

Noxsano® Animal Health Restore Wound Pads and Gels

Innovative technology uses nitric oxide to accelerate wound closure and prevent infection

THE PROBLEM

When an animal is injured or has a surgical incision, the primary goal is to close the wound quickly and return the animal to full health as soon as possible. Remediating and preventing infection that may complicate wound healing is also critical. Rapid healing reduces stress and lowers infection risk for the animal. Many treatments have proven useful in facilitating wound healing in human medicine, but most are prohibitively expensive for veterinary use.

We recognized an opportunity to improve wound healing outcomes in animals at a cost that the

pet owner could afford while also reducing the veterinary team's workload.

THE SOLUTION

We saw no need to invent a new

drug or chemical entity when effective but expensive solutions could be delivered more efficiently. We researched numerous studies in the literature to find an effective therapy that we could deliver at an affordable price and that could easily be packaged, produced and activated at the point of use. The answer: nitric oxide (NO), a natural biologic that the body produces. NO is a diatomic gas that has been used exogenously or topically in human medicine for more than 30 years and plays a critical role in regulating the wound healing process. NO is a biological messenger whose role in the wound healing cascade includes regulating the inflammatory process, initiating wound disinfection and stimulating angiogenesis and cell proliferation. When a wound occurs, thrombin activates endothelial NO synthase and triggers:

- **Antimicrobial action** — Post-coagulation, NO kills or removes

Jacob Adams, PhD

Dr. Adams leads product development and innovation at Noxsano and has published more than 20 scientific papers, patents and patent applications. His background includes development of topical actives for medical treatments, point-of-use activation of product benefits in fast-moving consumer goods and easily developable photoresists for use in microelectronics. He earned a PhD in organic chemistry from the University of Texas at Austin.



NOXSANO® ANIMAL HEALTH RESTORE WOUND PADS AND GELS



BEFORE



AFTER

pathogens in the wound bed to prevent infection. At low concentrations, NO functions as a signaling molecule to promote immune cell growth and activity. At high concentrations, NO activates nitrosative and oxidative reactions to induce broad-spectrum damage to pathogens. NO also controls immune cell signaling and biochemical reactions to protect against bacteria, fungi, viruses and parasites.

- **Wound repair** — NO upregulates endogenous collagenase expression to autolytically debride the wound and coordinate proliferation, differentiation and apoptosis in the numerous cell types involved in wound healing. NO stimulates endothelial cell proliferation to guide angiogenesis and increases blood flow and protein transport into the wound bed. In the final wound healing stages, NO coordinates increased collagen synthesis and deposition.

THE INNOVATION

NO is critical at every wound healing stage, and the challenge was to find a safe, efficient and effective system to deliver the correct amount that would facilitate healing at the wound bed. In human medicine, NO is delivered from a pharmaceutical at great expense or from a gas cylinder, requiring the patient be immobilized during treatment, which is not practical in veterinary medicine. We decided to create NO at the point of use utilizing precursors. NO can be generated from sodium nitrite through electrochemical reduction.

Sodium nitrite is an inexpensive salt commonly used as a meat tenderizer, but a controlled chemical reaction can produce NO when water is added to the product. Noxsano patented this process as the genesis for our product.

The product we send to the veterinarian does not arrive with NO, but once the veterinarian adds water, a chemical reaction produces it. Once activated, a biologically relevant NO level is generated over multiple days to increase blood flow, angiogenesis, proliferation and epithelialization, resulting in improved wound healing. Available products include:

wound bed and can be used alone or combined with other wound therapies.

- **Restore wound gel** — Restore wound gel, which is a hydrogel that can be applied directly to the wound bed, is ideal for large wounds or wounds in high-mobility areas where a secure bandaging may not be possible.

A recent clinical study of a canine model demonstrated that Noxsano products reduced healing time by up to 40%. Changing the pads and gel two to three times a week is recommended to reduce the total number of touch points and shorten overall healing time



THE DIFFERENCE MAKER

Noxsano® technology uses controlled generation of nitric oxide to accelerate wound closure and prevent infection. It speeds healing, reducing recovery time from minor injuries, incisions and even complex wounds.

- **Restore wound pads** — Restore wound pads are nonadherent and used with the veterinarian's secondary dressing choice. They are designed for multiple-day use (i.e., up to seven days), so less frequent dressing changes are required. The pads provide an ideal wound healing environment and contain hydrocolloidal components that aid in exudate management. Restore wound pads are available in multiple sizes, easily conform to the

compared with other wound healing products that require changing daily. While Noxsano pads and gel are extremely useful for managing large, complex wounds, these products can also help facilitate and speed healing of smaller wounds and surgical incisions.

Noxsano's innovative NO technology is an exciting new veterinary treatment that can accelerate healing and prevent infection in wounded and postsurgical patients.