COOK® MEDICAL

# Biodesign™

**SURGISIS® ADVANCED TISSUE REPAIR PRODUCTS**

## The Cross-Link Disconnect in Biologic Grafts

### Natural vs. chemical cross-linking

All biologic grafts are naturally cross-linked, but some are also chemically cross-linked during processing. Natural cross-linking, a common biological reaction joining two or more molecules by a covalent bond, occurs in the mammalian body as connective tissue forms, catalyzed by native enzymes. This process provides strength and makes biologic grafts formed from these tissues—such as Biodesign—effective in soft tissue repair *without* additional chemical cross-linking, a process used during the manufacture of some other grafts on the market.

The chemical cross-linking process, sometimes called tanning, mimics natural cross-linking by treating biologic grafts with harsh chemicals, making them resistant to degradation in vivo. However, controlled degradation of the graft is an important step in healing because it signals the surrounding tissue to repair the wound. When degradation is inhibited, cellular attraction is inhibited.[1] Additionally, chemical cross-linking alters the three-dimensional structure of the graft, inhibiting host cell infiltration.[2-4] See **Figure 1** below comparing non-cross-linked Biodesign with a cross-linked biologic graft.

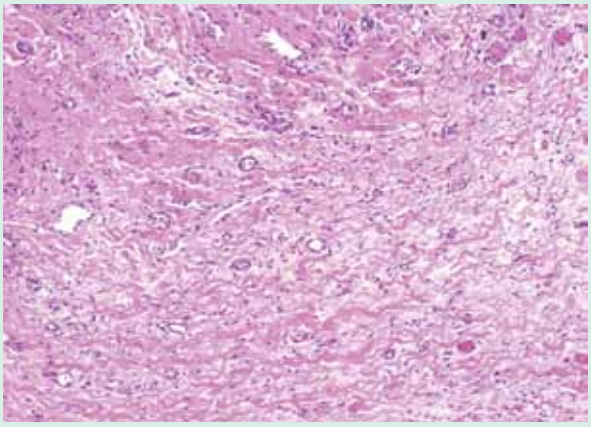
The chemicals used in the tanning process can also release cytotoxic residues[5], induce calcification of the graft[6] and cause the body to react as if the graft is foreign[2], provoking inflammation and encapsulation.[7]

### Chemically cross-linked grafts

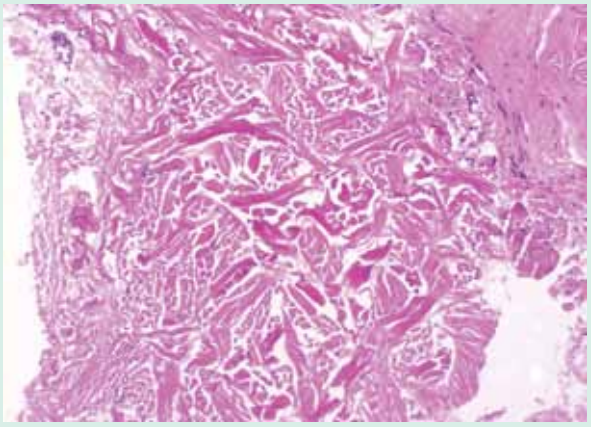
Some biologic grafts on the market, such as CollaMend®, Pelvicol® and Permacol®, are chemically

(continued on back)

Figure 1: Histologic comparison of the cellular infiltration of Biodesign vs. a cross-linked material (Pelvicol).



Biodesign at 8 months.



Cross-linked material (Pelvicol) at 26 months.



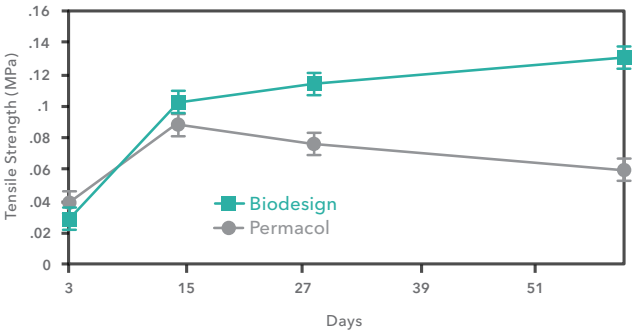
EVOLUTION OF TISSUE REPAIR

(continued from front)

cross-linked during processing. According to Covidien, its grafts are chemically cross-linked so that they have "the benefits of longevity and durability."[8] Published results support this outcome[2] but also demonstrate that this leads to detrimental results. Chemically cross-linked biologic grafts remain in the body like synthetic mesh—with the associated unwanted results.

Manufacturers might chemically cross-link biologic devices to decrease the immune response to foreign tissue. However, chemical cross-linking has been shown to result in chronic inflammation[9], encapsulation and even a host-versus-graft type of reaction.[2] Lastly, chemical cross-linking might be performed to increase the strength of the biologic device. Yet, a recent study has shown that cross-linked porcine dermis actually *decreases* in strength of incorporation after 2 weeks and beyond (see **Figure 2** below).[10]

Figure 2: Strength of Incorporation (SOI)




Strength of incorporation of explanted grafts. Days postimplantation versus tensile strength in megapascals (MPa). Error bars = SEM, N = 6.[10]

For more information about Biodesign, please contact your Cook Medical representative or visit **www.cookmedical.com/biodesign**.



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## Biodesign is not chemically cross-linked

Because it is not chemically cross-linked during the careful treatment process, Biodesign signals surrounding tissue to promote rapid and complete remodeling, supporting the damaged or infected tissue while the body restores itself. Biodesign grafts are not cytotoxic, are resistant to infection and encapsulation, and become strong, fully vascularized tissue that functions naturally. As shown in **Figure 2**, Biodesign grafts result in a repair that becomes stronger over time.

This revolutionary tissue repair technology is now available for use in many parts of the body. Biodesign has been distributed to 91 countries and used in more than one million patients. To date, more than 700 journal articles have been published about the technology on which Biodesign is based, including long-term data.[11] Biodesign is a breakthrough advancement in the evolution of tissue repair—a whole new category.

**References**


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