



Nano Ex[®]

Touch your Health



Introduction

Mankind has always been in search of an effective way to heal wounds. Thus, taking care of wounds has undergone dramatic changes throughout history. The cave dwellers were amongst the first to treat and heal wounds using ointments and potions. Also, scientists such as Hippocrates and Celsius were amongst the first to write down instructions for treating wounds. Moreover, several scriptures from ancient Egypt dating back to 1400 years BCE were found concerning how to treat wounds.

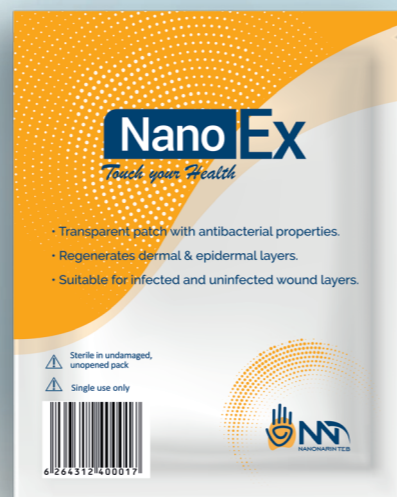
In ancient times, scientists had little knowledge and understanding of the pathophysiology of wounds, and the underlying mechanisms of their treatments, or how to manage the process of wound treatment. In the past centuries, however, following the First and the Second World Wars, there was a crucial need for discovering new treatments to decrease the mortality rate and the physical disabilities inflicted by the wars. Thus, human beings were obliged to conduct many sophisticated types of research to solve this problem. While aiming to reduce the pain of the patients and their families, NanoNarinTeb takes pride in introducing its NanoEx product as an innovative, cutting edge technology in wound dressing. Nano Ex is a biological dressing with a distinctive feature of reconstructing the deep layers of the skin (i.e., derma).

All the polymers used in the making of NanoEx are specifically designed to preserve their structural/biological properties while using toxic-free materials and avoiding destructive production methods. This product is made of a very transparent, flexible, 3D porous fiber, with a structure similar to the human skin. Additionally, this biological product has scaffolds similar to the structure of a normal extracellular matrix that provides suitable conditions for cell adhesion, reproduction, and migration. Moreover, NanoEx consists of a transparent layer of dressing, absorbent to the wound, which makes it not need to be removed or replaced. This product provides protection, is easy to use, and most importantly, is clinically acceptable. Besides, it can be used to heal wounds without any use of other medications or enzymes, especially in cases of chronic wounds such as diabetic ulcers, bedsores, etc.



• Properties

- 1- A biologic acellular wound dressing with a structure similar to the human skin
- 2- Antibacterial properties due to the presence of natural, non-toxic polymers
- 3- Low to moderate secretion absorption
- 4- Prevents and combats the formation of bacterial biofilms
- 5- Optimizes the moisture of the wound bed and prevents the maceration of healthy tissues
- 6- Cuttable
- 7- Flexible and adjustable to the shape of the wound bed
- 8- Possibility to check wounds due to the high transparency of the dressing
- 9- Absorbable to the wound
- 10- Regenerates dermal cells and accelerates the epithelialization process
- 11- Can be used for cavity wounds as it stimulates wound healing
- 12- Prevents scarring
- 13- Can be used on tendons and bones
- 14- Facilitate cell migration due to its porous 3D structure
- 15- Angiogenic properties
- 16- Easy-to-use
- 17- Painless and easy to change
- 18- Anti-inflammatory
- 19- Anti-irritant
- 20- Biocompatible



• Usage

- Burn wounds
- Diabetic foot ulcers
- Pressure ulcers (such as bedsores, etc.)
- Traumatic wounds
- Skin grafts
- Organ donation wounds
- Surgical wounds
- Tunneling wounds
- Infected and non-infected wounds
- Low to moderate drainage wounds

• Advantages of NanoEx Compared to other Similar Products

- Multifunctional, sterilized dressing, ideal for different types of wounds
- Absorbable to the wounds, and does not require removing
- Porous and breathable dressings with dermal repair properties
- Easy to see the wounds, exudates, and healthy skin; no need for unnecessary replacements of the dressing
- Shortens the healing time, and is ergonomic & economic
- Comfortable for patients
- Does not restrict the patients' movement, and it may be used in areas where joints are involved
- Forms a protective layer against microorganisms
- Multilayered and helps the slow releases of chemicals needed for wound healing



• Transparency

Wounds should continuously be monitored for infections, discharge, healing, etc. Yet, most dressings on the market fail to provide an in-depth view of the wound, which leads physicians to frequently changing the dressing even in times of unnecessary.

Having this objective in mind, NanoEx uses high quality raw materials, approved by the FDA, and is the result of highly sophisticated research aiming to provide maximum transparency to help both physicians and patients.

• Flexibility & Adjustability

Patients usually have to restrict their movements so that the wound dressings would not come off. This would negatively affect the patient's lifestyles. However, given the high sophistication of NanoEx, as well as its three dimensional porous design, this product could easily be adjusted to the shape of the wound; and consequently, not restricting the movement of the joints.

• Certificates

- Certified Europe (CE) certificate
- 1st class knowledge-based company certificate
- ISO 13485 Quality Management System (QMS) certificate
- The Ministry of Public Health manufacturing certificate

• 3D and Porous Structure

Every living tissue needs to exchange chemicals and fluids with its surroundings to stay alive. Also, every damaged tissue follows a specific three dimensional structural design during its reconstruction. Following this three dimensional structural design would eventually lead to the formation of a strong, elastic, natural, and healthy tissue.

Similarly, NanoEx follows a specifically engineered three dimensional design similar to the tissues of the skin, and contains multiple Nano-sized gaps, allowing it to exchange chemicals and fluids. Thus, giving the product the properties and structure of living tissues. This product enables the exchange of chemicals and oxygen with the healing skin. Moreover, due to its unique 3D structure, this dressing allows the placement of cells, as well as the extracellular materials and fluids in the correct location.

• Skin Immunity Booster & Anti-inflammatory

Besides being the largest organ of the body, the skin is one of the body's most important defense mechanisms against the entry of microorganisms and external damages. Damaging the skin would lead to the decrease of the efficiency of this defensive barrier, facilitating the entry of microorganisms that would result in infections and more severe reactions, both of which can have a significant impact on the healing process. In addition, through entering the deeper tissues, microorganisms can stimulate the body's immune response and result in inflammatory reactions such as redness, itching, etc.



This immune response and reaction could, complicate the healing process. NanoEx provides better conditions for wound healing by preventing the entry of microorganisms and reducing wound inflammation. Also, due to the structural and chemical similarities between NanoEx and the skin, it allows the exchange of chemicals and fluids and provides the necessary protection against microorganisms and external damages.

- **Angiogenic Properties**

Angiogenesis is one of the basic principles of wound healing, as it means supplying the wound with the necessary blood and nutritious elements. The materials used in the making of NanoEx have the ability to stimulate angiogenesis leading to the formation of blood vessels in the wound bed, which could result in faster regeneration of the skin and dermis.

- **Facilitates Cell Migration**

Facilitating the migration of cells from the healthy skin layers for the formation of granulation and epithelial tissues is one of the important issues that is usually ignored by other products. After stimulating the skin cells to divide and increase the cell population, suitable conditions must be provided for these cells to migrate easily; and regenerate the skin. With its unique anatomical structure, NanoEx facilitates the migration of divided cells and shortens the wound closing time.

- **Dermal Repair**

Healthy skin is composed of several layers (epider-

mis, dermis, etc.). Therefore, in clinical trials, the choice of treatment is determined based on the depth and severity of the wound, and the type of skin damage. The deeper areas of the skin require more healing time; and consequently, a more complicated healing process. Most wound dressings focus on epidermal regeneration (focusing on the superficial layer); while we know that in many wounds, along with epidermal damage, the dermis is also damaged. In addition to epidermal repair, NanoEx has the ability to reconstruct wounds with dermal damage.

- **Optimizing the Wound Bed Moisture**

In the last decade, the science of wound care has remarkably changed and evolved. One of such changes was the physician's attitude toward the moisture level of the wound bed. The previous attitude was the emphasis on reducing the moisture of the wound bed, an attitude which has changed today. NanoEx helps to maintain proper wound moisture by allowing the exchange of fluids.

- **Optimizing the Wound Bed PH**

In biology, homeostasis is the state of steady internal, physical, and chemical conditions maintained by living systems. All the organs and tissues of the body perform actions that help to maintain this state. For the healing of chronic wounds, one of the main factors to be considered is the maintenance of wound homeostasis and PH. Enzymes responsible to heal the chronic wounds are optimally active at alkaline (basic) PH. NanoEx is designed to provide a suitable PH so that enzymes such as Elastase, Collagenase,



etc., would remain inactive which would prevent entering the chronic phase and maintain their homeostatic steady state.

- **Multilayered and Helps the Slow Releases of Chemicals**

Wounds require constant attention and care. Due to the manufacturing techniques employed in the making of NanoEx, this product has a multilayered structure, which helps the slow and continuous release of chemicals and fluids. This dedicated feature results in a decrease in the number of dressing replacements.

- **Does not Require Removing the Dressing**

Removing dressings is always a challenge for both physicians and patients. For physicians, this process is time-consuming; and for patients, it is painful and invasive. Due to the unique production technology, and the first grade absorbent raw materials used in producing NanoEx, this product could be absorbed into the wound bed. Yet, at the same time, allow the exchange of different elements.

Adhesive and Covers the Wound Surface

NanoEx is tightly adhesive to the surface of wound and takes the shape of wound, and does not come off by movement. Another feature of NanoEx is that it is adhesive to the wound surface, which would yield the following benefits: It can help to protect the wound by blocking the entry of microorganisms and environmen-

tal contaminants, and most importantly, it does not come off when patients move.

- **Stimulates Wound Healing and Reduces the Number of Dressing Replacements**

NanoEx uses high quality, first grade materials that can stimulate wound healing. This could reduce the number of necessary replacements of the dressing, which would make it cost-effective. The administration period is 3 to 7 days.

- **Antibacterial Properties**

Wound infections are of great concern to both physicians and patients. Infections lead to the increase of foul-smelling wound drainage and, more importantly, to the enlargement of the wound area, which can complicate the healing process and spreading the infections in other part of body. The composite materials and the biochemical interactions of the fibers used in the making of NanoEx could serve as antimicrobial agents and can have significant effects on the level of exudate and odor caused by the infection.

Reduces Wound Exudates

Excessive wound drainage leads to the frequent replacement of the dressing. This will affect the mental state and the economic status of the patients. NanoEx dressings use composite materials that prevent biofilm formation and have the ability to significantly reduce wound exudates in a very short time.

