



# Examining Non-Hydrolyzed vs. Hydrolyzed Collagen in Wound Healing

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## **The Importance of Collagen in Wound Healing**

Collagen is the novel triple helix protein molecule that forms the vital fragment of the extracellular matrix (ECM). The ECM plays a major role in all phases of wound healing. There are various collagen technologies out in the advanced wound care market space. How do we know which product to choose?

The goal with collagen technology dressings are to reduce protease activity, while converting the wound to a healing state. Collagen advanced wound care dressings are proving to be a catalyst in wound chronicity by stimulating tissue growth, promoting autolysis, encourage angiogenesis, collagen deposition, and moving wounds towards re-epithelialization.

MMP modulating dressings or collagen technology dressings are ideal for chronic wounds by addressing elevated levels of matrix metalloproteinases (MMPs), which degrade both viable and non-viable collagen. As of today, we do not have a device to measure MMP levels in a wound bed. What we do know is that MMPs should be at the right amount, in the right place, and in the right time frame for a wound to move towards healing trajectory.

Approximately 70-80% of the ECM of skin is composed of collagen primarily types I and II. Collagen can be derived from any animal but is

mostly extracted from bovine, porcine, equine, Piscean, and avian. In its matrix structure, collagen becomes the template for new tissue growth and the primary structure continues to recruit fibroblasts to the site. As the healing process reaches the maturation phase, it is suggested that it enhances the deposition of oriented collagen fibers to increase the tensile strength of the new tissue.

### **Non-Hydrolyzed Collagen**

Non-Hydrolyzed collagen is collagen in its “purest form”. Non-hydrolyzed collagen retains significantly more native triple helical protein structure, therefore allowing superior stability of the molecule and scaffolding in wound healing. It is vital that collagen retains its triple helix shape to enhance thermal durability, mechanical strength, and ability to engage in precise interactions with other biomolecules.

When collagen molecules lose their triple helix shape by fragmentation, the role transitions into more of a renewed state by activating monocytes therefore creating more macrophages etc. Collagen particles or powders that are nonhydrolyzed may enable better scaffolding and cell migration for developing granulation tissue.

### **Hydrolyzed Collagen**

Hydrolyzed collagen’s main disadvantage is it cannot form scaffolds by itself due to low molecular weight of peptides but can be mixed with other copolymers such as cellulose and chitosan. It is “dead-protein”. This type of collagen is produced primarily from connective that is not bioavailable. The derived source must undergo hydrolysis, and aggressive chemical process, therefore is composed of amino acids that are ‘post-collagen’.

Hydrolyzed Collagen is broken down into its component amino acids, glycine, proline, and hydroxyproline, therefore, no longer retains its native triple helical structure or “purest form”. Hydrolyzed collagen fragment in

the form of particles or powder create more active sites in the wound bed to support binding of fibronectin and improved fibroblast activity.

### **Conclusion**

There are various Collagen technology dressings that have been shown to move chronic complex wounds towards the wound healing trajectory when used in conjunction with wound bed preparation, moist-wound healing, offloading/redistribution, and education. Healthcare professionals should take into consideration when selecting advanced wound care products, the quality, product properties, cost, and availability.

### **Source**

Brenner M, Albert P, Raminfar A. Collagen Treatment in the Diabetic Foot. *The Diabetic Foot*. 2019 November/December. *Podiatry Management*. <https://podiatrym.com/pdf/2019/11/Brenner1119Web.pdf> last accessed July 30, 2020.

Gibson DJ, Schultz GS. Molecular Wound Assessments: Matrix Metalloproteinases. *Adv Wound Care (New Rochelle)*. 2013;2(1):18-23. doi: 10.1089/wound.2011.0359

Chattopadhyay S, Raines RT. Review collagen-based biomaterials for wound healing. *Biopolymers*. 2014;101(8):821-833. doi: 10.1002/bip.22486 Xenogeneic extracellular matrix as a scaffold for tissue reconstruction.

Badylak SF *Transpl Immunol*. 2004 Apr; 12(3-4):367-77. Westgate, S., Cutting, K. F., Deluca, G., & Assad, K. (n.d.). Collagen dressings Made Easy (page 1 of 3) › Made Easy › Wounds UK. Retrieved March 26, 2018, from <http://www.wounds-uk.com/made-easy/collagen-dressings-made-easy>