Topical Gallium Maltolate as a Possible Alternative to Opioids for Chronic Pain

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INTRODUCTION

Gallium maltolate (GaM) has demonstrated analgesic and anti-inflammatory activity when administered topically to the skin or mucous membranes. In numerous case studies involving neuropathic pain, topical GaM has shown remarkable efficacy, even when other analgesic agents had been ineffective.

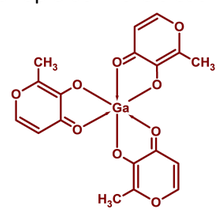
Systemic opioids are commonly used to treat chronic pain, but such treatment is generally of modest efficacy and produces adverse effects, including sedation and addiction, which degrade a patient's quality of life and ability to function normally. Experience has shown that, in at least some cases, topical GaM can be successfully substituted for systemic opioids, with no reported adverse effects, greatly improving the patient's quality of life.

Gallium Maltolate

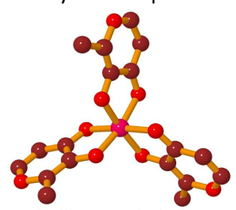
Gallium is a semi-metallic element that has no known essential physiological role, but displays therapeutic biological activities. Numerous animal studies have demonstrated potent anti-inflammatory activity for gallium, including in models of inflammatory arthritis, lupus, and multiple sclerosis [1]. The anti-inflammatory activity of gallium is due in part to its ability to selectively inhibit the activation and multiplication of T-helper type 1 (pro-inflammatory) cells, and also the secretion of pro-inflammatory cytokines from activated macrophages [1].

Gallium maltolate (GaM) is a coordination complex of gallium and maltol. Maltol is naturally present in some plants; it also occurs in baked foods, where it is a sugar degradation product. Due to its octanol:water partition coefficient of 0.41, it is soluble in both aqueous solutions and lipids [2]. This allows ready penetration of skin and cell membranes, including neuronal membranes.

We previously reported analgesic efficacy of topically applied GaM in postherpetic neuralgia [3], trigeminal neuralgia [4], orofacial pain following surgery or radiation treatment [5], and other types of pain [6]. The efficacy is hypothesized to be due in part to gallium's anti-inflammatory activity, plus its possible interference with substance P, certain matrix metalloproteinases, and NMDA receptors [2]. In this study, the aim was to explore the possibility of substituting topical GaM for opioids in the treatment of refractory chronic pain.



Molecular structure of gallium maltolate



Gallium maltolate molecule from x-ray crystallography

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CLINICAL STUDY

Case 1. Refractory trigeminal neuralgia

A 57-year-old woman had refractory right-side mandibular and maxillary trigeminal neuralgia for 22 years. She had been taking 100 mg morphine and 6 mg hydrocodone daily for several years, in addition to 300 mg/day pregabalin; her pain levels remained at 8 to 10*. She had been admitted to a psychiatric hospital several times following suicide attempts related to her extreme chronic pain. This patient reported a pain reduction from 10 to 2 within 20 minutes of first applying topical GaM to her face. Seven days after starting three-times daily use of topical GaM, her opioid use was halved. After 20 days, she stopped all use of opioids, and has never used them in the following four years. She continues using topical GaM several times per day, and intermittently takes 150 mg/day pregabalin.

Case 2. Severe chronic migraine

A 59-year-old woman had 6 to 12 episodes of severe migraine headache per month, each episode lasting one to four days. She was taking hydrocodone plus acetaminophen (Percocet®), at least 20mg/1300 mg per day, as well as alprazolam, baclofen, and a triptan. She then started applying topical GaM at least three times daily to her temples, which reduced the intensity and frequency of her headaches. Within a month she stopped the use of the hydrocodone and the other mentioned systemic drugs, and has not used them in more than three years. She continues to use topical GaM as needed.

Case 3. Refractory postherpetic neuralgia

A 99-year-old woman had left mandibular postherpetic trigeminal neuralgia for four years. Systemic anticonvulsants and tricyclic antidepressants, as well as topical lidocaine and capsaicin, had failed to produce significant pain relief. Marijuana, topical emu oil, and other non-standard treatments had also been ineffective. She was taking 60 mg/day morphine, which reduced her pain from an intensity of 10 to 8. An initial application of topical GaM reduced her pain level to 2 within 15 minutes. She stopped taking morphine within a week. She continued using topical GaM as needed, generally two to four times per day, for the next six years, and never used morphine or other opioids again. No adverse effects of any kind were reported from the topical GaM.

*Self-reported pain score, from 0 (no pain) to 10 (worst pain imaginable)

Case 4. Refractory postherpetic neuralgia

A 72-year-old woman had right mandibular postherpetic trigeminal neuralgia for two years. Her baseline pain was 10; morphine (100 mg/day) plus diclofenec brought the pain level down to 4. Application of topical GaM three times per day brought her pain level down to 2, and within a month she discontinued her use of morphine. For at least a year afterward she had not used morphine again.

Case 5. Refractory postherpetic neuralgia

A 64-year-old woman had left mandibular postherpetic trigeminal neuralgia for 21 years. Numerous therapies had not produced significant pain relief, and she was sometimes suicidal due to her pain. Her baseline pain was 10, which was reduced to 7 through the chronic use of morphine (100 mg/day) plus amitriptyline. Within 20 minutes of first applying topical GaM, she reported that her pain level went to 2 "for the first time in 20 years". Within a month she discontinued her use of morphine and amitriptyline. After three-times daily use of topical GaM for a year, followed by its as-needed use thereafter, her facial pain completely resolved after about 19 months, when she discontinued treatment with topical GaM.

Conclusions

This small study demonstrated that, in some cases of refractive, severe neuropathic pain and migraine headache, topically administered gallium maltolate could be effective in relieving pain and allowing the patient to discontinue the use of opioid medications. No adverse effects of any kind were reported. Controlled clinical trials should be conducted to further explore the potential use of topical gallium maltolate as an alternative to opioids in the treatment of chronic pain.

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