of broken hairs. The second trichoscopic finding is hair dye; if hair is improperly washed, dye can deposit on the scalp and may even penetrate the follicular ostia. While hair dye deposits can be confused with dirty dots, they are usually more diffuse and cannot be removed with shampooing.5

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Effect of Microneedle Pretreatment on Topical Anesthesia: A Randomized Clinical Trial

Microneedles are microscopic needles capable of creating microchannels through the stratum corneum to improve transdermal drug delivery.1-3 Microneedles have been shown to enhance the delivery of topical anesthetics with use of in vitro and animal models. In this split-body, randomized clinical trial, we investigated whether pretreatment with microneedles enhanced the anesthetic effect produced by topical lidocaine cream, 4%.

Methods | This study was approved by the institutional review board at the University of California, Davis. The participants provided written informed consent and received financial compensation. A summary of the study protocol is available in the Supplement and registered at clinicaltrials.gov (NCT02596750).7 Twenty-one men (mean [SD] age, 29 [1.9] years) were recruited from January 12 to May 1, 2015; there were no reported allergies to topical or injected anesthetics. Previous studies8 indicated that women have a higher pain tolerance than men, so only men were recruited to delineate pain improvement. In a binary design, participants were randomized by coordinators who did not perform the treatments, and the participants’ identity was revealed to the investigators on recruitment to receive pretreatment on each volar forearm with either an MR2 (0.2-mm) microneedle roller (Clinical Resolution Laboratories, Inc) or a sham microneedle roller containing no microneedles (Figure 1). Participants remained blinded throughout the study. Topical lidocaine cream, 4%, was applied to both arms. Each participant served as his own control, and pain was assessed using a spring-loaded needle lancet (LifeScan, Inc) at an identical site on both volar forearms at 2, 5, 10, and 30 minutes. A power analysis showed more than 90% power in discerning a 6-mm difference on the 100-mm pain visual analog scale at the 30-minute time point (primary end point) scale with significance set at P < .05. Differences at 2, 5, and 10 minutes were secondary end points. Participants graded pain after microneedle or sham treatment and pain stimulus using a 100-mm visual analog scale, which also served as a secondary end point. Statistical analyses were performed with 1-way analysis of variance. Data analysis was performed from June 16 to July 1, 2015.

Results | There were no dropouts and the intent-to-treat population was equivalent to the evaluable population in this study. All participants completed all study procedures. Needle lancet pain with microneedle pretreatment was significantly decreased at 30 minutes (microneedle: mean [SD], 4 [1.3] mm; sham: 14.4 [3.8] mm; P < .05) but not at earlier times (Figure 2A). When stratifying the data for participants who were more sensitive to pain (scores >20 mm on the visual analog scale), the pain level resulting from microneedle pretreatment followed by a spring-loaded needle lancet was significantly decreased at 10 and 30 minutes (P < .05) (Figure 2B).

Discussion | Results of this study indicate that pretreatment with microneedles improves the onset of lidocaine cream, 4%, anesthesia. These results are clinically significant since
topical lidocaine cream, 4%, is typically used to produce anesthesia 60 minutes after application.4,6 Our results suggest that the use of microneedle pretreatment can reduce the incubation time to 30 minutes—perhaps even to 10 minutes in more pain-sensitive individuals—to achieve sufficient anesthesia for needle insertion.

Our study has several limitations. First, the pain stimulus was needle based and it is not known how laser- or scalpel-based pain would have been altered. Second, our study was limited to men; future studies should include women. Finally, this study evaluated pain on the volar forearms, but pain sensitivity can vary by anatomical site. Because the participants served as their own controls and the anatomical site at each pain assessment had a symmetrically placed control, the role of the site was minimized. The study should be repeated using other anatomical sites.

Randomized clinical trials should be conducted with laser- or scalpel-based stimuli to simulate other dermatologic procedures. In particular, studies in a pediatric population can help clarify the role of microneedle pretreatment in topical anesthesia before invasive procedures. Regardless, the findings of this study are promising, showing that microneedles offer a minimally painful method of enhancing the effects of topical anesthesia.

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Association of Dermatology Consultation With Accuracy of Cutaneous Disorder Diagnoses in Hospitalized Patients: A Multicenter Analysis

Limited information exists on the activity and impact of hospitalist dermatology consultative services or the nature of dermatologic issues affecting inpatients across US academic medical centers.1-4 We performed a retrospective,