



ABSTRACT

Severe chronic neuropathic pain, which can profoundly and negatively affect quality of life, is usually caused by damage to peripheral nerve tissue from various physical, thermal, or chemical agents and is difficult to relieve. Commonly used opioids are quite effective in relieving nociceptive pain, but nerves that are damaged send pain-sensing fibers into an area of the spinal cord in which there are no mu or kappa receptors to receive opioids or the endogenous endorphins that relieve pain. Clinicians who treat neuropathic pain face daunting therapeutic challenges, but specific analgesic agents have proven effective in relieving that excruciating discomfort. In this article, drugs that target neuropathic pain are discussed, and case reports of patients who have overcome nerve-related pain are presented. Formulations for effective analgesic preparations useful in treating neuropathic pain are included.

CHRONIC NEUROPATHIC PAIN

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It is well recognized that neuropathic pain, especially if it is severe and chronic, is difficult to relieve. Sudden, sharp, lancinating, stinging, burning neuropathic pain, which may feel to the patient like an electric shock, is usually a consequence of damage to peripheral nerve tissue from various physical, thermal, or chemical agents, and that type of pain often afflicts patients long term. Although there are instances of isolated neuropathic pain (e.g., postherpetic or chemo-

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therapeutic pain, diabetic neuropathy), it is important to realize that patients with nonmalignant pain, like that caused by failed back or neck operations, or cancer-related pain often experience neuropathic pain in addition to somatic and/or visceral pain.

Why is neuropathic pain difficult to alleviate? If somatic pain is relieved by a conventional opioid like morphine or hydrocodone, why doesn't nerve pain respond to those agents? Many neurotransmitters and receptors are involved in the perception of pain, and legions of researchers are studying different hypotheses on that topic, but there is no single definitive explanation thus far. Commonly used opioids (morphine, fentanyl, hydromorphone, oxycodone, hydrocodone) relieve pain by acting as agonists on mu and/or kappa receptors in the dorsal horn of the spinal cord. Those agents are quite effective in relieving nociceptive (somatic and visceral) pain. However, when nerve tissue is injured, the damaged nerves send pain-sensing fibers into an area of the spinal

cord in which there are no mu or kappa receptors to receive opioids or endogenous endorphins that relieve pain. One interesting line of investigation has shown that activation of the *N*-methyl-D-aspartate (NMDA) receptor in the dorsal horn of the spinal cord by chronic, persistent pain impulses has a significant role in perpetuating chronic pain. There is increasing valid evidence that blocking the NMDA receptor can greatly relieve chronic pain, including neuropathic pain. In 2000, Brookoff^{1,2} suggested that chronic pain is a disease rather than a symptom and that opioids should be prescribed more frequently to relieve chronic pain. He described the constellation of nervous-system changes caused by activation of the NMDA receptor, and that research was the stimulus for and foundation of our clinical efforts to treat severe chronic pain, including neuropathic pain. At the present time, there are three clinically effective agents for treating chronic pain that block the NMDA receptor: levorphanol, methadone, and ketamine.

Rx

**KETAMINE 10%/GABAPENTIN 6%/
CLONIDINE 0.2%/LIDOCAINE 2% IN
PLURONIC LECITHIN ORGANOGEL**

For 100 mL

Clonidine hydrochloride	0.22 g
Ketamine hydrochloride	11.5 g
Gabapentin	6 g
Lidocaine	2 g
Ethoxy diglycol	10 mL
Lecithin:isopropyl palmitate	22 mL
Pluronic gel 30%	qs 100 mL

Note: Clonidine hydrochloride 1.1 mg equates to clonidine 1 mg. Ketamine hydrochloride 1.15 g equates to ketamine 1 g.

METHOD OF PREPARATION

1. Calculate the required quantity of each ingredient for the total amount to be prepared.
2. Weigh and/or measure each ingredient accurately.
3. Triturate the clonidine, gabapentin, lidocaine, and ketamine together.
4. Add the ethoxy diglycol to the resultant powder.
5. Add the mixture from step 4 to the lecithin:isopropyl palmitate solution and mix well until the mixture "smacks."
6. Add the Pluronic 30% gel in small increments to bring the mixture to volume.
7. Pass the mixture through an ointment mill.
8. Package and label.

PACKAGING

Dispense in a syringe to ensure accurate dosing. Store at room temperature.

LABELING

Store at room temperature.

STABILITY

A beyond-use date of 30 days is recommended for this preparation.

Rx

**KETAMINE 10%/CLONIDINE 0.2%/
METHADONE 1% PLURONIC LECITHIN
ORGANOGE**

For 100 mL

Ketamine hydrochloride	11.5 g
Methadone hydrochloride	1 g
Clonidine hydrochloride	0.22 g
Propylene glycol	1 mL
Ethoxy diglycol	10 mL
Lecithin:isopropyl palmitate	22 mL
Pluronic gel 30%	qs 100 mL

Note: Clonidine hydrochloride 1.1 mg equates to clonidine 1 mg. Ketamine hydrochloride 1.15 g equates to ketamine 1 g.

METHOD OF PREPARATION

1. Calculate the required quantity of each ingredient for the total amount to be prepared.
2. Weigh and/or measure each ingredient accurately.
3. Make a paste of methadone and propylene glycol.
4. Wet the ketamine and clonidine with ethoxy diglycol in a separate mortar and make a paste.
5. Add step 3 to step 4.
6. Add step 5 to the lecithin:isopropyl palmitate solution in a separate mortar and mix until the mixture "smacks."
7. Add the Pluronic gel geometrically to the mixture from step 6.
8. Pass the mixture through an ointment mill.
9. Package and label.

PACKAGING

Dispense in a syringe to ensure accurate dosing. Store at room temperature.

LABELING

Store at room temperature.

STABILITY

A beyond-use date of 30 days is recommended for this preparation.

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AGENTS THAT RELIEVE NEUROPATHIC PAIN

KETAMINE

Ketamine, an anesthetic that is related to “angel dust” (phencyclidine), can be administered via intravenous or subcutaneous infusion in subanesthetic doses to treat intractable neuropathic pain.^{3,4} That agent is also administered as a nasal spray,⁵ orally,⁶ or as a transdermal cream⁷ to reduce the psychomimetic adverse effects that occur in about one-third of patients who receive ketamine parenterally. A recent study showed that adding midazolam to parenteral ketamine greatly reduced ketamine-related adverse effects (F. A. Bailey, oral communication, July 2008).

Because ketamine is an NMDA receptor antagonist and not an opioid, there has been interest in its possible use to treat chronic pain in outpatients. The use of ketamine administered in a transdermal cream, as a nasal spray, or orally has been reported for that purpose, and preliminary reports are encouraging.

LEVORPHANOL

Levorphanol is the least known and most infrequently prescribed of the major opioids used to treat chronic pain. Marketed since the 1950s as Levo-Dromoran, levorphanol is an excellent opioid that declined in use during the 1980s, when sustained-action forms of fentanyl, morphine, and oxycodone were the agents most often prescribed for the treatment of chronic pain. By 1990, levorphanol was commercially available only as a generic 2-mg tablet (Boehringer Ingelheim Roxane Laboratories, Ridgefield, Connecticut). It was seldom prescribed until 2003, when, in a seminal evidence-based study, Rowbotham and colleagues⁸ demonstrated the dose-related efficacy of levorphanol in relieving neuropathic pain. That paper is listed as one of the five most important articles of 2003 in the Fischberg and Morrison annual review of palliative care literature at the 2004 convention of the American Academy of Hospice and Palliative Medicine.⁹ Foley also supported the findings of Rowbotham and colleagues,⁸ which demonstrated that levorphanol effectively relieved neuropathic pain.¹⁰ Randomized controlled trials that compare the effects of methadone and levorphanol with those of other opioids are necessary

Rx

LEVORPHANOL SYRUP 4 MG/ML

For 100 mL

Levorphanol tartrate	400 mg	
Water, purified	67 mL	
Flavor, pina coloda anhydrous	3 mL	
Stevia concentrate	3 mL	
Syrup	qs	100 mL

Note: If levorphanol powder is not available, then tablets of levorphanol can be substituted. Use the ground tablets to make a paste with a small amount of propylene glycol. Adjust the amount of the water and syrup to allow for tablet displacement.

METHOD OF PREPARATION

1. Calculate the required quantity of each ingredient for the total amount to be prepared.
2. Weigh and/or measure each ingredient accurately.
3. Place the water in a beaker.
4. Add the levorphanol tartrate and spin the mixture to dissolve it.
5. Add the flavors and sweeteners.
6. Add the syrup to volume.
7. Package and label.

PACKAGING

Dispense in an amber bottle.

LABELING

If levorphanol tablets are used: Shake well. Store in a refrigerator.

STABILITY

A beyond-use date of 14 days is recommended for this preparation when stored in a refrigerator.

Rx

METHADONE 20-MG/ML CHOCOLATE/ RASPBERRY CONCENTRATED SYRUP

For 100 mL

Syrup	42 mL	
Stevia concentrate	8 mL	
Sodium saccharin concentrate	0.5 mL	
Sodium chloride	333 mg	
Methadone hydrochloride	2 g	
Flavor, raspberry anhydrous	6 mL	
Flavor, chocolate	2 mL	
Flavor, peppermint oil	1 gtt	
Water, purified	qs	100 mL

METHOD OF PREPARATION

1. Calculate the required quantity of each ingredient for the total amount to be prepared.
2. Weigh and/or measure each ingredient accurately.
3. Dissolve the methadone and the sodium chloride in purified water.
4. Add the flavors and sweeteners.
5. Add the syrup.
6. Package and label.

PACKAGING

Dispense in an amber bottle.

LABELING

Refrigerate.

STABILITY

A beyond-use date of 14 days is recommended for this preparation when stored in the refrigerator.

to provide evidence-based data proving their value, but funding for those investigations has thus far been lacking.

METHADONE

The synthetic opioid methadone has been used for pain relief since the 1940s.^{11,12} Methadone, like levorphanol, is an NMDA receptor antagonist and a mu-opioid agonist. Because of the development of long-acting drugs such as fentanyl, oxycodone, and morphine in the 1980s, methadone has been prescribed for the past two decades primarily as a treatment for substance abuse. Its use has been limited by stigma and a lack of knowledge about the equianalgesic conversion ratios used to convert treatment with other opioids to therapy with methadone. Now, however, the use of methadone to relieve severe complex and neuropathic pain is increasing in the U.S. as the medical community becomes more aware of the therapeutic effects of that drug.¹³

TOPICAL MORPHINE

For several years there have been scattered reports of pain relief when topical morphine was applied to the denuded surface of painful decubitus ulcers and other open wounds, and no significant systemic absorption of morphine was noted as a result of that therapy. Nurses at the Hospice of St. Tammany Parish Hospital in Covington, Louisiana, now apply morphine cream to the open wound surfaces of painful decubitus ulcers in elderly bedbound patients, and that treatment has resulted in very good pain relief of 4 to 8 hours' duration in most cases.


COMMENT

The transdermal delivery of ketoprofen, diclofenac, ketamine, lidocaine, and various opioids provides relief from postherpetic neuropathic pain and localized postoperative and posttraumatic painful nerve injuries. Working with a compounding pharmacist enables a greater choice of drugs and dosages to meet specific patient needs. This is particularly true when the pharmacist is a member of a hospice and/or palliative medicine team caring for patients at home or in a nursing facility.


CONTROLLING CHRONIC NEUROPATHIC PAIN: AN OBSERVATIONAL CASE SERIES

From 2001 through 2008, as a medical director of the Hospice of St. Tammany, I provided symptom management to 2148 hospice patients, and during that time I also served as a palliative medical consultant to 261 nonhospice patients in an outpatient clinic at the St. Tammany Parish Hospital. It was often necessary to prescribe an NMDA receptor antagonist to relieve complex chronic pain. During that time at

TABLE 1. Converting Treatment with Opioids to Methadone Therapy.

1. Convert all opioids taken in 24 hours to their oral morphine equivalents.
2. Use the ratios below to convert treatment with morphine to methadone:

Morphine equivalent oral daily dose:

<30 mg morphine:	ratio of morphine to methadone	= 3:1
30 - 99 mg morphine:	ratio of morphine to methadone	= 5:1
100 - 299 mg morphine:	ratio of morphine to methadone	= 8:1
300 - 499 mg morphine:	ratio of morphine to methadone	= 12:1
500 - 999 mg morphine:	ratio of morphine to methadone	= 15:1
>1000 mg morphine:	ratio of morphine to methadone	= 20:1

Source: Ayanrinde OT, Bridge DT. The rediscovery of methadone for cancer pain management. *Med J Aust* 2000; 173(10): 536-540.

TABLE 2. Converting Treatment with Morphine to Levorphanol Therapy.

Morphine to Levorphanol Ratio:

Morphine <100 mg	2:1 (12 mg MS = 1 mg levorphanol)
Morphine 100 - 299 mg	15:1 (15 mg MS = 1 mg levorphanol)
Morphine 300 - 599 mg	20:1 (20 mg MS = 1 mg levorphanol)
Morphine 600 - 799 mg	25:1 (25 mg MS = 1 mg levorphanol)
Morphine 801 - 999 mg	No data
Morphine >1000 mg	No data

Sources: McNulty JP. Can levorphanol be used like methadone for intractable refractory pain? *J Palliat Med* 2007; 10(2): 293-296; and McNulty JP. Levorphanol for the treatment of severe chronic pain. *IJPC* 2007; 11(3): 202-211.

Rx
MORPHINE 1% EMOLLIENT CREAM

For 100 mL

Morphine sulfate	1 g
Glycerin	2 mL
Base, emollient cream	qs 100 g

METHOD OF PREPARATION

1. Calculate the required quantity of each ingredient for the total amount to be prepared.
2. Weigh and/or measure each ingredient accurately.
3. Make a paste of the morphine and the glycerin.
4. Incorporate the mixture from step 1 geometrically into the base.
5. Package and label.

PACKAGING

Dispense in a syringe to ensure accurate dosing.

LABELING

Store at room temperature.

STABILITY

A beyond-use date of 30 days is recommended for this preparation.



Rx

**MORPHINE 30-MG/LORAZEPAM
1-MG/ML PLURONIC LECITHIN
ORGANOSEL**

For 100 mL

Morphine sulfate	3 g
Lorazepam	100 mg
Propylene glycol	1.5 mL
Lecithin:isopropyl palmitate	22 mL
Pluronic 20% gel	qs 100 mL

METHOD OF PREPARATION

1. Calculate the required quantity of each ingredient for the total amount to be prepared.
2. Weigh and/or measure each ingredient accurately.
3. Wet the morphine sulfate and the lorazepam with just enough propylene glycol to make a smooth, creamy paste.
4. Add the lecithin:isopropyl palmitate solution and mix in a mortar until the mixture “smacks.”
5. Remove the plunger from a syringe, place a rubber tip on the syringe end, and dump the contents of the mortar into the syringe.
6. Attach the empty syringe to the step-5 syringe with a Luer-to-Luer connector and transfer the contents back and forth to ensure thorough mixing. Draw the contents into one of the syringes to determine the amount of Pluronic 20% gel needed.
7. Draw up the Pluronic 20% gel in another syringe, reattach the syringe containing the active ingredient mix, and perform a syringe-to-syringe transfer to ensure complete mixing.
8. Package and label.

PACKAGING

Dispense in a syringe to ensure accurate dosing.

LABELING

Store at room temperature.

STABILITY

A beyond-use date of 30 days is recommended for this preparation.

TABLE 3. Converting Treatment with Levorphanol to Methadone Therapy.

Note: The conversion of treatment with levorphanol to methadone is based on limited experience. No data on parenteral conversion are available. Both drugs have a conversion ratio from oral to parenteral of 2:1.

Note: Two milligrams of levorphanol orally = 5 mg of methadone orally.

Levorphanol 2 mg every 8 hours roughly equals a dose of methadone 5 mg orally every 8 hours.

Recommended ratio: Levorphanol:methadone = 1:2.

TABLE 4. Converting Treatment from Methadone to Levorphanol Therapy.

1. Converting from methadone therapy to treatment with most opioids is difficult for patients, who often experience pain escalation and other increased symptoms.
2. Converting treatment from methadone to levorphanol has been associated with no adverse symptoms.
3. A dose of methadone 5 mg is roughly equal to a dose of levorphanol 2 mg.

Recommended ratio for cross-tolerance: Methadone:levorphanol = 3:1.

those institutions, methadone was prescribed for 242 hospice and 133 nonhospice patients, and levorphanol was prescribed for 43 hospice and 30 nonhospice patients. Although some of those patients with pain had cancer, many had been experiencing, for months or years, severe nonmalignant pain from diseases such as fibromyalgia, degenerative or rheumatoid arthritis, accidents, or failed operations of the back, neck, or extremities. Regardless of the type of their chronic pain, many of those individuals had received prior interventional pain therapy with no lasting benefit. We found that it was not necessary to hospitalize patients to provide effective pain relief with either methadone or levorphanol, and few adverse effects resulted from the use of those agents. One cancer patient became oversedated on methadone due to a caregiver error in 2001 and was briefly hospitalized to treat pneumonia, but no other serious complications occurred as a result of treatment with methadone or levorphanol during that 8-year period.

Of the 375 patients whom we treated with methadone, 186 had an excellent response (i.e., their pain scores declined from a range of 7 to 10 to a range of zero to 3 on a 10-point scale in which 10 represented the worst possible pain). Ninety-four of our methadone-treated patients experienced fair relief; their pain scores decreased from a range of 7 to 10 to a range of 4 to 5 on that same scale. Overall, the favorable response rate in patients who received methadone approached 75%.

Of the 73 patients treated with levorphanol, 35 had an excellent response, and 14 experienced fair relief (overall favorable response rate, 70%). Those results strongly suggest that patients with severe chronic pain who were treated with levorphanol or methadone benefitted from those opioids. Evidence-based randomized controlled trials are needed to confirm these preliminary findings.

When pain is unrelieved and it is necessary to replace ineffective opioids, the clinician should calculate the amount of opioids taken by the patient during the preceding 24 hours. Standard equianalgesic tables

should be used to convert treatment with those opioids to their 24-hour oral morphine equivalents. If treatment with morphine is converted to methadone therapy, use Table 1. If treatment with morphine is converted to levorphanol therapy, use Table 2, and to convert levorphanol therapy to methadone treatment, use Table 3. Although converting treatment with methadone to therapy with other opioids is difficult and often causes increased pain and other symptoms, converting methadone therapy to levorphanol treatment has thus far produced no adverse symptoms if the protocol in Table 4 is followed.

COMMENT

When chronic neuropathic pain is severe and persistent and treatment with nonopioids, nonsteroidal anti-inflammatory drugs, tricyclic or anticonvulsant adjuvants, lidocaine, duloxetine, or conventional opioids (hydrocodone, oxycodone, morphine, fentanyl, and hydromorphone) has not been effective, a trial with an NMDA receptor antagonist such as levorphanol, methadone, or ketamine may provide surprisingly good pain relief, as our results at the Hospice of St. Tammany and St. Tammany Parish Hospital indicated.

In people who live with chronic pain, depression and anxiety are almost universal. Frustration and anger, which are common in those with ongoing pain, are often directed toward the medical establishment, which has often done little to help them. Many such patients are unable to earn a living or maintain relationships, and the effects of those losses are devastating to health and well-being. Suicide becomes one of the possible options when suffering is unbearable for those individuals.

The following case reports describe patients who were miserable because of chronic neuropathic pain until a physician finally understood their need for relief and prescribed an effective analgesic drug.

CASE REPORT NUMBER 1

A 75-year-old man was diagnosed with cancer of the anus in January 2004 and underwent radiation therapy, chemotherapy, and then an abdominoperineal resection in April of that year. After surgery, he complained of severe constant burning and lancinating pain of the perineum, scrotum, and both medial upper thighs and found sitting painful. The pain kept him awake at night. Visits to the surgeon, oncologist, and radiation oncologist, who denied responsibility for that complication, were frustrating. Hydrocodone was prescribed but provided no relief. By July 2004, the patient was so depressed and exhausted that he attempted suicide. Hospitalization in a psychiatric facility and treatment with antidepressants helped, but the pain persisted. In October of that year, he was referred to our clinic by his wound-care nurse. After our evaluation, he was treated with low-dose methadone for sacral neuropathy. A bedtime dose of methadone 5 mg was administered, shortly after which the patient's pain lessened and he slept the entire night for the first time in 6 months. On a methadone dosage of 2.5 mg twice daily, he experienced excellent pain relief for 18 months and resumed many of his normal activities. At the time of this writing, his cancer has not recurred, his pain level is tolerable, and his quality of life is greatly improved.

Rx

LECITHIN/ISOPROPYL PALMITATE SOLUTION

For 220 mL

Sorbic acid	0.66 g
Lecithin soya granules	100 g
Isopropyl palmitate	117 mL

METHOD OF PREPARATION

1. Calculate the required quantity of each ingredient for the total amount to be prepared.
2. Weigh and/or measure each ingredient accurately.
3. Disperse the lecithin and the sorbic acid in the isopropyl palmitate.
4. Allow the mixture to stand overnight.

PACKAGING

Store in a tightly closed amber stock bottle.

LABELING

Store at room temperature.

STABILITY

A beyond-use date of 180 days is recommended for this preparation.

Rx

SODIUM SACCHARIN CONCENTRATE 30 MG/0.1 ML

For 100 mL

Sodium saccharin	30 g
Sodium benzoate	0.5 g
Water, purified	85 mL

Note: Prewarming the water over low heat will help dissolution.

METHOD OF PREPARATION

1. Calculate the required quantity of each ingredient for the total amount to be prepared.
2. Weigh and/or measure each ingredient accurately.
3. Dissolve the sodium saccharin and the sodium benzoate in an appropriate amount of purified water (90% of the total preparation volume).
4. Add sufficient purified water to volume.
5. Package and label.

PACKAGING

Place in an amber bottle equipped with an adapter cap.

LABELING

Store at room temperature.

STABILITY

A beyond-use date of 180 days is recommended for this preparation.



CASE REPORT NUMBER 2

A 56-year-old man was referred by his anesthesiologist for consultation at our clinic because interventional pain therapy and treatment with hydrocodone had provided little relief from chronic low-back pain after a laminectomy. As a young man, this patient had sustained multiple injuries as a rodeo rider. While serving in Vietnam, he underwent a lumbar fusion for a back injury, and he was treated for posttraumatic stress disorder after his discharge from the U.S. military. He experienced severe chronic low-back pain over the next 5 years, which caused him to become severely depressed. When coping with his pain became increasingly difficult, he considered suicide and was treated at a local psychiatric Veterans Administration hospital. His low-back pain persisted,

however, and eventually limited his functioning. After evaluation in our clinic, he was treated with oral methadone 10 mg every 8 hours. Three days after the initiation of that treatment, his pain score decreased from a range of 7 to 8 to 2 to 3 on a scale of zero to 10, where 10 represented the worst possible pain. He has continued treatment with methadone 10 mg every 8 hours to date and is much more functional and satisfied with his treatment as a result of that therapy.



CASE REPORT NUMBER 3

On the left cheek of an 81-year-old man, a large fibrosarcoma developed, extended into the maxillary sinus, and caused lancinating, burning, aching pain. Surgical removal of the tumor was not possible because of

Rx

**STEVIA CONCENTRATE SOLUTION
500 MG/ML**

For 100 mL

Stevia powder extract		50 g
Sodium benzoate		0.5 g
Water, purified	qs	100 mL
Alcohol, 95%		18 mL

Note: Stevia goes into solution slowly and may take up to 30 minutes to do so, depending on the volume prepared, and also produces frothing; allow for settling.

METHOD OF PREPARATION

1. Calculate the required quantity of each ingredient for the total amount to be prepared.
2. Weigh and/or measure each ingredient accurately.
3. Prewarm the water (about 50% of the total preparation volume) over low heat.
4. Add the sodium benzoate to the water and place the mixture in a beaker with a spin bar. Let the mixture dissolve.
5. Add the alcohol, 95% to the mixture from step 4.
6. Gradually add the stevia and continue to stir the mixture over low heat.
7. Add sufficient purified water to volume.
8. Package and label.

PACKAGING

Store in an amber bottle and keep refrigerated.

LABELING

Refrigerate.

STABILITY

A beyond-use date of 180 days is recommended for this preparation, which must be refrigerated.

Rx

BASE, EMOLLIENT CREAM

For 100 g

Sodium benzoate	200 mg
Polysorbate 80	2 g
Base, ointment	40 g
Water, purified	58 mL
Butylated hydroxytoluene	200 mg

Note: To ensure accuracy, after pouring the water into the beaker, mark the meniscus with tape. Add sufficient water to the tape mark after the sodium benzoate has dissolved.

Note: Ointment Base contains white petrolatum, cetostearyl alcohol, and light mineral oil.

METHOD OF PREPARATION

1. Calculate the required quantity of each ingredient for the total amount to be prepared.
2. Weigh and/or measure each ingredient accurately.
3. Reduce the particle size of the butylated hydroxytoluene in a mortar to speed the compounding process.
4. Melt the ointment base at 60°C and add the polysorbate 80 and the butylated hydroxytoluene.
5. Heat the water to 60°C and add the sodium benzoate.
6. Add the mixture from step 5 to the mixture from step 4 (the base).
7. Stir the resultant mixture with an electric mixer (without heat) until the cream thickens and is uniform.
8. Package and label.

PACKAGING

Store in an ointment jar.

LABELING

Refrigerate.

STABILITY

A beyond-use date of 180 days is recommended for this preparation.

the patient's heart disease. Palliative radiotherapy did not reduce his pain, and hydrocodone, oxycodone, morphine, and adjuvants were also ineffective in providing relief. Treatment with oral methadone 10 mg every 8 hours reduced his level of pain from a range of 7 to 9 to 1 to 3 on a scale of zero to 10, where 10 represented the worst possible pain, but he disliked the mild drowsiness caused by that agent. Levorphanol 4 mg every 6 hours reduced his pain level to a score of zero to 3 on that scale and produced no adverse effects. Over the next 2 years, the escalation of this patient's pain required slow increases in levorphanol. At the time of this writing, his pain is well controlled with a levorphanol dosage of 12 mg every 6 hours (48 mg/24 h). He is normally active for his age, drives a vehicle, and has a very good quality of life. If and when he is unable to swallow tablets, he will receive levorphanol oral concentrate buccally.

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CASE REPORT NUMBER 4

Isolated ulnar neuropathy developed in a 46-year-old man as a complication of a prolonged coronary bypass operation. Constant burning and intermittent shocklike neuropathic pain in his left hand and forearm impaired his career as an attorney. His pain score ranged from 5 to 9 on a scale of zero to 10, where 10 represented the worst possible pain.

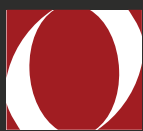
He exhibited weak interosseus muscle function. Constant pain after 12 weeks of treatment with hydrocodone and gabapentin led to consultation for a possible trial with levorphanol. Treatment with that agent was initiated at a dosage of 1 mg (half of a 2-mg tablet) every 6 hours. After the dose was increased to 2 mg every 6 hours, the patient's lancinating pain rapidly decreased to a pain score of zero to 1 on a scale of zero to 10 (where 10 represented the worst possible pain) and did not recur. The burning pain subsided with a levorphanol dosage of 3 mg every 8 hours. After undergoing surgery to correct nerve entrapment 6 months after levorphanol therapy was initiated, this patient resumed a normal workload. At the time of this writing, he is treated with 4 mg of levorphanol every 12 hours, and his pain level is acceptable.

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CASE REPORT NUMBER 5

A 56-year-old man with cancer of the tongue underwent radical resection of the soft palate and hemiglossectomy. Recurrence of the aggressive tumor in his oropharynx, sinus, and cheek caused severe trigeminal and glossopharyngeal pain that worsened this patient's chronic anxiety and panic attacks. When he was admitted to hospice, his pain score was 7 to 8 on a scale of zero to 10, where 10 represented the worst

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possible pain. Methadone oral concentrate 20 mg/mL administered via a gastrostomy tube every 8 to 12 hours reduced the level of pain, but the patient was afraid to take methadone. When he received levorphanol 2 mg every 6 hours for 5 days, his pain score was 5 on that pain scale. His level of pain was tolerable (a score of 3) for the next 6 weeks until his death on day 47 of levorphanol treatment. In that patient, the most effective dosage of levorphanol proved to be 16 mg/24 h.

CONCLUSION

The treatment of both malignant and nonmalignant neuropathic pain is challenging, but the appropriate prescription of drugs that target nerve-related pain can provide relief, even in the most difficult cases. Working with a compounding pharmacist provides a greater choice of drugs and dosages that can be customized to meet specific patient needs and reduce neuropathic pain to a manageable level.

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Rx

**KETOPROFEN 10%/KETAMINE 10%/
LIDOCAINE 5% IN PLURONIC LECITHIN
ORGANOCEL**

For 100 mL

Ketoprofen	10 g
Ketamine hydrochloride	11.5 g
Lidocaine	5 g
Ethoxy diglycol	10 mL
Lecithin:isopropyl palmitate	22 mL
Pluronic gel 30%	qs 100 mL

METHOD OF PREPARATION

1. Calculate the required quantity of each ingredient for the total amount to be prepared.
2. Weigh and/or measure each ingredient accurately.
3. Triturate (in a mortar) the ketoprofen, ketamine, and lidocaine.
4. Add the prewarmed ethoxy diglycol to the mortar mix and make a paste.
5. Add the lecithin palmitate to the mixture from step 4 and mix well until the mixture “smacks.”
6. Add 95% of the Pluronic gel 30%.
7. Add sufficient Pluronic gel 30% to volume.
8. Pass the mixture through an ointment mill.
9. Package and label.

PACKAGING

Dispense in a syringe to ensure accurate dosing.

LABELING

Store at room temperature.

STABILITY

A beyond-use date of 30 days is recommended for this preparation.

HELP PATIENTS GO FROM THIS



TO THIS



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