

# A New Approach for the Prophylactic Improvement of Surgical Scarring: Avotermin (TGFβ3)

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## KEYWORDS

- Avotermin • Transforming growth factor β3
- Cicatrix • Scarring • Surgery

## PATIENTS ARE CONCERNED ABOUT SCARRING FROM ELECTIVE AND AESTHETIC SURGICAL PROCEDURES

Scarring following aesthetic plastic surgery is a major issue for surgeons and their patients. The authors recently collaborated in a research survey investigating concerns about scarring in two groups:<sup>1</sup> United States patients who recently had undergone a routine surgical procedure (97 in total) and<sup>2</sup> plastic and dermatological surgeons conducting aesthetic procedures (24 in total). The survey confirmed that patients and clinicians are concerned with surgical scars and that patients in particular value any opportunity to improve or minimize scarring.<sup>3</sup> Overall, 60% of patients were dissatisfied with scars resulting from their recent surgery, with similar rates of dissatisfaction seen in patients with different gender, age, and ethnicity. Although the patients surveyed indicated that they were concerned with scars on visible body sites, they also identified scar(s) over a range of body sites (visible and nonvisible) that they wished were less noticeable. Data from the survey raised questions about the accuracy of gender

stereotypes on the acceptability of scarring. Although half (48%) of the patients said that it is acceptable for a man to have a scar, only 25% thought that it was acceptable for a woman to have a scar. When patients were asked about their own scars, however, a very different picture emerged. Most (greater than 90%) of both men and women indicated that they wished their own scars were less noticeable, and more than one third of men admitted that they had tried to conceal their scar.

The clinician survey showed that plastic surgeons and aesthetic dermatologists have a high awareness of patients' concerns, with 96% agreeing that scarring was a concern for most of their patients and 100% agreeing that they always attempt to prevent/improve scarring when conducting a surgical procedure. The surveys, however, revealed issues in the communication between patients and clinicians regarding scars. The survey showed that most patients had expected the scar resulting from their recent surgical procedure to be less noticeable than it was, but only 64% of patients had discussed the

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possibility of scarring with their surgeon. Overall, 71% of patients agreed that they were more concerned with scarring than their surgeon, and 60% said that their surgeon could be more sensitive to how they felt about their scar from a recent surgical procedure. Patients were very sensitive and valued any opportunity to improve scars. Overall, 91% agreed that even a small improvement in scarring on a visible site would be worthwhile. To address patients' expectations about scarring, surgeons need to clearly communicate the possibility and severity of scarring following surgery, and demonstrate that they are doing all that is possible to reduce scarring, irrespective of how small the final scar might be.

The management of patients' expectations about scarring following aesthetic procedures is a complex area. The perceived severity of a surgical scar is influenced by three dimensions (**Fig. 1**):

- The surgical technique undertaken (and, of course, the expertise of the surgeon)
- The objective appearance of the scar (influenced by a range of biological and wound factors)
- The overall impact of the scar on the patient

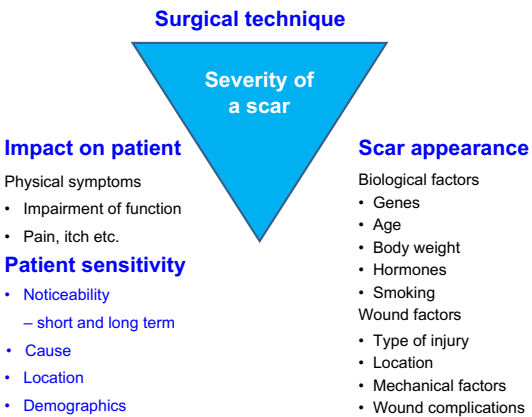
The impact of the scar can be related to impairment of function and physical symptoms such as chronic pain and itching. The sensitivity of the patient to the scar is a major factor influencing the perception of severity, however. Objectively, the noticeability of a scar depends on how closely it blends with surrounding normal skin, both in the short and longer term. Studies and the authors' clinical experience, however, indicate that patients' anxiety and self-consciousness about their scars do not correlate with the severity of the scar.<sup>1,2,4</sup> One patient with a relatively minor

scar may suffer as much anxiety as another with a severely disfiguring scar. Patient sensitivity can be influenced by the cause of the scar and whether it is the legacy of a traumatic event or illness. Scar location is another factor influencing patient sensitivity, as it determines whether the scar is visible. Visible, however, is also a subjective concept that varies according to social situation (eg, a scar that is not visible in a professional context may be revealed during sport or leisure activities). In the patient survey discussed previously, scars on a range of body sites (both visible and non-visible) caused patients concern, and nearly one third of patients indicated that they would be embarrassed to have a scar that was seen only by their partner. Demographics and the cultural context of the patient also have a major influence on sensitivity to scarring, particularly in societies where there is pressure to conform to an idealized appearance.

SCARRING IN THE MODERN SURGICAL CONTEXT

The optimal outcome of wound repair is the complete restoration of normal (unwounded) skin architecture, strength, and function. The major evolutionary forces shaping the cellular and molecular mechanisms underlying adult wound healing were directed at walling off foreign bodies and infectious agents, and rapidly replacing missing tissue with partly functioning repair tissue (ie, a scar). This response was driven by wounds with variable amounts of tissue damage that were exposed to dirty conditions, such as would be encountered in a primitive bite, blow, or other trauma. In this context, speed of healing was balanced against restoration of function so as to preserve the life of the animal.<sup>5</sup> These are not the kinds of wounds most commonly encountered today, however. Today, the most common injuries are those occurring during surgical repair, which involve sharp injuries made under sterile conditions with close approximation of the wound margins. The healing of surgical wounds to the skin has not been optimized by evolutionary forces and, within the modern surgical context, scarring can be considered an inappropriate response.

There is a high unmet need for therapies that are effective for reducing scarring following surgery. The latest statistics from the American Society of Plastic Surgeons show that almost 12 million cosmetic and 5.1 million reconstructive plastic surgery procedures were performed in the United States in 2007.<sup>6</sup> Statistics also reveal that there is a high demand for scar revision, which was the third most frequent reconstructive procedure conducted in the United States in 2007. When



**Fig. 1.** Three dimensions affecting the perceived severity of a surgical scar by a patient.

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