

## The Patient's Guide to Psoriasis Treatment. Part 4: Goeckerman Therapy

Tian Hao Zhu · Mio Nakamura · Benjamin Farahnik · Michael Abrouk ·  
Rasnik K. Singh · Kristina M. Lee · Sarah Hulse · John Koo ·  
Tina Bhutani · Wilson Liao

Received: May 6, 2016 / Published online: July 29, 2016  
© The Author(s) 2016. This article is published with open access at Springerlink.com

### ABSTRACT

**Background:** The Goeckerman regimen remains one of the oldest, most reliable treatment options for patients with moderate to severe psoriasis. Goeckerman therapy currently consists of exposure to ultraviolet B light and application of crude coal tar. The details of the procedure can be confusing and

---

**Enhanced content** To view enhanced content for this article go to <http://www.medengine.com/Redeem/C9D4F0600C816B7E>.

---

T. H. Zhu (✉)  
University of Southern California Keck School of  
Medicine, Los Angeles, CA, USA  
e-mail: tianhao@usc.edu

M. Nakamura · K. M. Lee · S. Hulse · J. Koo ·  
T. Bhutani · W. Liao  
Department of Dermatology, Psoriasis and Skin  
Treatment Center, University of California-San  
Francisco, San Francisco, CA, USA

B. Farahnik  
University of Vermont College of Medicine,  
Burlington, VT, USA

M. Abrouk  
University of California-Irvine, School of Medicine,  
Irvine, CA, USA

R. K. Singh  
University of California-Los Angeles, David Geffen  
School of Medicine at UCLA, Los Angeles, CA, USA

challenging to understand for the first-time patient or provider.

**Objective:** To present a freely available online guide and video on Goeckerman treatment that explains the regimen in a patient-oriented manner.

**Methods:** The Goeckerman protocol used at the University of California—San Francisco Psoriasis and Skin Treatment Center as well as available information from the literature were reviewed to design a comprehensive guide for patients receiving Goeckerman treatment.

**Results:** We created a printable guide and video resource that covers the supplies needed for Goeckerman regimen, the treatment procedure, expected results, how to monitor for adverse events, and discharge planning.

**Conclusion:** This new resource is beneficial for prospective patients planning to undergo Goeckerman treatment, healthcare providers, and trainees who want to learn more about this procedure. Online media and video delivers material in a way that is flexible and often familiar to patients.

**Keywords:** Goeckerman therapy; Patient education; Psoriasis; Tar; Video guide

## INTRODUCTION

The Goeckerman regimen is a unique combination therapy of ultraviolet B (UVB) light and application of crude coal tar (CCT) for the treatment of psoriasis [1, 2]. First introduced in 1925, the Goeckerman regimen remains one of the oldest, most reliable treatment options for patients with moderate to severe psoriasis [3]. The advantage in using tar and phototherapy together is that tar is a photosensitizer and when combined with UVB light acts synergistically to produce better results than either treatment alone [3–5]. In comparison to other treatment modalities such as internal biologic agents, oral systemic agents, and topical medications, Goeckerman therapy remains extremely effective with relatively few side effects. This makes Goeckerman regimen an excellent alternative for patients who may have previously failed multiple therapies, the elderly, pregnant patients, children, and the immunosuppressed [6].

Goeckerman therapy was originally administered at an inpatient hospital facility for 24 h a day for multiple days until the psoriasis cleared [2]. However, patients today are often treated in an outpatient day care setting where they return home at the end of the treatment day with similar results but significantly reduced cost [6, 7]. Currently, Goeckerman therapy at the University of California—San Francisco (UCSF) Psoriasis Center requires a minimum time commitment of 4–5 h in the daycare facility for 5 days a week for 6 weeks for a total of 30 total treatment days [1]. The major limitation of this therapy is the time commitment required as patients should avoid interruption in their therapy, which can delay complete treatment of their psoriasis lesions and shorten the remission time.

Nevertheless, almost all Goeckerman patients have seen significant improvement in their skin condition over the duration of their therapy.

In a study performed at the University of California San Francisco (UCSF) Psoriasis and Day Care Center 100% of patients receiving Goeckerman over a 12 week period achieved a 75% or greater improvement in their psoriasis lesions [8]. Another advantage of Goeckerman is the long period of remission following completion of therapy, which can last between 8 months to over a year [6, 9]. Studies have also shown that Goeckerman therapy can significantly increase patient satisfaction and improve overall quality of life [10]. In addition, UCSF has developed a modified Goeckerman regimen to treat other skin diseases such as eczema, prurigo nodularis, and pruritus [11, 12].

For the first-time patient or referring provider the details of the Goeckerman procedure can be confusing and challenging to understand. Therefore, the following guide and online media attempt to deliver the material in a way that is easily understandable and readily accessible. Below we will describe supplies for Goeckerman therapy, evaluation and preparation, treatment procedure, daily assessment, discharge planning, and safety considerations.

## METHODS

We reviewed the Goeckerman therapy protocol used at the UCSF Psoriasis and Skin Treatment Center. In addition PubMed database was searched using the term “psoriasis” combined with the term “Goeckerman therapy,” “tar therapy,” or “tar and light therapy” to identify relevant articles to design a comprehensive guide for patients receiving Goeckerman treatment.

This article does not contain any new studies with human or animal subjects performed by any of the authors. All photos are printed with the consent of the subject(s).

## RESULTS AND DISCUSSION

### Overview

The guide below will cover the supplies needed for Goeckerman regimen, the treatment procedure, how to monitor for side effects, daily assessment, and discharge planning.

### Supplies for the Goeckerman Regimen

Tar used for Goeckerman is available in two forms. CCT, commonly referred to as “black tar,” is compounded in white petrolatum ointment or Cetaphil® cream (Galderma Laboratories, L.P.) in concentrations of 2%, 5%, and 10%. Liquor carbonis detergens (LCD), commonly referred to as “gold tar,” is compounded in Aquaphor® ointment (Beiersdorf, Inc.), Cetaphil cream, or Vanicream™ lotion (Pharmaceutical Specialties, Inc.) as 20% concentration. Topical steroids include clobetasol propionate 0.05% ointment, triamcinolone 0.01% ointment, and desonide 0.05% ointment. Mineral oil is used for washing topical medications off. Moisturizing lotion used after therapy consists of Aquaphilic® ointment (Medco Lab Inc.) or Vanicream. Plastic wrap is used for occlusion purposes. Gown, gloves, socks, and shower cap are used for covering the skin (Table 1).

### Evaluation and Preparation

Prior to therapy a complete history and physical examination is performed for each patient to

**Table 1** Supplies for Goeckerman regimen

Crude coal tar (2%, 5%, 10%) “black tar”	White petrolatum ointment Cetaphil cream
Liquor carbonis detergens (20%) “gold tar”	Aquaphor ointment Cetaphil cream Vanicream lotion
Topical corticosteroids	Clobetasol propionate 0.05% ointment Triamcinolone 0.01% ointment Desonide 0.05% ointment
Tar removal	Mineral oil Soap
Moisturizing lotion	Aquaphilic ointment Vanicream
Occlusion	Plastic wrap
Miscellaneous	Gown Gloves Socks Shower cap

obtain important information on current and past medications, response to previous psoriasis therapies, history of adverse reactions to sunlight or phototherapy, and severity of itch. An initial assessment of the skin will help to determine the degree and severity of psoriasis involvement and whether patients display widespread or intense erythema. In cases of severe psoriasis it is recommended that patients undergo a cool down period during which topical corticosteroids will be applied to the affected areas and occluded with plastic wrap until the erythema is greatly reduced (3–14 days) [1, 11]. This is because UV light and tar preparations have the potential to worsen acutely inflamed psoriasis (Table 2).

**Table 2** Evaluation and preparation

---

Obtain history and physical  
 Assess for degree and severity of skin involvement  
 Perform optional cool down period

---

### Treatment Procedure

After the cool down procedure (if needed), the nurse will administer phototherapy in the morning each day before applying tar to affected areas of the skin. Narrowband UVB is most commonly used although broadband UVB may be used in certain situations where narrowband UVB is ineffective or not tolerated by the patient [5, 8]. The initial phototherapy dose is determined by the patient's Fitzpatrick skin type. A nurse will then adjust subsequent phototherapy dosing according to the patient's response and tolerance to phototherapy, noting any signs of skin burning or itching (Table 3).

After phototherapy, CCT will be applied to affected areas of the body and LCD for scalp involvement. Tar is typically started with the lowest concentration available and increased gradually as tolerated by the patient. Some patients may not tolerate CCT or LCD in Aquaphor base due to the greasy texture or alcohol content [11, 13]. For these patients, tar in Cetaphil cream, a water based moisturizer-may be substituted. A formulation of tar compounded with salicylic acid is often used in areas with greatly thickened plaques to help reduce the scaling. However, salicylic acid should be used with caution in patients with diabetes or gastric ulcers due to the potential for adverse side effects [14].

Occlusion of topical tar is then performed with plastic wrap to the body, arms, and legs, impermeable gloves for the hands, socks for the

**Table 3** Treatment procedure

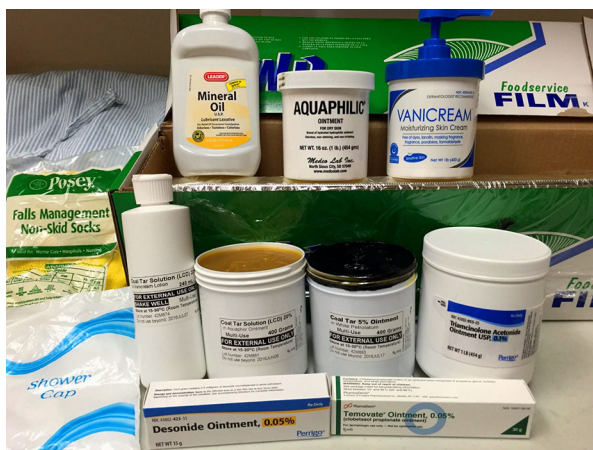
---

Patient checks in at front desk  
 ↓  
 Nurse administers UVB phototherapy  
 ↓  
 Patient asked to undress for tar application  
 ↓  
 Nurse applies CCT to body and extremities and LCD to the scalp  
 ↓  
 Tar is occluded with plastic wrap  
 ↓  
 Patient dressed in gown with gloves, socks, and shower cap  
 ↓  
 Therapy continues for 4–5 h  
 ↓  
 Tar is washed off with mineral oil and soap  
 ↓  
 Nurse applies LCD to the body before patient leaves for home

---

*CCT* crude coal tar, *LCD* liquor carbonis detergens, *UVB* ultraviolet B

feet, and a shower cap for the scalp (Fig. 1). Topical tar is typically left on the skin for a minimum of 4–5 h each day. During this time, patients may read, listen to music, work on a laptop computer, socialize with other Goeckerman patients, or participate in group activities such as meditation, board games, or cooking (Fig. 2). After the 4–5 h period, the tar is washed off in the shower with mineral oil and soap. After Goeckerman therapy is completed at the daycare center a nurse will apply LCD in Aquaphor ointment or Cetaphil cream (less greasy option) to the body before the patient leaves for home.



**Fig. 1** Supplies for Goeckerman regimen. *Left side* gown, socks, shower cap. *Top row* Mineral oil, Aquaphilic ointment, Vanicream, plastic wrap. *Middle row* 20% liquid carbonis detergens in Vanicream lotion, 20% liquid carbonis detergens in Aquaphor ointment, 5% crude coal tar in white petrolatum ointment, triamcinolone 0.01% ointment. *Bottom row* Desonide 0.05% ointment, clobetasol propionate 0.05% ointment



**Fig. 2** Treatment procedure. **a** Nurse occluding tar with plastic wrap. **b** Patient spends 4–5 h in waiting area during tar therapy

### Daily Assessment

Each day the patient will be assessed by the care team consisting of a doctor, fellow, and nurse for response to Goeckerman treatment. Signs of skin burn such as redness of the skin, skin tightness, pain, and rarely blistering may indicate too high a dose or intolerance to light therapy [1]. If a burning sensation develops, the phototherapy dose is either decreased or phototherapy treatment is not given at all for that day. Itch is another common concern as skin irritation may be a sign of sensitivity from tar or plastic wrap, in which case the concentration of tar may be decreased or the wrap may not be applied. Patients are also encouraged at this time to update their care team about any change in their medical conditions that may have occurred or outside doctor’s visits they may have had (Table 4).

### Discharge Planning

Upon completion of the Goeckerman course, patients will be started on a maintenance program which may include outpatient phototherapy three times a week for the first month with gradual taper and topical medications to be applied at home. One month after completion of Goeckerman the patient will be scheduled for a follow-up visit with the doctor (Table 5).

**Table 4** Daily assessment

Team of doctor, fellows, and nurses evaluate patient response to treatment
Check for signs of skin burn and itch
Adjust phototherapy dosing and tar concentration as appropriate

**Table 5** Discharge planning

---

Home maintenance program with outpatient phototherapy, LCD, and topical steroids
Reassess patient response to therapy after 1 month

---

*LCD* liquor carbonis detergens

### Safety Considerations

The safety profile of Goeckerman therapy is excellent with relatively few side effects. One of the main concerns regarding coal tar is the theoretical carcinogenic potential. However, many studies including a review of 13,200 patients undergoing Goeckerman regimen for psoriasis and eczema showed that there is no increased risk of cancer with tar therapy compared to topical corticosteroids [13]. In addition, Goeckerman therapy is entirely topical and has limited internal absorption, so it does not increase the risk for cardiovascular disease, tuberculosis, or serious infections that may be associated with some oral or injectable medications [15]. The most commonly observed side effects include mild folliculitis, a skin condition characterized by itchy red bumps that develop around hair follicles, and mild skin burning from the UVB light [1]. For this reason it is recommended that

**Table 6** Safety considerations

---

Side effect	Signs/symptoms
Skin burning <sup>a</sup>	Redness, tenderness, pain, tightness, itching, rarely blistering Noticeable 4–6 h after treatment with UVB phototherapy
Folliculitis	Itchy red bumps that develop around hair follicles
Itching	Skin irritation from tar or occlusion

---

*UVB* ultraviolet B

<sup>a</sup> Patients should avoid extended periods of sun exposure when tar is applied at home

patients avoid extended periods of sun exposure when tar is applied at home (Table 6).

## CONCLUSIONS

Goeckerman therapy is both safe and effective for treatment of moderate to severe psoriasis and is an excellent treatment option. Nevertheless, Goeckerman therapy requires a firm time commitment by the patient. Patients are encouraged to fully participate in this program by showing up daily, not missing therapy sessions, and communicating any symptoms or concerns to the care staff. With consistent adherence to therapy, the vast majority of patients can achieve total body clearing, even in the toughest areas such as the scalp, palms, and soles. This guide and the corresponding online video serves to orient and educate prospective patients planning to start Goeckerman treatment, healthcare providers, and trainees who want to learn more about this procedure.

## ACKNOWLEDGMENTS

We would like to thank Tim Sarmiento for producing, directing, and editing the educational video that accompanies this manuscript. We would also like to thank the amazing staff and nurses from the UCSF Psoriasis and Skin Treatment Center for inspiring and helping make the video possible. We thank Olivia Chen for her help reviewing the Spanish translation of the accompanying video. No funding or sponsorship was received for publication of this article. All named authors meet the International Committee of Medical Journal Editors (ICMJE) criteria for authorship for this manuscript, take responsibility for the integrity of the work as a whole, and have given final approval for the version to be published.

**Disclosures.** John Koo is a speaker for AbbVie, Leo, and Celgene, and conducts research for Amgen, Janssen, Novartis, Photomedex, Galderma, Pfizer and Merck. Tina Bhutani is an advisor for Cutanea, and conducts research for Abbvie, Janssen, and Merck. Wilson Liao conducts research for Abbvie, Janssen, Novartis, and Pfizer, and receives funding from the NIH (R01AR065174, U01AI119125). John Koo, Tina Bhutani, and Wilson Liao have no stocks, employment or board memberships with any pharmaceutical company. Tian Hao Zhu, Mio Nakamura, Benjamin Farahnik, Michael Abrouk, Rasnik K. Singh, Kristina M. Lee, and Sarah Hulse have nothing to disclose.

**Compliance with Ethics Guidelines.** This article does not involve any new studies of human or animal subjects performed by any of the authors. All photos are printed with the consent of the subject(s).

**Open Access.** This article is distributed under the terms of the Creative Commons Attribution-NonCommercial 4.0 International License (<http://creativecommons.org/licenses/by-nc/4.0/>), which permits any noncommercial use, distribution, and reproduction in any medium, provided you give appropriate credit to the original author(s) and the source, provide a link to the Creative Commons license, and indicate if changes were made.

## REFERENCES

- Gupta R, Debbaneh M, Butler D, et al. The Goeckerman regimen for the treatment of moderate to severe psoriasis. *J Vis Exp* 2013;(77):e50509. doi:10.3791/50509.
- Perry HO, Soderstrom CW, Schulze RW. The Goeckerman treatment of psoriasis. *Arch Dermatol*. 1968;98(2):178–82.
- Goeckerman WH. The treatment of psoriasis. *Northwest Med*. 1925;24:229–30.
- Parrish JA, Morison WL, Gonzalez E, Krop TM, White HA, Rosario R. Therapy of psoriasis by tar photosensitization. *J Invest Dermatol*. 1978;70(2):111–2.
- Le Vine MJ, White HA, Parrish JA. Components of the Goeckerman regimen. *J Invest Dermatol*. 1979;73(2):170–3.
- Menter A, Cram D. The Goeckerman regimen in two psoriasis day care centers. *J Am Acad Dermatol*. 1983;9(1):59–65.
- Storan E, McEvoy M, Wetter D, et al. Filling a critical practice gap: experience with a dermatology day treatment center at Mayo Clinic. *Int J Dermatol*. 2014;54(5):600–4.
- Lee E, Koo J. Modern modified “ultra” Goeckerman therapy: a PASI assessment of a very effective therapy for psoriasis resistant to both prebiologic and biologic therapies. *J Dermatol Treat*. 2005;16(2):102–7.
- Koo J, Lebwohl M. Duration of remission of psoriasis therapies. *J Am Acad Dermatol*. 1999;41(1):51–9.
- Ho J, Chern E, Yau D, et al. Positive effect of modified Goeckerman regimen on quality of life and psychosocial distress in moderate and severe psoriasis. *Acta Dermato Venereol*. 2011;91(4):447–51.
- Dennis M, Bhutani T, Koo J, Liao W. Goeckerman therapy for the treatment of eczema: a practical guide and review of efficacy. *J Dermatol Treat*. 2011;24(1):2–6.
- Sorenson E, Levin E, Koo J, Berger TG. Successful use of a modified Goeckerman regimen in the treatment of generalized prurigo nodularis. *J Am Acad Dermatol*. 2015;72(1):e40–2.
- Roelofzen J, Aben K, Oldenhof U, et al. No increased risk of cancer after coal tar treatment in patients with psoriasis or eczema. *J Invest Dermatol*. 2009;130(4):953–61.
- Madan R, Levitt J. A review of toxicity from topical salicylic acid preparations. *J Am Acad Dermatol*. 2014;70(4):788–92.
- Pittelkow M, Perry H, Muller S, Maughan W, O'Brien P. Skin cancer in patients with psoriasis treated with coal tar: a 25-year follow-up study. *Arch Dermatol*. 1981;117(8):465–8.