PRN® Pharmacal
8809 Ely Road
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WOUND CARE

COLLAGEN:
CHARACTERISTICS AND USES DURING THE WOUND HEALING PROCESS

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Bobcat head wound injury

How is Collagen used in the wound healing process?

The skin is the largest organ of the body and is noted for its complexity by containing sebaceous glands, blood vessels, sweat glands, sensory cells, nerves, epidermal cells and lastly, hair. The skin consists of two layers: the epidermis and the dermis. Partial thickness wounds are contained within the upper portion of the dermis (epidermis) and heal by regeneration. Full thickness wounds involve the loss of the epidermis, dermis and any underlying fatty tissue. This tissue heals by granulation, contraction and epithelialization (known as wound remodeling.)

Wound healing in well-nourished, healthy patients follow three predictable phases. Understanding them is important when it comes to providing the utmost care. This paper will discuss those wound healing phases in greater detail and collagen's role in each stage.

INTRODUCTION OF COLLAGEN:

Collagen products are used in medicine for many purposes, including wound dressings and as matrices for tissue growth. Collagen has many unique biological characteristics for which no synthetic substitute exists.

There are many physical, chemical, and biological properties of collagen that favor the use of collagen as a biomaterial. These include: high tensile strength, orientation of fibers, semi-permeability of membranes, low-antigenicity, its positive effect on wound healing rates and hemostatic properties.

Above: Following surgery to clean and debride the wound and remove necrotic tissue.

Left: 3 days after surgery and after start of Collasate® gel applications.

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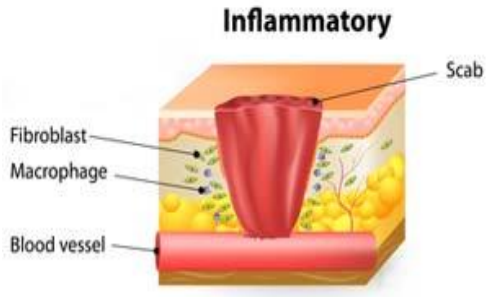
INFLAMMATORY PHASE

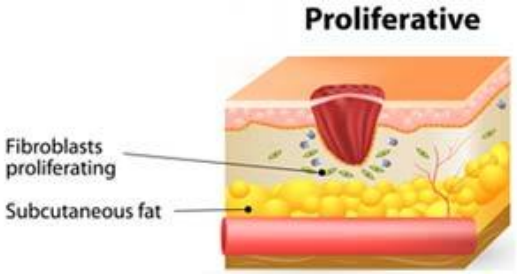
The inflammatory phase clinically manifests after injury/trauma and presents itself as erythema (tender bump), edema (swelling), pain and warmth, usually lasting about three days. Collagen provides a hemostatic function in working with the blood to form a natural blood clot formation. Collagen acts in a chemotactic role, providing the wound site with a proper environment conducive to healing by forming a protective barrier and "jump starting" the healing process.



PROLIFERATIVE PHASE

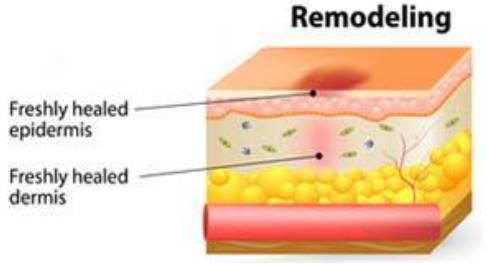
The proliferative phase provides for the formation of granulation tissue and the epithelialization process to begin. The granulation tissue is the bright, red, raised and thickened tissue in the wound bed. (Epithelialization is the process of epithelial cell migration from the wound's borders.) It has a very distinctive appearance; appearing as a thin, silvery layer of new epithelial cells circumscribing the zone of bright red granulation tissue and/or surrounding hair follicles or sweat ducts. Collagen provides the support needed for the growth of new capillaries and provides for increased fibroblastic activity during this phase. (As mentioned previously, collagen is chemotactic and this process is called chemotaxis.)

During this phase, the wound will begin to shrink and undergo wound contraction. This process is observed chemically as closure and is used to measure healing. Collagen has been shown to accelerate the rate of healing by forming a network that can support cell adhesion and tissue integrity.



MATURATION PHASE

The maturation phase (also known as the remodeling phase), is when the continuity of the skin surface and tissue strength has been established to meet normal activity levels. This is when strengthening and shrinking (by contraction) of the wound has taken place. Collagen and its remodeling process does play a key role in this phase by providing nutritive protein directly to the wound site, reducing scarring and providing an environment for tissue repair.



Source: Maynard, John, et al. How Wounds Heal: The 4 Main Phases of Wound Healing. December 18, 2015.

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Types of Collagen in the Wound Healing Process

There are three types of Collagen that are native to the body and to the wound healing process:

- Type I: The most abundant of all three collagen types. It is the dominant constituent, occupying more than 90% of the tissue and is the most commonly used collagen in the wound healing process. In addition to the skin, it can also be found in tendons, ligaments, bone, teeth and scar tissue.

- Type II: This type of collagen is the least abundant in the body and is used in the treatment of arthritis, cellulite and wrinkles. It has fibrils that are important for providing tensile strength to tissues.

- Type III: This is the second most abundant form of collagen in the body and is closely related to type I collagen in terms of location and manner of synthesis. It can be found in intestinal walls, muscles, blood vessels and other locations in conjunction with type I collagen.

Hydrolyzed Collagen

Hydrolyzed collagen is achieved through a highly controlled hydrolysis process to achieve an ideal weight/size.

Hydrolyzed collagen is defined as a collagen hydrolysate polypeptide derived by hydrolysis having a molecular weight of 1,000 to 10,000.

The primary benefit of the lower molecular weight – as compared to native, in tact collagen, is that it is immediately delivered to the body for use in wound healing. In tact collagen requires the body to first prepare the collagen for use – by way of the body's own process. And this can take up valuable time!

Collasate®

Collasate® products – offered by PRN® Pharmacal, provide veterinarians a suite of hydrolyzed collagen products to choose from to help enhance the wound healing process.

The formulations offered are:

- **Spray:** hydrolyzed collagen and Bitrex® to deter fur/wound licking; ideal for hard-to-reach wounds that make it difficult to bandage.
- **Gel**: hydrolyzed collagen that serves as a liquid-bandage; ideal for surgical wounds such as spay/neuter and declawing.
- **Silver Oxide Gel**: hydrolyzed collagen and silver oxide combination, ideal for non-surgical wounds such as burns, traumas or other injuries where there is an increased risk of infection.

For more information on collagen-based healing and Collasate® products, visit prnpharmacal.com/collasate

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