Chronic Pruritus

Gil Yosipovitch, M.D., and Jeffrey D. Bernhard, M.D.,

From the Departments of Dermatology, Neurobiology, and Anatomy, Wake Forest University Baptist Medical Center, Winston-Salem, NC (G.Y.); and the University of Massachusetts Medical School, Worcester (J.D.B.). Address reprint requests to Dr. Yosipovitch at the Department of Dermatology, Wake Forest University Baptist Medical Center, Winston-Salem, NC 27157, or at gyosipov@wakehealth.edu.

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An otherwise healthy 55-year-old man reports that he has been itchy all over for 6 months. The itch interferes with falling asleep and wakes him repeatedly during the night. Initially, there was no rash, but during the past 4 months, itchy nodules and plaques have developed on his back, arms, and legs. Treatment with sedating and nonsedating oral antihistamines and topical glucocorticoids has had no effect. How would you evaluate and manage this case?
to noxious stimuli that usually inhibit itch, such as heat and scratching. Misinterpretation of non-noxious stimuli also occurs: touch may be perceived as itch.\textsuperscript{17} It is not unusual for patients to report that just taking off or putting on their bedclothes triggers a bout of itching. Strange symptoms like this, combined with the extreme distress of chronic itch, sleep loss, and visits to many physicians, may lead to the erroneous diagnosis of psychogenic itch.

\begin{table}  
\centering  
\begin{tabular}{|l|}
\hline  
\textbf{TREATMENT OPTIONS}  
\hline  
\textbf{Emollients and Soaps}  
\textbf{Topical Therapy}  
\textbf{Oral Antihistamines}  
\textbf{Anticonvulsants}  
\textbf{Selective Serotonin Reuptake Inhibitors}  
\textbf{Systemic Antihistamines}  
\textbf{Corticosteroids}  
\textbf{Systemic Immunomodulatory Agents}  
\textbf{Systemic Steroids}  
\textbf{Other Agents}  
\hline  
\end{tabular}  
\caption{Summary of treatment options for chronic itch.}  
\end{table}

The skin should be examined carefully for primary lesions. Excoriations, nonspecific dermatitis, prurigo nodularis, and lichen simplex chronicus are secondary lesions for which an underlying cause should be sought (Fig. 2). In some patients — for example, those with scabies, pemphigoid, or dermatitis herpetiformis — subtle primary lesions may be masked by secondary changes or may be nondiagnostic (e.g., patients with scabies may present with urticarial features, scattered secondary patches of dermatitis, nodules on genitalia, and interdigital dermatitis). Patients with excessively dry skin (xerosis) usually present with minimally detectable changes, but erythematous and scaly inflammatory patches may develop.

In addition to a history taking and physical examination, screening laboratory and imaging studies are suggested (Fig. 3).

\textbf{MANAGEMENT}

Treatment of chronic pruritus should be directed at the underlying cause when possible. Itch that is caused by hyperthyroidism or cutaneous T-cell lymphoma, for example, resolves with effective treatment of these conditions. In the absence of a definitive diagnosis, symptomatic treatment is required. Data from randomized, controlled trials of agents for itch treatment are scarce, and in practice, the treatments that are used have variable and often suboptimal effectiveness (Table 1).\textsuperscript{19}
Wet pajama treatment can be helpful and soothing when extensive inflammation is present, as in severe atopic dermatitis. In this technique, the patient first applies an emollient and a low-potency topical glucocorticoid to the affected area and then dips a pair of cotton pajamas in water, wrings them out, and wears them overnight. This treatment should be limited to short courses (≤1 week at a time) because of the associated risks of folliculitis and excess absorption of topical glucocorticoids.

Since solutions with a high pH such as alkaline soaps increase the secretion of serine proteases that may induce itch, their use should be avoided in favor of moisturizers and cleansers with a low pH (4.5 to 6.0). If secondary infection is present, it should be treated.

Figure 1. Pathways of Itch from Skin to Brain.

Itch originates in the epidermis and dermal–epidermal junction and is transmitted by itch-selective C nerve fibers. Some of these fibers are sensitive to histamine, but the majority are not. A complex interplay among T cells, mast cells, neutrophils, eosinophils, keratinocytes, and nerve cells (along with increased release of cytokines, proteases, and neuropeptides) leads to exacerbation of itch. The C fibers form synapses with second-order projections in the dorsal horn, and the itch signal ascends in the contralateral spinothalamic tract, with projections to the thalamus. From the thalamus, itch is transmitted to several regions of the brain that are involved in sensation, evaluative processes, emotion, reward, and memory.
Anesthetics
Capsaicin, which acts locally by desensitizing peripheral-nerve fibers, has been used as an antipruritic agent in various localized disorders. In a randomized, vehicle-controlled trial, topical capsaicin showed efficacy in patients with notalgia paresthetica. Clinical experience suggests that higher concentrations of capsaicin (up to 0.1%) may be more effective than lower ones.
Preparations of topical anesthetics such as pramoxine 1% or 2.5% cream and the eutectic mixture of lidocaine and prilocaine 2.5% cream have been reported in case series to have short-term beneficial effects for neuropathic, facial, and anogenital itch, although data from randomized trials that support their use are limited. In one randomized trial involving patients with pruritus caused by chronic kidney disease, pramoxine 1% cream significantly reduced pruritus, as compared with vehicle alone. The safety of long-term use of these agents or use over a large area of skin is unknown.

Coolants
Topical menthol relieves itch by activating A-delta cold afferents, which transmit the sensation of cold by the activation of an ion channel called transient receptor potential cation channel subfamily M member 8 (TRPM8); the cool sensation appears to reduce itch. Clinical experience suggests that topical menthol may be effective in low concentrations (1 to 5%); higher concentrations tend to cause irritation. The long-term use of this agent for chronic itch has not been studied.

Glucocorticoids
Although topical glucocorticoids do not have direct antipruritic effects, they are antiinflammatory. In randomized, controlled trials, glucocorticoids (both those of high potency and those of moderate potency) have shown efficacy in inflammatory skin conditions, such as atopic eczema, psoriasis, lichen planus, and genital lichen sclerosus. Potent glucocorticoids are also used for secondary manifestations of chronic itch, such as prurigo nodularis and lichen simplex chronicus, although such therapy is largely based on clinical experience in the absence of controlled studies.

Other Agents
Randomized clinical trials have shown the efficacy of the topical calcineurin inhibitors tacrolimus and pimecrolimus in reducing itch in inflammatory skin conditions, including seborrheic dermatitis, psoriasis, and various types of eczema. In a small controlled study, tacrolimus was effective for resistant anogenital pruritus. The antipruritic effect of these agents may be mediated by the activation of transient receptor potential cation channel subfamily V member 1 (TRPV1). A common adverse effect of topical calcineurin inhibitors is a burning sensation that fades after a few days of repeated applications.
In one randomized, controlled trial, doxepin 5% cream, a tricyclic antidepressant with potent anti-H1 properties, relieved localized itch in patients with atopic eczema and contact dermatitis. However, efficacy has not been shown in other conditions that cause chronic pruritus. Potential adverse events include drowsiness (from absorption through the skin) and allergic contact dermatitis.

Systemic Therapy

Antihistamines
In clinical practice, sedating antihistamines (e.g., hydroxyzine, doxepin, and diphenhydramine) are often used as first-line treatment for pruritus. However, data from randomized trials are lacking to support the efficacy of antihistamines in pruritic conditions other than urticaria. It appears in practice that the observed benefits may be due to the drugs’ soporific properties, which may help patients sleep and take the edge off itching during the day. Nonsedating H1-receptor and H2-receptor antagonists have at most a limited effect.
in the treatment of chronic itch, since histamine does not play a major role in conditions other than urticaria.\textsuperscript{25,32}

**Neuroactive Medications**

Gabapentin and pregabalin, structural analogues of the neurotransmitter $\gamma$-aminobutyric acid, are effective for several types of pruritus. In controlled trials involving patients with pruritus caused by chronic kidney disease, low doses of gabapentin (100 to 300 mg three times a week) were significantly more effective in reducing itch than placebo.\textsuperscript{33,34} Case reports have described the use of these drugs in practice to reduce neuropathic itch (e.g., postherpetic itch, brachioradial pruritus, and prurigo nodularis), although there are no data from controlled studies of these conditions.\textsuperscript{15,35} The mechanisms of action are unclear. The most frequent adverse effects are constipation, weight gain, drowsiness, ataxia, and blurred vision.

**Antidepressants**

Selective serotonin-reuptake inhibitors (e.g., paroxetine, sertraline, fluvoxamine, and fluoxetine) have been reported to reduce generalized pruritus of various types, including but not limited to psychogenic itch, in case series.\textsuperscript{36} One small randomized trial showed a modest antipruritic effect of paroxetine, as compared with placebo.\textsuperscript{37} A small double-blind trial demonstrated the efficacy of sertraline (at a daily dose of 100 mg) for cholestatic itch.\textsuperscript{38} Case reports have also suggested that the oral noradrenergic and specific serotonergic antidepressant mirtazapine (at a dai-
| Table 1. Commonly Used Topical and Systemic Medications for Chronic Pruritus.* |

<table>
<thead>
<tr>
<th>Medication</th>
<th>Common Dose</th>
<th>Side Effects</th>
<th>Medical Condition</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Topical therapy</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Emollients</td>
<td>Many products with different</td>
<td>None</td>
<td>Atopic eczema itch, dry-skin itch, skin-barrier damage</td>
<td></td>
</tr>
<tr>
<td></td>
<td>ingredients</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Glucocorticoids</td>
<td>Many products with various</td>
<td>Skin atrophy, telangiectasia, folliculitis</td>
<td>Atopic dermatitis, psoriasis, skin inflammation</td>
<td>Use low-potency agents in children and on face and in skin folds; avoid long-term use of very potent agents</td>
</tr>
<tr>
<td></td>
<td>doses</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Anesthetic agents</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Capsaicin</td>
<td>0.025% to 0.1%</td>
<td>Burning sensation for the first 2 wk</td>
<td>Neuropathic itch, itch caused by chronic kidney disease</td>
<td></td>
</tr>
<tr>
<td>Pramoxine</td>
<td>1% to 2.5%</td>
<td>Skin irritation and dryness at the affected area</td>
<td>Facial eczema, genital itch, itch caused by chronic kidney disease, neuropathic itch</td>
<td></td>
</tr>
<tr>
<td>Lidocaine and prilocaine</td>
<td>2.5% to 5%</td>
<td>Methemoglobinemia</td>
<td>Neuropathic itch, postburn itch</td>
<td></td>
</tr>
<tr>
<td>mixture</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Menthol</td>
<td>1% to 5% cream</td>
<td>Skin irritation (including hypersensitivity and burning sensation) with higher concentrations</td>
<td>Itch that responds well to the application of an ice cube or to cold showers</td>
<td></td>
</tr>
<tr>
<td>Calcineurin inhibitors</td>
<td>Pimecrolimus, 1% cream; tacrolimus, 0.03% to 0.1% ointment</td>
<td>Transient stinging or burning sensation</td>
<td>Atopic dermatitis, contact dermatitis, and particularly for facial or anogenital itch</td>
<td></td>
</tr>
<tr>
<td><strong>Systemic therapy</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Oral antihistamines</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hydroxyzine</td>
<td>25 to 50 mg four times daily</td>
<td>Drowsiness, dry mouth; abrupt withdrawal may cause confusion</td>
<td>Chronic urticaria, nocturnal itch, pruritic conditions in which drowsiness is desired effect</td>
<td>Should not be administered with antidepressants</td>
</tr>
<tr>
<td>Doxepin</td>
<td>10 to 50 mg orally one to three times daily</td>
<td>Same as for hydroxyzine; can prolong QT interval, so should be used with caution in patients with electrocardiographic abnormalities</td>
<td>Same as for hydroxyzine</td>
<td>May cause confusion in elderly, urinary retention</td>
</tr>
<tr>
<td>Diphenhydramine</td>
<td>25 to 100 mg orally four times daily</td>
<td>Same as for hydroxyzine</td>
<td>Same as for hydroxyzine</td>
<td></td>
</tr>
</tbody>
</table>
### Anticonvulsants

<table>
<thead>
<tr>
<th>Drug</th>
<th>Dosage</th>
<th>Side Effects</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gabapentin</td>
<td>100 to 1200 mg orally three times daily</td>
<td>Drowsiness, constipation, leg swelling, neuropathic itch (high dose, up to 3600 mg daily), pruritus from chronic kidney disease (low dose, 100 to 300 mg three times a week after dialysis)</td>
</tr>
<tr>
<td>Pregabalin</td>
<td>25 to 200 mg orally twice daily</td>
<td>Drowsiness, leg swelling</td>
</tr>
<tr>
<td>Valproate</td>
<td>10 to 40 mg orally once daily</td>
<td>Insomnia, dry mouth, sexual dysfunction</td>
</tr>
<tr>
<td>Carbamazepine</td>
<td>75 to 150 mg orally once daily</td>
<td>Drowsiness, dry mouth, increase in appetite, weight gain, neuropathic itch</td>
</tr>
<tr>
<td>Amitriptyline</td>
<td>25 to 150 mg once daily or up to 3 divided doses</td>
<td>Drowsiness, dizziness, constipation, urinary retention, heart palpitations, low blood pressure, confusion in elderly</td>
</tr>
</tbody>
</table>

### Antidepressants

<table>
<thead>
<tr>
<th>Drug</th>
<th>Dosage</th>
<th>Side Effects</th>
</tr>
</thead>
<tbody>
<tr>
<td>Paroxetine</td>
<td>10 to 40 mg orally once daily</td>
<td>Insomnia, dry mouth, sexual dysfunction, generalized pruritus, paraneoplastic itch, psychogenic pruritus</td>
</tr>
<tr>
<td>Mirtazapine</td>
<td>7.5 to 15 mg orally once daily</td>
<td>Drowsiness, dizziness, constipation, generalized pruritus, nocturnal</td>
</tr>
<tr>
<td>Amitriptyline</td>
<td>25 to 150 mg once daily or up to 3 divided doses</td>
<td>Urinary retention, heart palpitations, low blood pressure, confusion in elderly</td>
</tr>
<tr>
<td>Venlafaxine</td>
<td>12.5 to 50 mg orally once daily</td>
<td>Intractable itch, cholestatic pruritus, pruritus from chronic kidney disease</td>
</tr>
</tbody>
</table>

### Opioids

<table>
<thead>
<tr>
<th>Drug</th>
<th>Dosage</th>
<th>Side Effects</th>
</tr>
</thead>
<tbody>
<tr>
<td>Naltrexone</td>
<td>12.5 to 50 mg orally once daily</td>
<td>Nausea and vomiting, abdominal cramps, diarrhea, hepatotoxicity, intractable itch</td>
</tr>
<tr>
<td>Butorphanol</td>
<td>1 to 4 mg inhaled at bedtime</td>
<td>Drowsiness, dizziness, nausea, vomiting</td>
</tr>
<tr>
<td>Kappa agonist and mu antagonist</td>
<td></td>
<td>Intractable itch</td>
</tr>
<tr>
<td>Ultraviolet B radiation (broad and narrow band)</td>
<td>Three times a week</td>
<td>Atopic dermatitis, psoriasis, pruritus from chronic kidney disease</td>
</tr>
</tbody>
</table>

*Data are adapted from Yosipovitch and Patel.*
ly dose of 15 mg) may relieve nocturnal itch of various types, including cancer-related itching.\textsuperscript{39,40} Improvement in intractable itch has been reported in a case series of patients with cutaneous T-cell lymphoma who were treated with a combination of low-dose mirtazapine and gabapentin or pregabalin.\textsuperscript{41} Tricyclic antidepressants, such as amitriptyline, are also occasionally used to treat chronic pruritus (e.g., neuropathic or psychogenic forms),\textsuperscript{14,25} although these agents have not been studied for this use in randomized trials.

**Opiate Agonists and Antagonists**

Randomized, controlled trials have shown antipruritic effects of mu-opioid antagonists (e.g., naltrexone, nalmefene, and naloxone) in patients with chronic urticaria, atopic eczema, and cholestasis, findings that are consistent with the presumed involvement of endogenous activation of the mu-opioid receptor in mediating chronic itch (especially in systemic diseases such as chronic kidney disease and cholestasis).\textsuperscript{42} However, the results of studies of these agents for the treatment of pruritus in patients with chronic kidney disease have been inconsistent.\textsuperscript{43,44} Their use is limited by initial adverse effects, such as nausea, loss of appetite, abdominal cramps, and diarrhea.

In randomized, placebo-controlled trials, nalbufafine hydrochloride, a kappa-opioid agonist not currently available in the United States (but available in Japan), was shown to reduce itch significantly in patients with chronic kidney disease.\textsuperscript{45,46} The major adverse effect is insomnia. According to anecdotal reports, butorphanol, a kappa-opioid agonist and mu-opioid antagonist that is administered intranasally and has been approved by the Food and Drug Administration for the treatment of migraines, reduces intractable itch associated with non-Hodgkin’s lymphoma, cholestasis, and opioid use.\textsuperscript{47}

**Phototherapy**

Observational studies have suggested that broadband ultraviolet B (UVB) radiation, alone or combined with ultraviolet A (UVA) radiation, reduces pruritus caused by chronic kidney disease and improves itch in skin diseases such as psoriasis, atopic eczema, and cutaneous T-cell lymphoma.\textsuperscript{36,40} In a single-blind, randomized trial involving patients with refractory itch caused by chronic kidney disease,\textsuperscript{50} there was no significant difference in efficacy between narrow-band UVB radiation and UVA radiation.

**Behavioral Therapy**

Behavioral-modification therapies, including education of the patient regarding coping mechanisms and stress-reduction techniques that interrupt the itch—scratch cycle, may complement pharmacotherapy.\textsuperscript{51,52} However, data from randomized trials of such therapies are limited. In one randomized trial that assessed the addition of cognitive behavioral therapy and patient education to conventional dermatologic therapy in patients with chronic itch, there were short-term benefits in some outcomes, including a nonsignificant reduction in itch frequency and scratching (but not in intensity) and significant improvement in the use of coping mechanisms.\textsuperscript{53}

**Areas of Uncertainty**

The pathophysiology of pruritus is only partially understood. The optimal evaluation strategy with respect to yield and cost-effectiveness has not been determined. Data from randomized, controlled trials of various pharmacologic and nonpharmacologic treatments for chronic pruritus are scarce.

**Guidelines**

European guidelines for the management of chronic pruritus have been published. The recommendations in our article are largely concordant with these guidelines, except that some medications are not currently available in the United States.\textsuperscript{25}

**Conclusions and Recommendations**

The patient described in the vignette presented with chronic, severe, generalized pruritus of undetermined origin. He has prurigo nodules and lichenification (thickening of the skin); these are secondary to rubbing and scratching, not indicative of a primary dermatologic condition. In such patients, careful examination is needed to look for a dermatologic disorder. A complete medical history should be taken, and a physical examination and basic laboratory tests should be performed to look for evidence of systemic causes, such as chronic kidney disease, cholestasis, hyperthyroidism, or lymphoma. Periodic reevaluation is warranted if no cause is identified.

Since dryness of the skin may be subtle, and because dryness may aggravate pruritus of any
cause, emollients should be recommended; mild cleansers should be used to avoid further irritation. Trigger factors such as overheating from the use of excessive bedding should be avoided. Topical antipruritic agents (e.g., pramoxine) may be helpful.

In patients with severe pruritus that cannot be eliminated by identifying and treating an underlying cause (or pending effective primary treatment), topical therapy and lifestyle changes are unlikely to be sufficient, and systemic therapy should be considered. Given a paucity of data from randomized trials to evaluate various therapies, therapeutic choices are largely based on clinical experience and anecdotal reports. Sedating antihistamines are commonly used as first-line therapy but often have only modest efficacy in practice (largely attributable to their soporific properties), and these drugs have not helped the patient described in the vignette. We would consider off-label treatment with gabapentin, starting at a low dose (e.g., 300 mg and increasing up to 2400 mg daily in divided doses). If this therapy is not adequate to control pruritus, we would consider adding off-label treatment with low-dose mirtazapine (7.5 to 15.0 mg at night), although data from randomized trials are lacking to support this approach.

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Disclosure forms provided by the authors are available with the full text of this article at NEJM.org.

REFERENCES