Advances in medicine, as any other endeavor, are intimately dependent upon the communication and dissemination of new information among practitioners. Historically, physicians relayed the art of their practice anecdotally—teaching each subsequent generation verbally. Clearly, with the explosion of technology in the later part of the 20th century, the practice of medicine has also been dramatically and irrevocably altered. Concomitantly, the communication landscape, too, has been changed, evolving from the oral and then the written form into the electronic and digital spheres. In this era of a rapidly changing technology and its immediate access, there lies a significant risk of becoming dogmatic and unilateral in the way we learn and practice medicine.

In an effort to relay current innovations in an open dialogue with debate and exchange of ideas at the same time as maintaining the tradition of sharing experiences with colleagues, we inaugurate a new feature to Dermatologic Surgery. *The section, entitled "*Controversies in Dermatologic Surgery,*" will allow two authors to present opposing philosophy, technique, or approach for the same dermatologic surgical issue. While definitive answers may remain elusive, our goals are to stimulate debate, generate ideas, share pearls and perils, ultimately advance our specialty, and, most importantly, improve the quality of care.*

The opinions expressed in these dialogues are those of the author(s), and do not reflect the views of the section editors nor the Journal. *We welcome suggestions, comments, questions, and potential topics.*
Viva la difference! Please submit your manuscripts to: Seth L. Matarasso, MD, Associate Clinical Professor of Dermatology, University of California School of Medicine, 490 Post Street, Suite 700, San Francisco, CA 94102 or Jeffrey S. Dover, MD, FRCPC, Associate Professor of Dermatology, Harvard Medical School, 25 Boylstonl Street, Suite 104, Chestnut Hill, MA 02167.

Antibiotic Prophylaxes in Laser Resurfacing Patients

Over the past several years, laser resurfacing has become a widely utilized and successful technique in the treatment of facial rhytides, scarring, and photoaged skin. Laser resurfacing produces a superficial second-degree burn, and the extent of the wound healing period and the final cosmetic outcome depend on the preoperative and postresurfacing care regimes.[1] Bacterial infection after laser skin resurfacing compromises healing by extending the depth of the original wound and delaying reepithelialization, subsequently increasing the risk of scarring, persistent erythema, and dyschromias.[2] The types of infectious agents identified are similar to those reported for burn injuries and commonly include *Staphylococcus aureus*, *S. epidermidis*, and *Pseudomonas aeruginosa*.[3,4]

Oral antibiotics are routinely prescribed to prevent secondary bacterial infection, generally beginning 1-day preoperatively and continuing until reepithelialization has been completed.[5–12] Various prophylactic antibiotic regimens in laser resurfacing patients have been used, including semisynthetic penicillins (dicloxacillin), macrolide antibiotics (azithromycin), cephalosporins, and quinolones. There has been recent controversy in the dermatologic surgical community over the use of antibiotic prophylaxis in laser resurfacing patients.[13,14] Walia and Alster[14] recently reported a retrospective study which showed no significant reduction with the use of prophylactic antibiotics after laser resurfacing using the open dressing technique. The results are debatable, however, since the control group was small[13] and the treatment groups were not equal or randomized.

Laser resurfacing produces open wounds with copious drainage and extensive crusting. There is the additional component of underlying thermal damage that may lead to a localized immunosuppression, predisposing the patient to secondary infection.[15] The use of topical antibiotics to prevent infection by providing a bacteriostatic or bactericidal environment during wound healing is limited by the risk of contact dermatitis in laser-abraded skin, and most clinicians avoid their use.[2,6,9–10]

Narrow-spectrum antibiotics have been advocated as a first-line agent to lower the infection rate, while lessening the chance of emerging resistance, and lowering patient costs.[2,16] The incidence of bacterial infection after laser skin resurfacing with narrow-spectrum prophylactic antibiotic regimes has been low, with an overall risk of 1–2%.[2,6,7,11] A narrow-spectrum antibiotic is also less likely to cause colonization with gram-negative bacilli by producing the least disturbance to the endogenous flora.[2,17] Walia and Alster[14] found an infection rate of 24% in their series of patients treated prophylactically with intraoperative intravenous cephalexin and postoperative oral azithromycin. The most commonly cultured pathogen was *Enterobacter*, an uncommon cause of wound infection after laser resurfacing,[3] likely selected for by the broad-spectrum prophylactic regimen.[18] One of the penicillinase-resistant

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penicillins, such as dicloxacillin provides activity against gram-positive bacteria, especially *S. aureus*, the more likely pathogen.[2] Prophylaxes for gram-negative pathogens may be important with the prolonged use of occlusive dressings or for patients with risk factors for gram-negative infection.[2]

Patients undergoing full-face resurfacing and those using a bioocclusive dressing postoperatively have been shown to be at increased risk for infection.[1,3] Occlusive dressings maintain a moist environment over the layer of necrotic tissue, providing a medium for the growth of pathogenic bacterial organisms.[1,3] A dramatic increase in the rate of infection after laser resurfacing was seen by Sripachya-Anunt et al.[3] with the prolonged use of semiocclusive dressings and no systemic antibiotics. The infection rate in their series was 9.82% during a 4-month period when they used a Silon II semipermeable occlusive dressing for 3–5 days without systemic antibiotics. The rate of infection was decreased to 2.1% with an open method of wound care and prophylactic oral antibiotics. Manuskiatti et al.[5] reported a bacterial infection rate of 8.2% without antibiotic prophylaxis utilizing a closed postoperative wound technique for 1–2 days; the bacterial infection rate in their series decreased to 4.3% when patients were given prophylactic ciprofloxacin.

Antibiotic prophylaxis is recommended to prevent wound infections involving "clean-contaminated" wounds, especially when performing procedures involving perioral or perinasal skin.[12,19] Burn wounds are initially clean, but are rapidly colonized by endogenous and exogenous bacteria. Patients with staphylococcal colonization of their anterior nares are at greater risk for wound colonization and infection.[17] Environmental microorganisms and patient risk factors may also affect the incidence of wound infection[19] until reepithelialization occurs. The presence of a remote infection,[19] such as otitis externa secondary to P. *aeruginosa*,[2,10] exposure to health care workers or family members who are nasal carriers for *S. aureus*,[20,21] and exposure to pets may increase the risk for postoperative infection. Handling wound care products and emollients may also provide a reservoir for secondary infection.[11] Additional patient risk factors such as advancing age, obesity, diabetes mellitus, and corticosteroid administration may also influence the incidence of postoperative infection.[19] Patient education regarding environmental surveillance, meticulous wound care hygiene and handwashing techniques after laser resurfacing, in addition to systemic antibiotics, may help diminish the role of external sources of infection.[2,11]

We continue to advocate narrow-spectrum antibiotic prophylaxis and the open wound technique.[6,7,16] Given the increased risk of postoperative infection with the prolonged use of semiocclusive dressings, appropriate antibiotic coverage (Gram negative and positive) remains imperative[1,3,5] and is not debatable. The standard of care, however, in patients treated with the open method of wound care will likely remain controversial in the dermatologic surgical community until a large-scale, randomized controlled prospective study or well-designed observational cohort study[22] is performed. Regardless of the use of a prophylactic antibiotic regimen in laser resurfacing patients, diligent postoperative wound care and careful patient follow-up are mandatory.

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Against Antibiotic Prophylaxis for Cutaneous Laser Resurfacing

Cutaneous laser resurfacing has become a popular and well-accepted treatment for a variety of skin lesions and carries a relatively low risk of significant side effects and complications.[1,2] Because of the integumental injury produced by the procedure, it is not surprising that bacterial and viral infections have been reported. As infected wounds do not heal properly, concerns have been raised about the effect of infection on the development of prolonged postoperative erythema and the ultimate risk of scarring.

Antimicrobial prophylaxis for any surgery is deemed necessary in situations where there is a high risk for postoperative infection and/or when the anticipated postoperative infection is potentially severe. The use of antibiotics must be weighed against the potential costs, both literally and in terms of antimicrobial resistance, toxicity, and allergenicity. Despite the fact that the incidence of infection after clean-uncontaminated and clean-contaminated surgery is less than 5% and 10%, respectively,[3] and infection rates reported after laser resurfacing have been even lower (ranging from 0.4 to 4.5%),[1,2,4] physicians often advocate their use. Recent research and reports in the medical literature, however, have failed to justify this practice with respect to cutaneous laser resurfacing.

Fitzpatrick and Goldman's group first reported post-laser infection rates of 4.3% with the use of prophylactic ciprofloxacin compared to 8.2% without antibiotic prophylaxis.[4,5] The differences seen could have been explained by the various postoperative wound care and ancillary procedures prescribed, thus providing a weak basis on which to make appropriate antibiotic recommendations. A prospective pilot study of eight full-face laser resurfacing patients by Ross et al.,[6] in which 50% of those who received no antibiotics suffered a superficial wound infection, led the authors to recommend the use of prophylactic narrow-spectrum antibiotics for these procedures. On the other hand, reporting on a series of 133 consecutive full-face CO_2 laser procedures, Walia and Alster[7] showed no significant increase in infection rates with the use of prophylactic oral and/or intravenous antibiotics either in the peri- or postoperative period. In fact, concerns were raised in this latter study about suprainfection with organisms of increased pathogenicity when antibiotics were prescribed, as the most commonly cultured organisms included *Pseudomonas* and *Enterobacter* species. These latter findings are in accordance with those reported in the burn literature, where the use of systemic antibiotic prophylaxis has not been shown to reduce the incidence of infections, complications, or mortality rates.[8–11] It appears, in fact, that improved survival rates of burn victims is most dependent on good wound care, a concept also strongly supported by dermatologic surgeons for a number of outpatient surgical procedures.[12]

It is interesting to note that in a recent poll of 885 plastic and cosmetic surgeons who regularly perform laser resurfacing procedures, 40% of respondents did not routinely prescribe prophylactic antibiotics for the procedure, with no apparent increase in the rates of infection.[13] In addition, consultants for the *Medical Letter on Drugs and Therapeutics* have concluded in their exhaustive review of available literature that not only were "postoperative [antibiotic] doses generally unnecessary," but "the small number of wound infections that would be prevented by antimicrobial prophylaxis" and "the potential adverse effects of using prophylaxis in such a large number of procedures" mitigated against their use.[14]

Of course, the above discussion applies solely to antibacterial prophylaxis. It remains standard practice to prescribe prophylactic antiviral therapy for all patients undergoing full-face and/or perioral laser skin resurfacing, regardless of personal herpetic histories, in order to reduce the risk of postoperative herpetic infection.[15] Not only is the incidence of herpes simplex virus development higher (than bacterial infection) after laser skin resurfacing, but the risk of drug-related toxicities/side effects is also very low, providing ample support for their use.[16]

The role of antibiotic prophylaxis in cutaneous laser resurfacing thus has not been fully elucidated and will remain an area of controversy until more definitive large-scale prospective and controlled studies are performed. In the meantime, however, based on the evi-

dence to date, I have discontinued the prophylactic administration of antibiotics to laser resurfacing patients in my practice, except in those instances where the risk is high for infectious-related complications (eg, mitral valve prolapse with regurgitation, valvular heart disease, prosthesis, immunosuppression). It is important that antibiotic prophylaxis not be used as a substitute for precise surgical technique, close postoperative follow-up, and meticulous wound care. Early diagnosis and intervention for suspected infection remain key elements in reducing further adverse sequelae and optimizing final clinical outcomes, regardless of whether prophylactic antibiotics are used. Given the relatively low risk of the surgery compared to antibiotic administration, not to mention the elective nature of most laser resurfacing procedures, it would be a tragedy for a patient to experience an antibiotic-related mishap, which could range from drug resistance or toxicity to allergy and anaphylaxis.

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