Keloid scars—fibrous overgrowths that occur in sites of previous skin injury—are composed of excess collagen and often extend beyond the borders of the original wound (Figure 1). Keloids often develop soon after injury but can also occur up to several years following the initial traumatic insult. Common causes include surgical procedures, piercings, vaccinations, lacerations, and burn injuries.¹

There is potential for all individuals (except albinos) to develop keloid scars; however, the greatest incidence is seen in patients of darker skin color. Keloids are most common in the second to third decades of life, and susceptibility decreases with age.²,³

Lesions are firm, pink to purple, and mildly tender. The most common anatomic sites to develop keloid scars include the anterior chest, shoulders, ear lobes, cheeks, and skin overlying joints. After development, keloid lesions continue to persist without spontaneous regression and have no malignant potential. Patients often complain of itchiness, pain, and abnormal sensitivity to touch. These symptoms, along with the contractures created from excessive scar formation, can be extremely uncomfortable for patients.²,³

The cause of keloid scar development is multifactorial, with a strong genetic component. Uncontrolled scar formation is due to aberrant wound healing following any injury to the deep dermis. Normal wound healing depends on the fine balance between extracellular matrix deposition and degradation. However, in keloid scars, there is overexpression of specific growth factors and inflammatory molecules that stimulate fibroblasts to increase collagen synthesis.¹,³

Current Therapies
While multiple treatment modalities exist for treating keloid scars, no single method is proven to be widely effective. Steroid injections directly into keloids (intralesional) are the mainstay treatment method and are usually well tolerated by patients; however, approximately 50 percent of lesions recur after treatment.¹,⁴ Alternatively, contact cryosurgery using liquid nitrogen to “freeze” the lesion is moderately effective, but patients may require up to 20 treatments.⁵-⁹ Often, these two methods (contact cryosurgery and intrale-
INTRALESIONAL CRYOSURGERY AS A NOVEL TREATMENT

Intralesional cryosurgery, introduced in the early 1990s, is a treatment that allows for a focused destruction of keloid scar tissue with minimal damage to the surface of the skin.11 Most recently, a uniquely designed needle probe has been developed (CryoShape®).9 After proper local anesthesia is achieved, the probe is inserted into keloid scars and attached to a liquid nitrogen source (a cryogun). As liquid nitrogen passes through the needle, a lethal zone (<22°C) is created around the inserted probe which is situated deep in the scar tissue, thereby directly destroying the cells that produce keloids.12 This is in contrast to traditional contact cryosurgery, which forms a lethal zone on the surface of the skin, often leading to blistering, loss of pigmentation, and inadequate penetration to the deeper tissue structures.7,9

Immediately after treatment, patients experience redness, swelling, and blister formation. After approximately one month, the wound is healed with a flat, slightly thinned scar. Since the surface of the skin is mostly spared from the intralesional cryosurgery technique, there are minimal cosmetic side effects (Figure 2).9,12

Several studies9,13–16 have examined the safety and efficacy of intralesional cryosurgery for treating keloid scars. There is a significant reduction in objective parameters, such as scar volume, deformity, hardness, and redness. Microscopically, the scar architecture is transformed into a more organized arrangement.9 Notably, this treatment also decreases subjective concerns including tenderness, itching, and aesthetic discomfort.14 Patients experience better results and shorter healing time compared to the contact cryosurgery technique.17

CONCLUSION

The treatment of keloid scars continues to be a challenging clinical scenario. Intralesional cryosurgery is shown to reduce the size of keloid scars and eliminate the symptoms associated with abnormal scar formation. Intralesional cryosurgery is a novel, safe, and highly efficacious technique recommended for clinicians and patients striving to minimize both the appearance and discomfort of these physically and psychologically damaging lesions. ■

The authors have no relevant disclosures.

Adam Luber, BA is a Clinical Research Fellow at the Mount Sinai School of Medicine Department of Dermatology.

Gary Goldenberg, MD is an Assistant Professor of Dermatology and Pathology at the Mount Sinai School of Medicine Departments of Dermatology and Pathology.