

# **Nonlinear Modeling of Venous Leg Ulcer Healing Rates**

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## **ABSTRACT**

**Purpose:** To evaluate the feasibility, accuracy and reliability of nonlinear regression models for use in analyzing the healing rates of venous leg ulcers (VLUs.)

**Methods:** We studied 3,588 serial wound tracings of 338 VLUs that had been followed during a controlled, prospective, randomized pivotal trial of two topical wound treatments, to determine whether the change in wound surface area over time fit a standard linear model or could be described through nonlinear mathematics.

**Results:** A majority of VLUs exhibited surface area reduction via an exponential decay model consistent with the mechanics of wound contraction and epithelial cell proliferation. Goodness-of-fit statistics suggested that much of the individual variation in healing could be described as nonlinear variation from the exponential model.

**Conclusions:** We have provided both simple and more sophisticated methodologies for using regression modeling in the assessment of wound healing data. We believe that parameter estimates from regression algorithms provide the most accurate quantification of wound healing rates, and that these parameters should be routinely used to compare the efficacy of various treatments in routine practice and in product registration trials.