sis, and interpretation of data; or in the preparation, review, or approval of the manuscript.

Additional Contributions: Chaya R. Spears, MA, and Thomas A. Arcury, PhD, assisted with this article.

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PRACTICE GAPS

Failing to Clarify Treatment Action Plans With Mom in Pediatric Atopic Dermatitis

The report by Fenerty et al highlights common difficulties in physician-patient interaction that can directly impact adherence to desired treatments, in this case for atopic dermatitis. This group and others have studied adherence to treatment regimens in the past. The gap highlighted in this publication is communication. Physicians have long assumed that information given during office or hospital visits will be carried out appropriately. More recently, as reported by Sleath et al,[1] the use of a shared decision-making model in the clinical arena has been stressed by the US Institute of Medicine. The concept of patient-centered care is now common practice in many areas.

Involvement of the caregiver is critical to successful treatment. The authors highlight that mothers are the usual caregivers for their children's medical conditions. They appropriately highlight measures such as discussing the disease process and administration of medication as being key to successful therapies. Families do not routinely feel comfortable with the overall management of their children's skin disease.[2] Taking time to engage the caregivers and (when feasible) the patients in these discussions is critical.[1] Awareness of cultural and other family needs must be included. Demonstrating topical application methods or physically identifying specific areas for application may better clarify verbal or written instructions. Any concerns that the family or patient might have must be elicited and addressed by the physician, a process often requiring strong communication skills.

These practices are not new and have been used in the management of other diseases such as asthma, where identical measures have proven their efficacy. An additional adherence enhancement tool that I have used successfully in my practice for many years for pediatric patients with atopic dermatitis is a treatment action plan (eFigure; http://www.jamaderm.com.) that outlines, in stepwise fashion, interventions for care. These plans can be used for some families with careful explanation in addition to each of the measures suggested by Fenerty et al.

As physicians, we must engage our patients and their caregivers in the care of all disorders, including atopic dermatitis. This requires additional time and training for some. The practice, however, has demonstrated efficacy.[1] Spending the extra time initially might lead to less time needed in follow-up.

To close the communication gap between physicians and the caregivers for their pediatric patients requires that we, as practitioners, be willing to take the time and effort to do so. Engaging our staff in this effort is key, as well. This practice is key to the principle of shared decision making and can result in better overall clinical outcomes.

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Conflict of Interest Disclosures: None reported.
Online-Only Material: The eFigure is available at http://www.jamaderm.com.

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RESEARCH LETTERS

Enhanced Skin Self-examination: A Novel Approach to Skin Cancer Monitoring and Follow-up

Advances in mobile telephone technology and available dermoscopic attachments for mobile telephones have created a unique opportunity for consumer-initiated mobile teledermoscopy. At least 2 companies market a dermoscope attachment for an iPhone (Apple), forming a mobile teledermoscope. These devices and the corresponding software applications (apps) enable (1) lesion magnification (at least ×20) and visualization with polarized light; (2) photographic documentation using the telephone camera; (3) lesion measurement (ruler); (4) adding of image and lesion details; and (5) e-mail data to a teledermatologist for review. For lesion assessment, the asymmetry-color (AC) rule has 94% sensitivity and 62% specificity for melanoma identification by consumers.[1] Thus, consumers can be edu-

Table 1. Participant Characteristics and Feasibility of Mobile Teledermoscopy

Participant Characteristics and Study Survey Items	Participants, No. (%) (n = 10)
Sex	
Male	6 (60)
Female	4 (40)
Age, y	
31-40	4 (30)
41-50	3 (30)
51-60	0
≥61	3 (30)
Educational attainment	
Trade or technical certificate	5 (50)
University or college degree	5 (50)
Work	
Full time (including self-employed)	8 (80)
Part time or casual	1 (10)
Retired	1 (10)
Marital status	
Married/living together	6 (60)
Divorced/separated	1 (10)
Single/never married	3 (30)
History of melanoma	
Personal history	8 (80)
First-degree relative with history of melanoma	2 (20)
Natural hair color at age 21	
Fair or blonde (including white)	1 (10)
Red (including auburn)	1 (10)
Light or mouse brown	3 (30)
Dark brown	4 (40)
Black	1 (10)
Eye color	
Blue, greenish blue, or gray	3 (30)
Green or hazel	5 (50)
Brown or black	2 (20)
Moles	
None	0
Few	3 (30)
Some	2 (20)
Many	5 (50)
"Have you or someone who is not a doctor ever deliberately checked your skin for early signs of skin cancer?"	
Yes	7 (70)
No	3 (30)
"On a scale of 1 (not confident) to 10 (highly confident), how confident are you that you can check your skin correctly for skin cancer?"	
1-4	3 (30)
5-7	6 (60)
8-10	1 (10)
"On a scale of 1 (not confident) to 10 (highly confident), how confident are you photographing any skin lesions you find suspicious or may wish to monitor?"	
1-4	1 (10)
5-7	5 (50)
8-10	4 (40)

(continued)

cated to recognize asymmetry and color patterns in suspect lesions. However, we know little about consumers' use of mobile teledermoscopy for lesion assessment.

Methods. Our objective was to assess the feasibility of consumer mobile teledermoscopy to potentially complement skin self-examination (SSE). We documented satisfaction with SSE and AC rule education, mobile teledermoscopy, and mobile teledermoscopy outcomes (number of e-mailed lesions per participant, image quality, lesion diversity, and lesion location). We recorded the likelihood of malignancy and need for further follow-up (excision, biopsy) after telediagnosis.

Ethical clearance was granted by the Human Research Ethics Committee at Queensland University of Technology (QUT 1100001392) and Metro South Health Service District from the Princess Alexandra Hospital (PAH) (PAH HREC/09/QPAH/126/AM02). This study was part of the larger PAH Nevi Surveillance Study (NSS). The convenience sample consisted of 10 NSS participants, 18 years or older (4 women, 6 men), with a personal or family history of melanoma, atypical

Table 1. Participant Characteristics and Feasibility of Mobile Teledermoscopy (continued)

Participant Characteristics and Study Survey Items	Participants, No. (%) (n = 10)
Feasibility Findings	
"Did you conduct SSE following the study instructions?"	
Yes	8 (80)
No	2 (20)
"In the next 12 mo, do you intend to thoroughly check your skin for early signs of skin cancer?"	
Yes	10 (100)
No	0
"Conducting a thorough SSE was easy."	
Agree	6 (60)
Disagree	4 (40)
Unsure	0
"I will continue examining my skin in the future."	
Agree	8 (80)
Disagree	1 (10)
Unsure	1 (10)
"I could easily attach the dermoscope to the iPhone."	
Agree	7 (70)
Disagree	1 (10)
Unsure	2 (20)
"Taking photos with the dermoscope attachment was easy."	
Agree	8 (80)
Disagree	2 (20)
Unsure	0
"The procedures for taking photos were clearly explained."	
Agree	9 (90)
Disagree	1 (10)
Unsure	0
"The procedures for sending photos to the dermatologist were clearly explained."	
Agree	9 (90)
Disagree	0
Unsure	1 (10)
"Having the dermoscope has motivated me to do skin examinations on myself more regularly."	
Agree	6 (60)
Disagree	2 (20)
Unsure	2 (20)
"I intend to purchase a dermoscope for myself in the future."	
Agree	4 (40)
Disagree	5 (50)
Unsure	1 (10)
"Instructions to look for asymmetry and color (AC rule)"	
Highly Satisfactory	4 (40)
Satisfactory	6 (60)
"Would you wish to use photos to assist you in checking your own skin in the future?"	
Yes	8 (80)
No	2 (20)
Don't know	0
"Would you wish to send photos to a doctor to assist you in checking your own skin in the future?"	
Yes	7 (70)
No	2 (20)
Don't know	1 (10)

Abbreviations: AC, asymmetry-color; SSE, skin self-examination.

nevi, or multiple moles. Experience with a smartphone was not necessary. The study was conducted from November 2011 to May 2012.

Participants completed a survey on sociodemographic characteristics, risk factors, and SSE practice and then received the following materials to use for home SSEs: (1) a booklet explaining the AC rule and SSE instructions and a body chart to record lesion locations; (2) the mobile teledermoscope comprising an iPhone 3 (app preloaded) attached to a Handyscope (FotoFinder Systems); and (3) additional image information and instructions for photographing and e-mailing the photographs to researchers.

Guided by the AC rule, participants photographed lesions found during SSE. The teledermatologist (H.P.S.) reviewed the images for quality and telediagnosis. Participants had 1 week to complete the SSE and photograph submission, and all used the same mobile teleder-

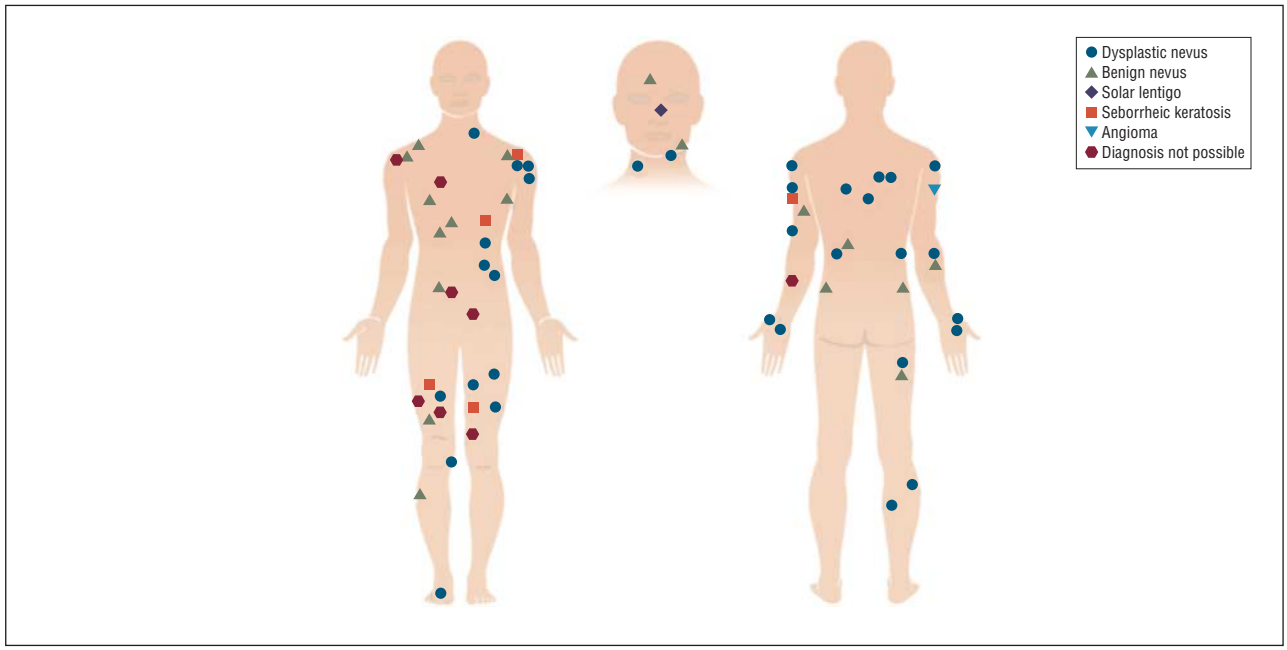

Figure 1. Locations of skin lesions on study participants.

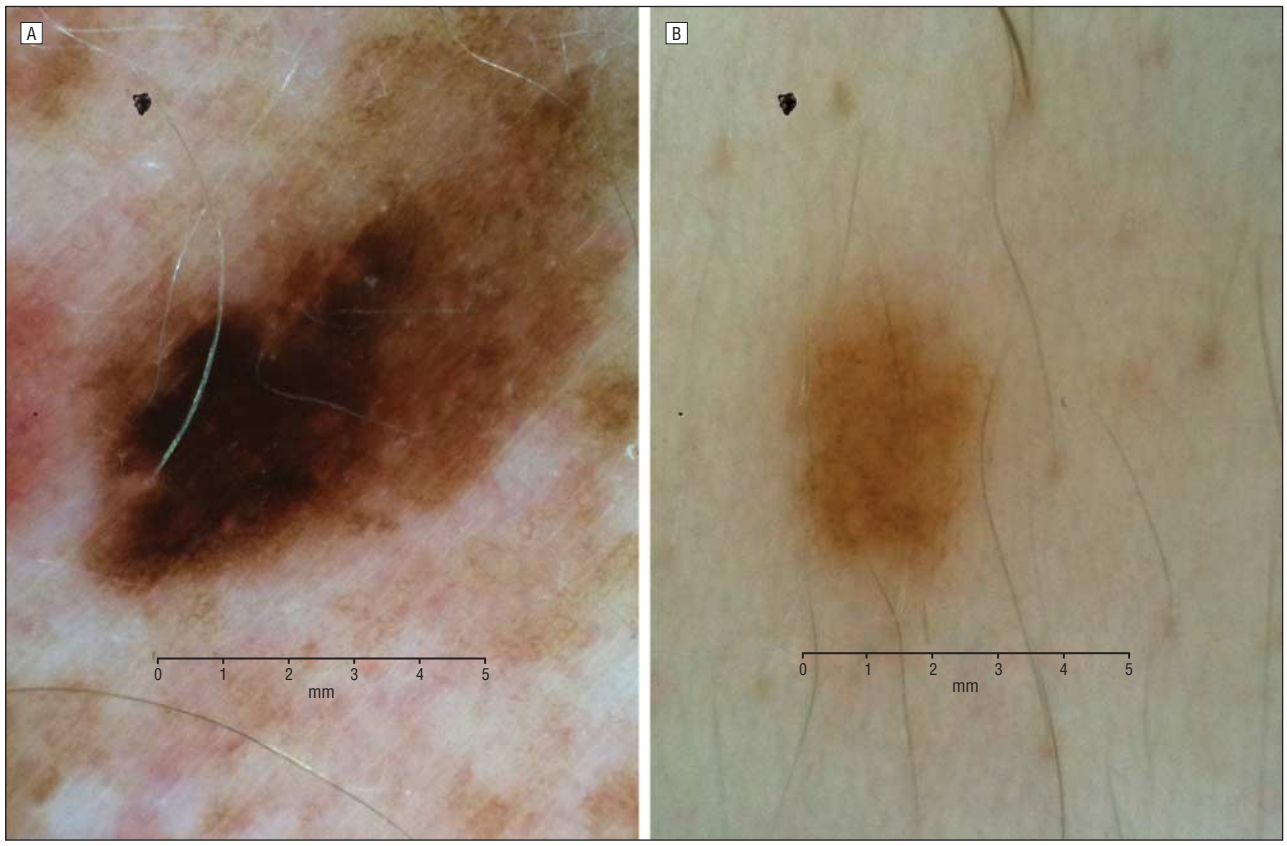

Figure 2. Teledermatology images used for diagnosis. A, Dysplastic nevus, likelihood of malignancy and need for excision, both 4 of 5. B, Benign nevus, likelihood of malignancy and need for excision, both 1 of 5.

moscope. They mailed the body chart along with a follow-up survey on satisfaction with mobile teledermoscopy and its usefulness for SSE.

Results. Participant characteristics and feasibility findings are listed in **Table 1**. Participants submitted 66 photographs (mean, 6.6 photographs per participant; range, 2-12 photographs). Most photographs were of good quality (88%), allowing the following telediagnoses: 33 dysplastic nevi (50%); 18 benign nevi (27%); 5 seborrheic keratoses (8%); 1 solar lentigo (2%); and 1 angioma (2%). Lesion types and locations are illustrated in **Figure 1**,

Table 2. Teledermatologists' Evaluations Based on Patient-Provided Photographs

Telediagnosis From Photographs	Lesions/Photographs, No. (%) (n = 58)[a]
Likelihood of malignancy	
1 Very unlikely	27 (47)
2	26 (45)
3	4 (7)
4	1 (2)
5 Very likely	0
Recommended excision	
1 Not at all	27 (47)
2	26 (45)
3	4 (7)
4	1 (2)
5 Strongly	0

[a]While 66 photograph were submitted, only 58 allowed a teledermatologist's evaluation.

example lesions in **Figure 2**. Most lesions were rated as having a low likelihood of malignancy, not needing excision (**Table 2**).

Comment. Routine SSE potentially improves melanoma early detection; however, SSE sensitivity is low (25%-93%), and specificity is higher (83%-97%).[2] Only recently has patient-performed dermoscopy been proposed to complement SSE. Goulart et al[3] reported 2 cases of consumers who independently purchased conventional dermoscopes and, without training, detected a melanoma and a dysplastic nevus. Now that smartphones are becoming ubiquitous, the commercial availability of dermoscopy attachments likewise may increase consumer-initiated mobile teledermoscopy. Some researchers have noted that sensitivity may decrease among untrained physicians using dermoscopes compared to evaluation using the naked eye,[4] but most studies have reported better sensitivity and specificity using dermoscopes than using the naked eye.[5] It will be important to carefully assess similar outcomes for consumers. Consumers might improve their sensitivity, but they might also misjudge a dangerous lesion as unremarkable or—probably the greater concern—overlook lesions completely (eg, those on hard-to-see areas).

We demonstrated that providing melanoma high-risk consumers with brief dermoscopy instructions and a mobile teledermoscope to examine skin lesions detected during SSE is feasible. Participants had few issues with the mobile teledermoscopy procedures. They were able to select atypical moles for photographs; yet they also selected benign nevi, indicating the need for more training about benign nevi[3] or optimization of the technology.

Advantages of mobile teledermoscopy are convenience (scheduling, travel) and rapid telediagnosis from the teledermatologist.[6] Disadvantages are availability of dermoscope attachments (currently for smartphones only), and cost, both of which may limit consumer use. Other barriers for consumers may include access to technology and a teledermatologist,[7] low health literacy precluding self-education, and concern about identification of most worrisome lesions. For dermatologists, preference for detailed medical history taking and tactile assessment of lesions, time, funding and medical-legal risk may represent barriers. Still, for high-risk consumers, mobile teledermoscopy may be a useful SSE tool, meriting further study. This study represents the first phase of our consumer mobile teledermoscopy research program.

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Accepted for Publication: September 6, 2012.
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Author Contributions: All authors had full access to all of the data in the study and take responsibility for the integrity of the data and the accuracy of the data analysis. *Study concept and design:* Janda, Loescher, and Soyer. *Acquisition of data:* Janda. *Analysis and interpretation of data:* Janda, Loescher, and Soyer. *Drafting of the manuscript:* Janda and Loescher. *Critical revision of the manuscript for important intellectual content:* Janda, Loescher, and Soyer. *Statistical analysis:* Janda. *Obtained funding:* Janda. *Administrative, technical, and material support:* Janda and Loescher. *Study supervision:* Janda and Soyer.
Conflict of Interest Disclosures: Dr Soyer is cofounder and shareholder of E-derm Consult GmbH. He is also shareholder and reports for MoleMap by Dermatologists Ltd.
Funding/Support: This study was supported in part by National Health and Medical Research Council of Australia (NHMRC) Practitioner Fellowship APP1020145 (Dr Soyer), NHMRC grant CDA 553034 (Dr Janda), and the Queensland University of Technology Institute of Health and Biomedical Innovation.
Role of the Sponsors: The sponsors had no role in the design and conduct of the study; in the collection, analysis, and interpretation of the data; or in the preparation, review, or approval of the manuscript.
Additional Contributions: We thank the Pan-Pacific Skin Cancer Consortium for providing the foundation for our research team.

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Influence of Cyclosporin and Prednisolone on *RAGE*, *S100A8/A9*, and *NFκB* Expression in Human Keratinocytes

Squamous cell carcinoma (SCC) is the most common neoplasm among immunosuppressed patients.[1] The immune system plays a prominent role in tumor development. The role of *RAGE* and its extracellular heterodimeric ligand *S100A8/A9* in the development of SCC has recently been suggested.[2] Because this pathway acts through the transcription factor *NFκB* and thus regulates inflammatory responses, its function may be of particular interest with respect to the development of skin cancer in immunosuppressed patients. Therefore, we aimed to analyze the impact of the most commonly used immunosuppressive agents (cyclosporin A and prednisolone) on *RAGE*, *S100A8/A9*, and *NFkB* expression.

Methods. After study approval from the institutional review board, human keratinocytes were obtained from normal skin of healthy volunteers. For the experiments, the cells were incubated with either cyclosporin A (CsA) (Novartis Pharma, Switzerland) or methylprednisolone (MP) (Sigma Aldrich, Switzerland) at different concentrations for 12 hours. The control cells were treated with vehicles only, ethanol and dimethyl sulfoxide for CsA and MP, respectively. After the incubation period, the cells were homogenized with TRIzol Reagent (Invitrogen) for subsequent messenger RNA (mRNA) extraction and quantitative reverse transcriptase–polymerase chain reaction analysis. Specific primers were used for *S100A8* (primer forward, GGGAATTTCCATGCCGTCT; primer reverse, CCTTTTTCCTGATATACTGAGGAC), *S100A9* (primer forward, CTGTGTGGCTCCTCGGCT; primer reverse, GCGTTCCAGCTGCGACAT), *RAGE* (Hs_AGER_1_SG) (Quantitect Primer assay; Qiagen AG), and *NFκB* (NF-κB-p65) (primer forward, CCCCACGAGCTTGTAGGAAAG; primer reverse, CCAGGTTCTGGAAACTGTGGAT). Samples were processed in triplicate with *36B4* (primer forward, GCAATGTTGCCAGTGTCTGT; primer reverse, GCCTTGACCTTTTCAGCAAG) as the internal standard. Expression of mRNA was calculated by the ΔΔ threshold cycle.[3] Significance was set at $P<.05$ (analysis of variance followed by Dunnett post hoc test). All experiments were performed 2 times independently.

Results. Methylprednisolone induced the expression of *S100A8*, *S100A9*, *NFκB*, and *RAGE* in human primary keratinocytes. Normal human keratinocytes cultured for 12 hours in the presence of different concentrations of MP (ranging from 0.1mM to 3.0mM), a potent anti-inflammatory and immunosuppressive drug, significantly increased the expression of the *S100A8* and *S100A9* mRNA, and the induction was more pronounced for the *S100A8* gene (**Figure 1**). At the concentrations tested, MP also significantly increased the mRNA expression of *RAGE* and its putative downstream target, *NFkB*.

Cyclosporin treatment increased mRNA levels of *S100A8* and *S100A9*. Analysis of the influence of CsA on the *S100A8/A9-RAGE* loop members in vitro demonstrated that this commonly used immunosuppressive drug is an inducer of *S100A8* and *S100A9* mRNA. Normal human keratinocytes exposed to relatively low concentrations of CsA, ranging from 1μM to 10μM, responded by increased expression of the heterodimer *S100A8/A9* (**Figure 2**). Only the highest CsA concentration slightly but significantly decreased the *RAGE* mRNA level however, most likely reflecting the cytotoxic effect of this concentration. Cyclosporin A had no influence on mRNA expression for the *RelA* subunit of the *NFκB* complex.

Comment. Multiple clinical phenomena suggest a close relationship between inflammation and SCC development.[1] It has been shown that inflammation is present at low levels in the microenvironment of in situ and invasive SCC of the skin.[4] The difference between this kind of chronic inflammation and acute inflammation lies probably in the orchestration of an effective antitumor immune response. Acute inflammation if strong enough is therapeutically used to treat SCC of the skin,[5] while chronic inflammation can be observed in SCC of the skin where a lack of antitumor defense may allow for tumor formation.

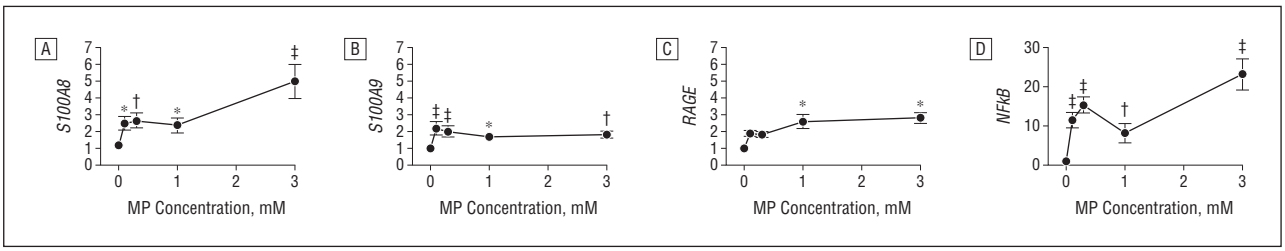

Figure 1. Methylprednisolone (MP) induced increased expression of several genes in cultured normal human keratinocytes. A and B, Real-time polymerase chain reaction analysis of messenger RNA (mRNA) showed up to 5-fold increased *S100A8* expression (A) and up to 2-fold *S100A9* expression (B) after 12 hours of incubation in different MP concentrations. C and D, In addition, MP upregulated the mRNA levels of *RAGE* by 3-fold (C) and *NFκB* up to 14-fold (D) in a dose-dependent manner. The graphs show mean (SD) relative expression. *$P<.05$; †$P<.01$; ‡$P<.001$.