abstract (/doi/10.1111/j.1365-2133.2005.06414.x/abstract)
- Full Article (HTML) (/doi/10.1111/j.1365-2133.2005.06414.x/full)
- PDF(81K) (/doi/10.1111/j.1365-2133.2005.06414.x/pdf)
- References (/doi/10.1111/j.1365-2133.2005.06414.x/references)

41 *Dalgard F, Lien L, Dalen I. Itch in the community: associations with psychosocial factors among adults. J Eur Acad Dermatol Venereol 2007: **21**: 1215–1219.*

PubMed (/resolve/reference/PMED?id=17894708), CAS (/resolve/reference/CAS?id=1:STN:280:DC%2BD2srntlentg%3D%3D), Web of Science® Times Cited: 4

(/resolve/reference/ISI?id=000249826100011)

42 *Dalgard F, Dawn AG, Yosipovitch G. Are itch and chronic pain associated in adults? Results of a large population survey in Norway. Dermatology 2007: **214**: 305–309.*
CrossRef (/resolve/reference/XREF?id=10.1159/000100881), PubMed (/resolve/refere /PMED?id=17460401), Web of Science® Times Cited: 5 (/resolve/reference /ISI?id=000246063700006)

43 *Krishnan A, Koo J. Psyche, opioids, and itch: therapeutic consequences. Dermatol Ther 2005: **18**: 314–322.*
Direct Link:
- Abstract (/doi/10.1111/j.1529-8019.2005.00038.x/abstract)
- Full Article (HTML) (/doi/10.1111/j.1529-8019.2005.00038.x/full)
- PDF(89K) (/doi/10.1111/j.1529-8019.2005.00038.x/pdf)
- References (/doi/10.1111/j.1529-8019.2005.00038.x/references)

44 *Koblenzer CS. Cutaneous manifestations of psychiatric disease that commonly present to the dermatologist – diagnosis and treatment. Int J Psychiatry Med 1992: **22**: 47–63.*
CrossRef (/resolve/reference/XREF?id=10.2190/JMLB-UUTJ-40PN-KQ3L), PubMed (/resolve/reference/PMED?id=1577548), CAS (/resolve/reference /CAS?id=1:STN:280:DyaK383ltVajug%3D%3D), Web of Science® Times Cited: 19 (/resolve/reference/ISI?id=A1992HN40100004)

45 *Gupta MA, Gupta AK, Ellis CN, Koblenzer CS. Psychiatric evaluation of the dermatology patient. Dermatol Clin 2005: **23**: 591–599.*
CrossRef (/resolve/reference/XREF?id=10.1016/j.det.2005.05.005), PubMed (/resolve /reference/PMED?id=16112434), CAS (/resolve/reference /CAS?id=1:CAS:528:DC%2BD28XhtFGitbfP), Web of Science® Times Cited: 18 (/res /reference/ISI?id=000231996700002)

46 *Koblenzer CS. Neurotic excoriations and dermatitis artefacta. Dermatol Clin 1996: **14**: 447–455.*
CrossRef (/resolve/reference/XREF?id=10.1016/S0733-8635(05)70372-7), PubMed (/resolve/reference/PMED?id=8818554), CAS (/resolve/reference /CAS?id=1:STN:280:DyaK28vhsFKntg%3D%3D), Web of Science® Times Cited: 19 (/resolve/reference/ISI?id=A1996UW89700007)

47 *Psouni E. On psychological factors affecting reports in itch perception. In: YosipovitchG, GreavesM, FleischerA, McGloneF, eds. Itch: basic mechanisms and therapy. New York: Marcel Dekker, 2004: 351–367.*

48 *Melamed Y, Yosipovitch G. Itching as a focus of mental disturbance. In: YosipovitchG, GreavesM, FleischerA, McGloneF, eds. Itch: basic mechanisms and therapy. New York: Marcel Dekker, 2004: 369–375.*

49 *Hatch ML, Paradis C, Friedman S, Popkin M, Shalita AR. Obsessive-compulsive disorder in patients with chronic in patients with chronic pruritic conditions: case studies and*

discussion. J Am Acad Dermatol 1992: ***26****: 549–551.*

CrossRef (/resolve/reference/XREF?id=10.1016/0190-9622(92)70078-T), PubMed (/re /reference/PMED?id=1597540), CAS (/resolve/reference /CAS?id=1:STN:280:DyaK383otl2qug%3D%3D), Web of Science® Times Cited: 26 (/resolve/reference/ISI?id=A1992HL54100004)

50 *Murase JE, Wu JJ, Koo J. Morgellons disease: a rapport-enhancing term for delusions of parasitosis. J Am Acad Dermatol 2006:* ***55****: 913–914.*

CrossRef (/resolve/reference/XREF?id=10.1016/j.jaad.2006.04.042), PubMed (/resolve /reference/PMED?id=17052509), Web of Science® Times Cited: 11 (/resolve/reference /ISI?id=000241596000031)

51 *Koblenzer CS. The challenge of Morgellons disease. J Am Acad Dermatol 2006:* ***55****: 920–922.*

CrossRef (/resolve/reference/XREF?id=10.1016/j.jaad.2006.04.043), PubMed (/resolve /reference/PMED?id=17052516), Web of Science® Times Cited: 8 (/resolve/reference /ISI?id=000241596000038)

52 *Koo J, Lee CS. Delusions of parasitosis. A dermatologist's guide to diagnosis and treatment. Am J Clin Dermatol 2001:* ***2****: 285–290.*

CrossRef (/resolve/reference/XREF?id=10.2165/00128071-200102050-00003), PubMe (/resolve/reference/PMED?id=11721647), CAS (/resolve/reference /CAS?id=1:STN:280:DC%2BD3Mnns1ajtg%3D%3D)

53 *Boylan LS, Ettinger AB. Psychotropic effects of antiepileptic drugs. Neurology 2007:* ***69****: 1640.*

CrossRef (/resolve/reference/XREF?id=10.1212/01.wnl.0000285525.64585.45), PubM (/resolve/reference/PMED?id=17938375), Web of Science® Times Cited: 1 (/resolve /reference/ISI?id=000250198800013)

54 *Bandelow B, Wedekind D, Leon T. Pregabalin for the treatment of generalized anxiety disorder: a novel pharmacologic intervention. Expert Rev Neurother 2007:* ***7****: 769–781.*

CrossRef (/resolve/reference/XREF?id=10.1586/14737175.7.7.769), PubMed (/resolve /reference/PMED?id=17610384), CAS (/resolve/reference /CAS?id=1:CAS:528:DC%2BD2sXnt1Kgsbw%3D)

55 *Cole BE. Diabetic peripheral neuropathic pain: recognition and management. Pain Med 2007:* ***8*** *(Suppl. 2): S27–S32.*

Direct Link:

- Abstract (/doi/10.1111/j.1526-4637.2007.00349.x/abstract)
- Full Article (HTML) (/doi/10.1111/j.1526-4637.2007.00349.x/full)
- PDF(67K) (/doi/10.1111/j.1526-4637.2007.00349.x/pdf)
- References (/doi/10.1111/j.1526-4637.2007.00349.x/references)

56 *Robinson-Papp J, Simpson DM. Safety profile of treatment in diabetic peripheral neuropathic pain. Pain Med 2007:* ***8*** *(Suppl. 2): S43–S49.*

Direct Link:

- Abstract (/doi/10.1111/j.1526-4637.2007.00351.x/abstract)
- Full Article (HTML) (/doi/10.1111/j.1526-4637.2007.00351.x/full)
- PDF(75K) (/doi/10.1111/j.1526-4637.2007.00351.x/pdf)
- References (/doi/10.1111/j.1526-4637.2007.00351.x/references)

57 *Yosipovitch G, Carstens E, McGlone F. Chronic itch and chronic pain: Analogous mechanisms. Pain 2007:* ***131****: 4–7.*
CrossRef (/resolve/reference/XREF?id=10.1016/j.pain.2007.04.017), PubMed (/resolve/reference/PMED?id=17524558), Web of Science® Times Cited: 8 (/resolve/reference/ISI?id=000249236100002)

58 *Ständer S, Böckenholt B, Schürmeyer-Horst F, Heuft G, Luger TA, Schneider G. Antipruritic potency of serotonin re-uptake-inhibitors: results of a proof-of-concept study; Acta Derm Venereol 2007:* ***87****: 459–480.*

59 *Brambilla P, Cipriani A, Hotopf M, Barbui C. Side-effect profile of fluoxetine in comparison with other SSRIs, tricyclic and newer antidepressants: a meta-analysis of clinical trial data. Pharmacopsychiatry 2005:* ***38****: 69–77.48.*
CrossRef (/resolve/reference/XREF?id=10.1055/s-2005-837806), PubMed (/resolve/reference/PMED?id=15744630), CAS (/resolve/reference/CAS?id=1:CAS:528:DC%2BD2MXjt1Cmtbs%3D), Web of Science® Times Cited: 23 (/resolve/reference/ISI?id=000227854300001)

60 *Weinfeld PK. Successful treatment of notalgia paresthetica with botulinum toxin type A. Arch Dermatol 2007:* ***143****: 980–982.*
CrossRef (/resolve/reference/XREF?id=10.1001/archderm.143.8.980), PubMed (/resolv/reference/PMED?id=17709655), CAS (/resolve/reference/CAS?id=1:CAS:528:DC%2BD2sXhtVWktrjJ), Web of Science® Times Cited: 5 (/reso/reference/ISI?id=000248723900002)

61 *Turk U, Ilhan S, Alp R, Sur H. Botulinum toxin and intractable trigeminal neuralgia. Clin Neuropharmacol 2005:* ***28****: 161–162.*
CrossRef (/resolve/reference/XREF?id=10.1097/01.wnf.0000172497.24770.b0), PubM(/resolve/reference/PMED?id=16062093), Web of Science® Times Cited: 11 (/resolve/reference/ISI?id=000231330000002)

62 *Argoff CE. A focused review on the use of botulinum toxins for neuropathic pain. Clin J Pain 2002:* ***18****: S177–S181.*
CrossRef (/resolve/reference/XREF?id=10.1097/00002508-200211001-00010), PubMe(/resolve/reference/PMED?id=12569966), Web of Science® Times Cited: 37 (/resolve/reference/ISI?id=000179165400010)

63 *Meehan W, Badreshia S, Mackley C. Successful treatment of delusions of parasitosis with olanzapine. Arch Dermatol 2006:* ***142****: 352–355.52.*
CrossRef (/resolve/reference/XREF?id=10.1001/archderm.142.3.352), PubMed (/resolv

/reference/PMED?id=16549712), Web of Science® Times Cited: 22 (/resolve/reference/ISI?id=000236124900012)

64 *De Leon OA, Furmaga KM, Canterbury AL, et al. Risperidone in the treatment of delusions of infestations. Int J Psychiatry Med 1997:* ***27****: 403–409.*
CrossRef (/resolve/reference/XREF?id=10.2190/JJY8-P3YW-MN9Y-WBTX), PubMed (/resolve/reference/PMED?id=9565735), CAS (/resolve/reference/CAS?id=1:STN:280:DyaK1c3is1ymtA%3D%3D), Web of Science® Times Cited: 28 (/resolve/reference/ISI?id=000072638500062)

65 *Lee CS, Koo J. Psychopharmacologic therapies in dermatology: an update. Dermatol Clin 2003:* ***23****: 735–744.*
Web of Science® Times Cited: 4 (/resolve/reference/ISI?id=000231996700019)

66 *Gieler U, Niemeier V, Kupfer J, Brosig B. Psychosomatic aspects of pruritus. In: YosipovitchG, GreavesM, FleischerA, McGloneF, eds. Itch: basic mechanisms and therapy. New York: Marcel Dekker, 2004: 343–349.*

67 *Yosipovitch G, Maibach HI. Effect of topical pramoxine on experimentally induced pruritus in humans. J Am Acad Dermatol 1997:* ***37****: 278–280.*
CrossRef (/resolve/reference/XREF?id=10.1016/S0190-9622(97)80143-0), PubMed (/resolve/reference/PMED?id=9270522), CAS (/resolve/reference/CAS?id=1:STN:280:DyaK2svhs1GksA%3D%3D), Web of Science® Times Cited: 14 (/resolve/reference/ISI?id=A1997XT27500025)

68 *Yosipovitch G, Maibach HI, Rowbotham MC. Effect of EMLA pre-treatment on capsaicin-induced burning and hyperalgesia. Acta Derm Venereol 1999:* ***79****: 118–121.*
CrossRef (/resolve/reference/XREF?id=10.1080/000155599750011327), PubMed (/resolve/reference/PMED?id=10228629), CAS (/resolve/reference/CAS?id=1:CAS:528:DC%2BD3MXkslOhs7Y%3D), Web of Science® Times Cited: 17 (/resolve/reference/ISI?id=000079702800006)

69 *Yosipovitch G, Sugeng MW, Chan YH, Goon A, Ngim S, Goh CL. The effect of topically applied aspirin on localized circumscribed neurodermatitis. J Am Acad Dermatol 2001:* ***45****: 910–913.*
CrossRef (/resolve/reference/XREF?id=10.1067/mjd.2001.117399), PubMed (/resolve/reference/PMED?id=11712038), CAS (/resolve/reference/CAS?id=1:STN:280:DC%2BD3MnmsFOqsQ%3D%3D), Web of Science® Times Cited (/resolve/reference/ISI?id=000172431000015)

Get PDF (116K) (/doi/10.1111/j.1529-8019.2008.00167.x/pdf)

More content like this

Find more content:

- like this article (/advanced/search/results?articleDoi=10.1111/j.1529-8019.2008.00167.x&scope=allContent&start=1&resultsPerPage=20)

Find more content written by:

- Gil Yosipovitch (/advanced/search/results?searchRowCriteria[0].queryString="Gil Yosipovitch"&searchRowCriteria[0].fieldName=author&start=1&resultsPerPage=20)
- Lena S Samuel (/advanced/search/results?searchRowCriteria[0].queryString="Lena S Samuel"&searchRowCriteria[0].fieldName=author&start=1&resultsPerPage=20)
- All Authors (/advanced/search/results?searchRowCriteria[0].queryString="Gil Yosipovitch" "Lena S Samuel"&searchRowCriteria[0].fieldName=author&start=1&resultsPerPage=20)